

A Novel Cytotoxic Compound From the Endolichenic Fungus, *Xylaria psidii* Inhabiting the Lichen, *Amandinea medusulina*

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Abstract

The lichen host, *Amandinea medusulina*, collected from mangrove habitats in Sri Lanka, and its associated endolichenic fungi were isolated and identified by rDNA-ITS sequence analysis and morphological features. One of the fungal strains frequently isolated from the lichen thalli was identified as *Xylaria psidii*. This study aimed at the isolation and identification of the cytotoxic compounds present in this fungus. Secondary metabolites of *X. psidii* were first extracted into ethyl acetate and subsequently subjected to bioassay-guided fractionation to isolate the bioactive compounds. Sulforhodamine B assay against a lung cancer (NCI-H292) cell line was used to determine the differential cytotoxic activity. Bioassay-guided fractionation led to the isolation of an active compound, SS/02/29/08, showing moderate cytotoxicity (IC₅₀ = 27.2 µg/mL). Its structure was elucidated by IR, 1D- and 2D-NMR, and ¹³C-NMR spectrophotometry and MS, in combination with HRMS, ¹³C NMR, HSQC, HMBC, and DQF-COSY. The structure of SS/02/29/08 was determined as (*Z*)-3-[(3-acetyl-2-hydroxyphenyl)diazonyl]-2,4-dihydroxybenzaldehyde and identified as a new compound. This novel compound has promising differential cytotoxic activity against human lung cancer cell line (NCI-H292).

Keywords

endolichenic fungi, *Xylaria psidii*, *Amandinea medusulina*, anticancer activity, lung cancer, bioactivity

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Cancer is one of the leading causes of death worldwide. Chemotherapy has been the choice for cancer treatment for many years, but this can also affect normal cells and create many undesirable side effects and has the potential to develop resistance. Therefore, alternative medicines of natural origin are gaining attention in cancer research. Among them, fungal metabolites have gained much attention in the scientific community as a source of novel bioactive compounds. Endolichenic fungi are a diverse group predominantly inhabiting asymptotically in the interior of lichen thalli. These fungi produce a broad spectrum of secondary metabolites for their survival in order to overcome their local challenges. Since the first report of metabolites of an endolichenic fungus,¹ 176 compounds have been isolated, of which 104 were identified as new compounds²; several of these with antioxidant and antibacterial properties have been reported.³ Kannangara et al⁴ isolated several endolichenic fungal strains with antifungal properties from lichens found in Hakgala montane forest in Sri Lanka. Five novel bioactive polyketides with antioxidant properties have been isolated and

characterized from the endolichenic fungi, *Curvularia trifolii* and *Penicillium citrinum*⁵⁻⁷ from Sri Lanka. Most of these secondary metabolites from endolichenic fungi have shown remarkable cytotoxic activities against cancer cell lines. Gao et al² presented a comprehensive review on cytotoxic compounds discovered from endolichenic fungi, but no such

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