

UNIVERSITI TEKNOLOGI MARA

**PRESSURISED HOT WATER EXTRACTION
(PHWE) OF NATURAL COLORANTS FROM THE
HEARTWOOD OF *XYLOCARPUS MOLUCCENSIS*
AND ITS DYEING CHARACTERISTICS ON
DIFFERENT FABRICS**

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of the requirements for the degree of
Master of Science

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and the result is of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree qualification.

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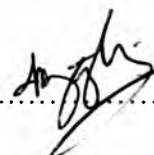
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ABSTRACT

A remarkable growth of public awareness towards environmental pollution caused by the synthetic dyes resulted in an increased demand of natural dyes which led to the exploration of potential plants as source for natural dyes. Traditionally, natural dyes were extracted by soaking or boiling method which requires long extraction time and plenty of water. Hence, there is a demand to exploit suitable efficient techniques to extract natural dyes from the plant materials. One of the potential plants is *Xylocarpus moluccensis* (Nyireh batu) species which can be found in mangroves forest around Peninsular Malaysia. In this study, a pressurised hot water extraction (PHWE) technique was employed to selectively extract natural dyes from the *Xylocarpus moluccensis* heartwood at different elevated temperature from 50 °C to 150 °C. This technique is more efficient and environmental friendly method and may increase productivity of natural dyes for dyeing fabrics. The dye extracts were then used to dye fabrics such as cotton, silk and viscose rayon with the addition of 3% mordant such as paddy husk ash (PHA), vinegar and alum. Each of dyed fabrics was analysed to determine its dyeability and dyeing properties. Based on the experiment, colour attained (h°) on cotton and viscose rayon was varied from 3° to 48° and 6° to 48° respectively. However, the h° of silk fabrics ranges between 40° to 48° (brownish colour). PHA and vinegar were observed to give high colour intensity (C^*) and colour strength (K/S) to dyed silk compared to alum. In contrast, cotton and viscose rayon had better colour strength (K/S) and colour intensity (C^*) when mordanted with alum compared to natural mordant. Based on colour fastness test, viscose rayon had the best colour fastness to washing and perspiration compared to cotton and silk although the K/S and the C^* were low. The colorant compounds were extracted by soaking with methanol and dichloromethane followed by purification on a polyamide solid phase extraction cartridge prior to gas chromatography mass spectrometry (GC-MS) and Fourier Transform Infra Red (FT-IR) spectroscopy analysis. It was found that, the heartwood extracts contained mainly quinoline and anthraquinone moieties in their molecules.

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