

UNIVERSITI TEKNOLOGI MARA

**CHEMICAL CONSTITUENTS AND BIOLOGICAL
ACTIVITIES OF BARK AND FLOWERS OF
*CASSIA ALATA***

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ABSTRACT

Cassia alata L. (Gelombang besar), commonly known as “seven golden candlesticks” is a shrub belonging to the family Leguminosae. Medicinal values of all plant parts have been reported. *C. alata* is a well-known remedy for ringworm and other related parasitical skin diseases such as purities, eczema, itching and scabies. A chemical study was done on the constituents of the dried barks and flowers of *C. alata*. The crude extracts were obtained by soaking the plant parts in dichloromethane followed by methanol. Isolation work was carried out using extensive chromatographic procedures. Torachryson and three anthraquinones, known as chrysophanol, physcion, and emodin, along with mixture of sterols were isolated from the barks. Meanwhile, aloe-emodin, and rhein were isolated from flowers. Structures of all compounds were established based on spectral studies using ultraviolet-visible spectroscopy, infrared spectroscopy, one and two dimensional nuclear magnetic resonance spectra, and mass spectroscopy. In addition structure of torachryson was also confirmed through crystallographic studies. The various plant parts that are leaf, bark, flower, and pod were also screened for potential biological activities. Bioassays conducted were antioxidant, radical scavenging (DDPH), total phenolic content (TPC), antimicrobial, and antimalaria assay.

In the ferric thiocyanate method (FTC) all extracts showed strong antioxidant activity comparable to Vitamin E with the exception of methanol bark extract. The radical scavenging activity of the dichloromethane flower extract was strong with 80% inhibition at 250 µg/ml dosage. The dichloromethane bark extract exhibited moderate radical scavenging activity at the same dosage. Total phenolic content which was measured as pyrocatechol equivalent of all crude extracts were found to be low. In antimicrobial assay, extracts from all parts including flower extract affected *Burkholderia cepacia*, *Staphylococcus aureus* and *S. epidermidis* with inhibition zone ranging from 9 to 14 mm. Antimicrobial activity against fungi were notably low (less than 9 mm inhibition zone diameter). The minimum inhibitory concentration (MIC)

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CHAPTER 1

MEDICINAL PLANTS AND PHYTOCHEMISTRY

1.1 Introduction

For centuries, human have relied heavily on plants for food, medicines, timber, and raw material for manufacturing clothing, dyes and pigments. In the review of plants for healing by Raskin *et al.* (2002), plants have been the main source of medication, used for treating various illnesses and ailments, dating back at least 5000 years ago, based on the Sumerian records. Also, in the review by Hostettmann and Hamburger (1991), contribution of plants to medicine has been documented by early civilizations in China, India, and the Near East for the past thousand years. Since these times, the use of plants to cure and prevent diseases has been passed on from generation to generation until today. In the review by Alan Harvey (2000), 60% of the world's population recognizes plants and natural products as important source of therapeutic agents.

Many plants growing in tropical forest have been reported to have medicinal values. Soepadmo (1999), estimated that in the Southeast Asian region, 6000 species of plants have medicinal use and from this number, about 1000 species have been reported to grow in Peninsula Malaysia (Burkill, 1966). However, many of these plants have not been investigated phytochemically for their secondary metabolites. Table 1.1 lists some examples of the families from Malaysia that have large number of plant species, which have great potential for chemical studies.