

CHAPTER
6
THERAPEUTICS AND THE
BIOACTIVITY OF MAHKOTA
DEWA

*Lugman Chuah Abdullah, Adawiah Ismail,
Nor Fariza Ismail, and Pin Kar Yong*

6.1 INTRODUCTION TO HERBS

Malaysia is home to lush tropical rainforests abundant with thousands of plant species. It is about 2,000 species of medicinal plants or herbaceous plants have been recorded as safe plant material for valuable products or even for basic health care. They have long been used in traditional medicine and are becoming breakthroughs in modern medical specialties nowadays. The World Health Organization (WHO) reported that 80% of the world's population depends on herbal medicines in their primary health care. Old folks may find knowledge on nutritional herbs through observation of the effect of the plant is ingested by animals. Some plants may also be found intentionally or unintentionally through experience from their ancestor teaching. Sometimes, characteristics like body reflection, plant color, and smell can help to determine whether an herb can be used for medical purposes.

Among the well-known herbs in Malaysia are tongkat ali, kacip fatimah, misai kucing, hempedu bumi, dukung anak, mas cotek, pegaga, mengkudu, halia, and roselle. Besides being a source of traditional medicine, the herbs have the potential for producing fine chemicals or extracts containing active ingredients. The phenomenon of increasing interest in the natural product remedies has proven that people are aware of the side effects caused by synthetic drugs, the rising cost of health care and the failure of mainstream medicine in treating certain diseases. This chapter describes the application of mahkota dewa which is also known as *Phaleria macrocarpa* scientifically (Figure 6.1). This is a popular medicinal herb originating from South Asia and is also commonly planted as an ornamental. It is called as *makuto ratu* in Java, mahkota dewa in Malay and crown of god in English. The fruits and leaves of this plant are commonly used in treatment, meanwhile its seeds are toxic and usually used as an insecticide or skin problem treatment. It has also been used in traditional folk medicine from Indonesia to treat cancer, diabetes, common cold, viral infections, allergy problem, asthma, cardiovascular, high blood pressure, acne and insect bites. Recent scientific studies further proved the significant pharmacological properties to control cancer and exhibit antioxidant activity, as well as to reduce the symptoms of diabetes mellitus, rheumatism, high blood pressure, and acne (Zhang et al., 2012).

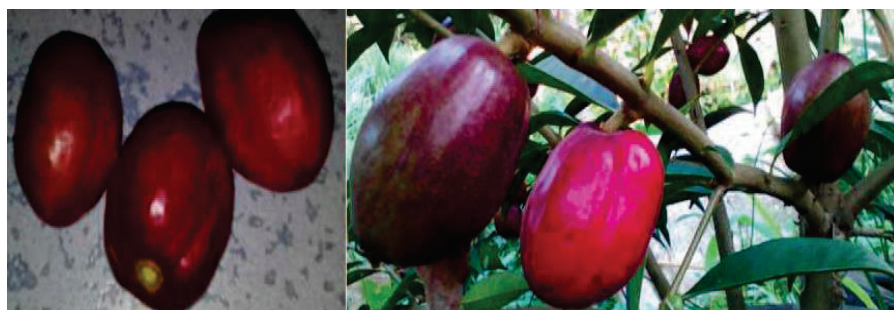


Figure 6.1 Mahkota dewa (*Phaleria macrocarpa*) fruit

The tree can grow to three meters in height. It has woody stems with rough skin surface and brown with the branch direction of upward sloping. It blooms throughout the year. Its fruit is in eclipse shape with a diameter around 3–5 cm. It is green when young and turn to red when ripe. Its flesh is fibrous, and watery, while its seeds are round, hard, and brown. The plants grow to a height between 10–1200m and can be propagated by seeds.

6.2 PHYTOCHEMICALS AND THEIR PROPERTIES

Owing to its multipurpose usages, mahkota dewa has triggered the increasing interest of researchers to investigate the science behind the traditional practice. Flavonoids have been found in the stem, bark, leaves, fruits and flowers of the plant. The detected glycosylated phenolics include phalerin, mahkoside A, mangiferin, and kaempferol-3-O- β -D-glucoside (Mae et al., 2005). Its fruit contains alkaloid, flavonoid, saponin, and polyphenol which have been proven for their antioxidant properties. Previous studies reported the discovery of lignins such as pinoresinol, lariciresinol, matairesinol, syringaresinol (lirioresinol B) and macronone with high antioxidant properties from the bark of the plant (Susilawati et al., 2012). Benzophenones such as 2,6,4'-trihydroxy-4-methoxy-benzo phenone and 6,4'-dihydroxy-4-methoxy-benzophenone-2-O- β -D-glucopyranoside, and triterpenoids such as 24-methylene cycloartan-3-one and 24-methyl-9,19-cyclolanost-25-en-3-ol were also identified in the study of Singh et al., (2014).

Phalerin or chemically known as 3,4,5-trihydroxy-4'-methoxy-benzo phenone-3-O- β -D-glucoside is a major flavonoid found in mahkota dewa. Its chemical structure is composed of two benzene rings and one sugar moiety as shown in Figure 6.2(a). It has been detected in fruit, leaves and bark of the plant. Previous studies revealed its anticancer potential of the plant. It showed cytotoxicity against myeloma cell line (Mae et al., 2005).

Mangiferin (1,3,6,7-tetrahydroxy-2-[3,4,5-trihydroxy-6-(hydroxymethyl)oxan-2-yl]xanthen-9-one) is a naturally occurring xanthone