

**CYTOTOXIC, ANTI-MICROBIAL AND ANTIOXIDANT ACTIVITY-GUIDED
FRACTIONATION FROM *Garcinia nervosa***



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5. Report

5.1 Proposed Executive Summary

There are several local Malaysian *Garcinia* species which have ethnobotanical uses but so far little studies have been carried out to link these folkloric uses with the phytochemistry of these plant species. It would be interesting therefore, to develop a phytochemical data of one such Sarawakian species which is *Garcinia nervosa*, a species not reported before.

Some species of *Garcinia* have been shown to possess interesting biological activities such as cytotoxic, antibacterial, antioxidant and anti-cancer activities. Leaves and stem bark samples of *Garcinia nervosa* will be extracted and purified using standard protocols which involves the conventional extraction technique such as chromatographic methods. Analyses for structural elucidations of pure bioactive compounds will involve the usual spectroscopic techniques such as NMR, FTIR, UV and MS.

The isolation and identifications of these natural products will lead us to establish a profile of chemical and biological activities of the extract for standardization and product development. The outcome of this project is a document of medicinal plants rich in active compounds for further investigation for potential in drug development

5.3 Introduction

Tropical plants are beneficial and can be manipulated for therapeutic purpose due to the high content of rich biological active compounds. *Garcinia* is one of those plant. *Garcinia* genus belongs to the family *Clusiaceae*, consists of a large genus of trees or shrubs, native to the "Old World" which are Asia, Australia, tropical and southern Africa and Polynesia. This genus is represented by approximately 200 species, some of which are known for their edible fruits. They are also used in traditional medicine or for other ethnobotanical uses such pigments from resins, gums, waxes, fuel and timber (Hemshekhar et al. 2011).

Garcinia species are used traditionally for the treatment of abdominal pain, infected wound, dysentery, diarrhoea, suppuration, leucorrhoea and chronic ulcer and gonorrhoea (Jayaprakasha, Negi, & Jena 2006). Although there were a number of studies been conducted on the different *Garcinia* species from various places however, there are no intensive studies and proper modern analysis of medicinal properties reported on *Garcinia nervosa* from Sarawak. Our very own *Garcinia nervosa* may serve as a potential source of the bioactive compounds as like the other *Garcinia* species. Thus, it would be an interesting study on this species of indigenous tropical plant of Sarawak in order to develop a new chemical profile not only for the purpose of expanding knowledge but also as an alternative for medicinal purpose to cure diseases.

The objectives of the research are:

- i) To isolate the chemical constituents from the leaves and stem barks extracts of *Garcinia nervosa*
- ii) To identify and elucidate structure of the isolated pure compounds
- iii) To determine the cytotoxicity, antimicrobial, anti-inflammatory and antioxidant activities of the crude extracts.

5.4 Brief Literature Review

Previous studies done on the isolation for various species of *Garcinia* family have successfully isolated flavonoids, biflavonoids, chalcones, isoflavones, xanthones, benzaphenones, anthocyanins and mangostin. These metabolites have also exhibited interesting biological activities such as cytotoxic, antibacterial, antioxidant and anti-cancer.

Garcinia is anti-inflammatory and anti-immunosuppressive (Gopalakrishnan, Banumathi & Suresh 1997). In addition, *Garcinia* has antitumor and antioxidant abilities (Williams et al. 1995). It was also reported that the bioactive substances that found in *Garcinia* showed anti-inflammatory effects (Lih, Ling & Ching 2008). *Garcinia* species are rich sources of mangostin, tannin, xanthone, isoflavone, flavones and other bioactive substances (Deachathai et al. 2005; Jung et al. 2006). Xanthones isolated from the pericarp of *Garcinia mangostana* (Mangosteen) were exhibited positive antioxidant activity (Jung et al. 2006). Previous studies on the compounds isolated from *G. xipshuanbannaensis* (Han et al. 2008), *Garcinia atroviridis* (Permana et al. 2001), *G. cantleyana* (Shadid et al. 2007) , *G. rigida* (Elya et al. 2008), *G. penangiana* (Jabit et al. 2007) and *G. Cochinchinensi* (Heip et al. 2001) exhibited significant cytotoxic activity against various three human cancer cell lines.

It is proven by extensive research that some bio-compounds from *Garcinia* species exhibited a wide range of biological and pharmacological activities such as cytotoxicity and antioxidant abilities.