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## Original Research Article

# Comparative antimicrobial activity of South East Asian plants used in Bornean folkloric medicine



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## ABSTRACT

Experimental assays were carried out to validate traditional claims about medicinal plants collected by the Traditional Knowledge Documentation Program at the Sarawak Biodiversity Centre on the island of Borneo. The majority of the medicinal plants are utilised as traditional therapies for various diseases, including diarrhoea, food poisoning, vaginomycosis, sexually transmitted infections (gonorrhoea) and furunculosis.

Six medicinal plants used as indigenous herbal medicines were individually screened for antimicrobial and antifungal effects using their crude extracts and were found to inhibit a broad range of pathogenic microorganisms. Plant extracts derived from *Fibraurea tinctoria*, *Polyalthia hookeriana*, *Pyrenaria* sp., *Baccaurea lanceolata*, *Goniothalamus tapisoides* and *Goniothalamus velutinus* were demonstrated to have the highest antimicrobial activities. *Pyrenaria* sp. showed significant antifungal activity against *Candida albicans* with minimum inhibitory and minimum fungicidal concentrations of 25 µg/mL and 50 µg/mL, respectively. The evidence in this study has highlighted the effectiveness of using the traditional knowledge approach to screen for antimicrobial and antifungal activity in plants to evaluate their potential as herbal remedies for human and animal protection against pathogens.

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## 1. Introduction

### 1.1. Significance of natural plants as medicines

Bacterial infections are among the most debilitating illnesses that affect humans and animals. The alarming spread of drug-resistant bacteria and limited access to anti-infective drugs in

some populations emphasizes the importance of discovering new antimicrobial compounds (Abdullah et al., 2013). Plants have been the main source of medicine since ancient times and 70% of the worldwide population still relies on some form of traditional medicine (Hamdan and Afifi, 2004). Generally, the practice of herbal medicine is most widespread in developing countries and is often more affordable than expensive modern pharmaceutical drugs. It has been revealed that 80%

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**Fig. 1 – Map of Borneo where the insert shows its regional location.**

Modified from [http://upload.wikimedia.org/wikipedia/commons/9/9d/Borneo2\\_map\\_english\\_names.svg](http://upload.wikimedia.org/wikipedia/commons/9/9d/Borneo2_map_english_names.svg).

of the population in African and Asian countries are still using herbal medicines as their main medicinal source for their well-being (Bodeker et al., 2005).

Herbal extracts are effective medicines that have usually originated in indigenous communities, with their side effects being continuously monitored over many centuries by experiential knowledge (Cars et al., 2011). However, in most cases there have been no systematic scientific analyses of these medicines to establish their mode of action, efficacy or active components. This study focuses on quantifying the antimicrobial and antifungal activities of selected plant extracts based on the knowledge of their usage by the indigenous people of Sarawak in Borneo.

### 1.2. Borneo and its rainforests

Borneo is one of the largest islands in the Asia-Pacific region and is positioned south-east of the Malay Peninsula. Fig. 1 shows a map of the island, which is surrounded by the South

China Sea (north-west), Sulu Sea (north-east), Celebes seas (east), Makassar Strait (south-east) and the Java Sea (south) (Nagarajan et al., 2013). It is divided between three different sovereign countries, which are Brunei, Indonesia and Malaysia. The largest part of the island belongs to Indonesia and is formally known as Kalimantan. Sarawak and Sabah are situated on the coastal line of the island (north to north-west) and were amalgamated with the Malaysian Federation in 1990. The indigenous peoples of Sarawak make up approximately 50% of the population, with the majority emanating from the ethnic group Iban. The Bidayuh inhabit the hinterland region of south-west Sarawak, the Kelabit live in the highlands of north-east Sarawak near the Indonesian border and the Kayan inhabit the far north region (Thiessen, 2012).

Borneo has unique wildlife and rainforests, and it has been suggested that the Bornean rainforest is the most biodiverse forest on the planet with an extensive variety of plants (Thiessen, 2012). The combination of biodiversity and indigenous populations has given rise to a pool of traditional

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