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Profiling and Quantification of Chemical Constituents in Leek (*Allium Porrum*) Cultivated in Cameron Highlands

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Structured Abstract

Background: Leek cultivars, belonging to the *Allium porrum* species, are widely utilized in various global cuisines due to their distinctive flavor and are a staple in diets worldwide. As a member of the *Amaryllidaceae* family and *Allium* genus, leeks share health benefits with other *Allium* species like onions and garlic, known for their rich of organosulfur compounds and bioflavonoids. This study focuses on profiling and quantifying the chemical constituents in leek cultivars using gas chromatography-mass spectrometry (GC-MS) and the evaluation of leek extract's antimicrobial activity against selected strains holds potential for the development of new antimicrobial agents or natural preservatives in light of rising antibiotic resistance.

Methods: Leek was extracted using a water-methanol (50:50) aqueous solution, followed by liquid-liquid partitioning with hexane, chloroform, and ethyl acetate. Each of extract subjected to GC-MS. The antimicrobial activity of extracts against Gram-positive bacteria (*Staphylococcus aureus*), Gram-negative bacteria (*Escherichia coli*), and a fungus (*Candida albicans*) was assessed using the agar well diffusion method by measuring diameter of growth inhibition zone.

Results: In the hexane extract, 66.2% consisted of saturated hydrocarbons, while unsaturated hydrocarbons made up 22.1%. The chloroform extract included 11.7% saturated hydrocarbons, 1-iodo-hexadecane (3.25%), 3-methylbutyraldehyde oxime (19.7%), 4-oxononanal (14.9%), trans-4-methylcyclohexanol (5.02%), fatty acids (8.32%), and organosulfur compounds (8.22%). Among these organosulfur compounds were dipropyl trisulfide, 3,4-dimethyl-2-(methyldisulfanyl) thiophene, and 2,4-dimethyl-thiophene. In the ethyl acetate extract, a semi-polar solvent, there was the presence of phenolic compounds (28.1%), fatty acids (5.19%), and phthalic acid, di-(2-propylpentyl) ester (2.30%). Additionally, there were residual amounts of saturated hydrocarbons (11.3%) and unsaturated hydrocarbons (32.3%). This extract also contained trans-4-methylcyclohexanol at 6.64% and 4-oxononanal at 5.29%. Notably, no sulfur-containing compounds were detected in the hexane and ethyl acetate extracts. The effects of environmental conditions, such as soil composition, pH and geographic location, influence the biosynthesis activities of plants. The hexane extract exhibits inhibition zone diameters against *S. aureus, E. coli,* and *C. albicans* of 12.00 mm, 12.67 mm and 28.00 mm, respectively. In contrast, the chloroform extract only demonstrates inhibition against *C. albicans* with an inhibition zone of 18.33 mm. The ethyl acetate extract displays inhibition zones only against *S. aureus* and *E. coli*, with inhibition zone diameters of 15.33 mm and 14.67 mm, respectively

Conclusion: Subsequent analysis involved profiling and quantifying identified chemical constituents, providing insights into the unique composition of leek. The investigation also explored the antimicrobial activity of leek extracts against selected microbial strains, aiming to establish therapeutic potential and compare efficacy with existing antimicrobial agents.

Keywords: Leek, *Allium porrum*, Antimicrobial, *Amaryllidaceae*

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