Effect of different solvents extraction on recovery of pigments in *Xylocarpus granatum*, endangered medicinal plant

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*Xylocarpus granatum* is locally known as Pokok Nyireh Bunga. This endangered mangrove species has economical importance. Pigments of *X. granatum* were investigated in the mature leaves of seedlings collected from Carey Island, Selangor, Malaysia. The pigments were solvent extracted using 80% methanol, 80% acetone, 80% *N*,*N*-dimethylformamide and 100% hexane. As recommended by Bertrand and Schoefs,¹ all the extraction steps were performed under weak light intensity to avoid photosynthetic pigment degradation. The pigments were detected by ultraviolet–visible spectroscopy and thin layer chromatography. Aqueous acetone was the best solvent for pigment extraction compared to methanol, *N*,*N*-dimethylformamide and hexane.

Keywords: Mangrove, Chlorophyll, UV–Vis spectroscopy, Thin layer chromatography

Introduction

*Xylocarpus granatum*, commonly known as ‘Pokok Nyireh Bunga’ in Malaysia, is native to the tropical mangrove forests of Africa, Australia, Malaysia and India. *X. granatum* is an endangered mangrove plant and is economically important for wood carvings, furniture and interior construction. It has been helpful for the natural ecosystem and is exploited by both internal and external agents. The internal forces, such as utilisation of the mangroves by fishermen for timber, fuel, fodder and medicine, have been in practice for a long time, even before the systematic identification of these taxa. In Carey Island, this is an essential wood and has importance for the Mah Meri indigenous people, whose evocative carvings are one of the major aspects of their culture.²

*X. granatum* is a traditional medicinal plant, with reported use as astringent, antiparasitic and antidiarrhoeal preparation.³ Recent studies have shown that stem bark extracts are effective in the treatment of diarrhoea in mice.⁴ The stem bark extracts of this evergreen mangrove have been found to contain high amounts of procyanidins and catechins and have been observed to have effect against Gram positive bacteria.⁵–⁷ In China, one novel tetranortriterpenoid derivative (xylocarpoloid A) was isolated from the seeds of *X. granatum*.⁸ Moreover, the *X. granatum* fruit constituents, gedunin and photogedunin, have been shown to possess a significant antisecretory effect on peptic ulcers.⁹

Pigments are classified into different groups, such as tetrapyrroles (e.g. chlorophylls), carotenoids (e.g. β-carotene), polyphenolics (e.g. anthocyanin) and alkaloids (e.g. betalains). Chlorophylls and carotenoids are hydrophobic compounds and can be extracted from single or mixed organic solvents.¹⁰ Natural colourants have become increasingly popular with consumers because synthetic colourants are frequently perceived as undesirable or harmful.¹¹,¹²

In this study, the pigments of *X. granatum* were extracted by different organic solvents. Major compounds like chlorophylls and carotenoids were very commonly present in the plant. These pigments have been shown to play crucial roles in photosynthesis. Additionally, other compounds, such as carotenes and xanthophylls, provide a protective mechanism for plant growth under saline stress conditions.¹³

Experimental

Plant collection

*X. granatum* seeds and propagules (Fig. 1) were collected from the mangrove forest of Carey Island, Selangor, Malaysia. The seedlings were maintained in the garden of the Institute of Biological Sciences, University of Malaya, Kuala Lumpur, Malaysia. Six-month-old to 1-year-old seedlings were used in this experiment.

Solvent extraction

Healthy, mature leaves were collected for pigment extraction. Two grams of leaves (the midrib and large veins of the leaves were discarded) was solvent extracted