

GROWTH INHIBITION OF BASIDIOMYCETES BY *DIALIUM POLYANTHUM* EXTRACTS AND CHARACTERIZATION OF ACTIVE COMPOUNDS

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About this study:

Basidiomycete fungi are responsible for significant wood degradation and post-harvest losses in tropical regions[1]. The search for sustainable and bio-based antifungal solutions has intensified interest in plant-derived compounds[2–4]. *Dialium polyanthum*, a Fabaceae species widely used in traditional medicine, represents a promising source of bioactive metabolites. However, its antifungal potential, particularly against basidiomycetes, remains underexplored. This study aimed to evaluate the inhibitory effects of *D. polyanthum* extracts against four ecologically relevant fungi (*Trametes versicolor* (L.) Lloyd (CTB863A), *Pycnoporus sanguineus* (M.K Nobles South Africa) and *Stereum hirsutum* (Willdenow ex Fries) Fries, and one brown-rot species *Coniophora puteana* (Shumacher ex Fries) Karsten (BAM Ebw. 15.)) and identify bioactive metabolites using a feature-based molecular networking (FBMN) approach. Wood samples were sequentially extracted using solvents of increasing polarity (dichloromethane, acetone, ethanol–water, water) via ultrasound-assisted extraction. Extracts were chemically profiled through UHPLC–HRMS and analyzed by molecular networking (FBMN). Antifungal activities were assessed by mycelial growth inhibition assays. Principal Component Analysis (PCA) was employed to differentiate extracts based on chemical composition. The acetone and hydrophilic extracts (ethanol–water and water) exhibited pronounced antifungal activities, inhibiting fungal growth by 80–91%. PCA highlighted significant chemical variability linked to extraction solvents. Molecular networking facilitated the identification and prioritization of seven bioactive candidate compounds for isolation, specifically m/z 637.30, 454.34, 696.541, 837.5287, 344.09, 429.3723, 663.453, and 330.28. This study demonstrates the efficacy of *D. polyanthum* extracts as sources of potent antifungal metabolites, emphasizing solvent polarity's crucial role in bioactive compound recovery. Future investigations will target the isolation, structural elucidation, and bioactivity validation of these identified metabolites, paving the way for environmentally friendly, bio-based solutions to wood decay management in tropical regions.

Key words: extractables; *Dialium polyanthum*; bioactive compounds; metabolomics.

RESULTS

Antifungal tests

Among the basidiomycetes evaluated, the ethanol–water bark extract exhibited the most potent antifungal activity against *Pycnoporus sanguineus*, achieving an inhibition rate of 91.12% (Fig. 1).

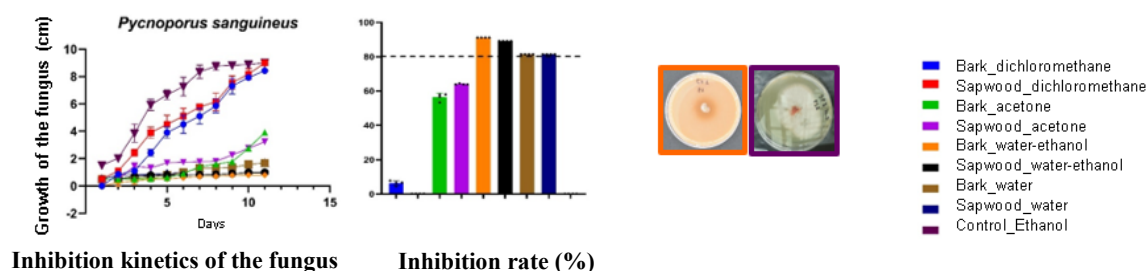


Figure 1: Antifungal effects (on *Pycnoporus sanguineus*) of extractable substances from *Dialium polyanthum*: comparison between the most active treated samples (left) and untreated controls (right).

Distribution of biocompounds

Principal Component Analysis (PCA) was performed to visualise structural and chemical variations among the different extracts (Fig. 2). Principal component analysis (PCA), as illustrated in the two plots, provides a clear overview of the distribution of extractable substances according to the solvent used, as well as the specific mass profiles within each extract.

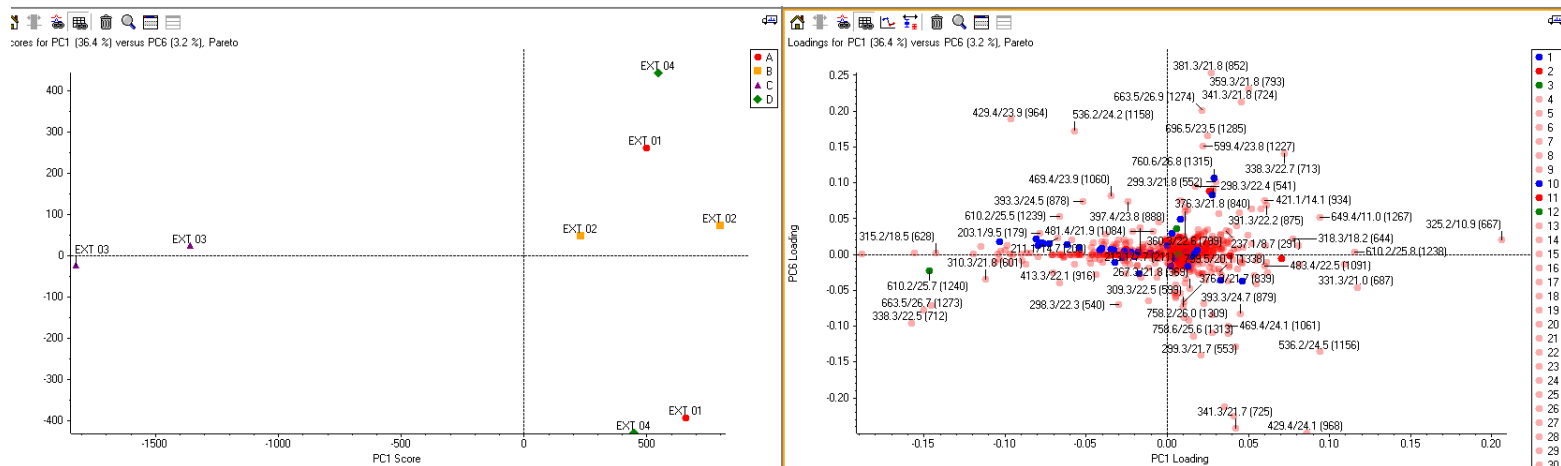


Figure 2: Distribution of compounds according to the extraction solvent. EXT_1: water; EXT2: acetone; EXT_3: ethanol–water; EXT_4: dichloromethane.

In the left-hand plot, the separation of extracts along the first two principal components (PC1: 36.4% and PC2: 3.2% of the total variance) highlights the marked influence of extraction solvents on chemical composition.

CONCLUSION:

This work demonstrates that *Dialium polyanthum* co-product extracts—especially acetone and ethanol–water fractions—strongly inhibit white-rot and brown-rot basidiomycetes (>80% growth reduction), underscoring the importance of solvent polarity in extracting antifungal metabolites. Metabolomic profiling combined with PCA and molecular networking distinguished the chemical signatures of each extract and prioritized seven high-abundance, solvent-specific compounds for targeted isolation. Ongoing efforts will isolate and structurally characterize these candidates, assess their antifungal potency via microplate assays, and evaluate toxicity and biodegradability. These findings pave the way for eco-friendly, plant-derived fungicides to protect tropical wood resources.

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