

CHAPTER 7 EXTRACTION FOR HEMPEDU BUMI

Chua Lee Suan, Nur Zulaika Ab Malik, and Zuhaili Idham

7.1 HEMPEDU BUMI

Natural products have been used for centuries in traditional medicine due to their potential therapeutic benefits and minimal side effects. One of the widely accepted natural products is from herbal plants with remarkable medicinal values. Hempedu bumi or scientifically known as *Andrographis paniculata* is a well-known herbaceous plant in the Acanthaceae family, and this herb is commonly referred to “King of Bitter” in Malaysia. It is a native plant of Southeast Asia, China, and India, thriving mostly in moist and shaded habitats. It can grow up to the height of 30 cm to 110 cm (12 inches to 43 inches). This annual herb also exhibits a remarkable ability to reproduce and lead to its categorization as a weed across various tropical and subtropical regions.

Hempedu bumi is commonly found in the wastelands and grasslands. In Malaysia, this herb can be found in the backyard of gardens, pots, or purposely cultivated for medicinal purposes. Its resilience is evident from its capacity to thrive and adapt to diverse soil conditions. The physical characteristics of the plant encompass an erect stature with quadrangular and branching stems. Its leaves can be distinguished by their green hue and possess a simple, glabrous surface, arranged in a decussate pattern with entire margins. These lanceolate-shaped leaves exhibit an acuminate apex

and an attenuated base. Figure 7.1 is the picture of hempedu bumi bearing some flowers and seed pods.



Figure 7.1 Herbal plant of hempedu bumi bearing some flowers and seed pops

The herb has a long history of usage in Ayurvedic formulation, particularly in the treatment of fever, torpid liver, and vitiligo, thus making it a vital component in various traditional and homeopathic medicinal systems. It is bestowed with the properties of analgesic, laxative, expectorant, and stomachic effects. Its applications extend to treating conditions like diabetes, fever, worm infections, chronic bronchitis, leprosy, flatulence, colic, dysentery, and various skin afflictions, including burns, wounds, and ulcers (Okhwarobo et al., 2014). A decoction of the aerial parts is used to treat the common cold, hypertension, diabetes, cancer, malaria, and snakebite in Malaysia. Herbs, though it has been utilized in various curative applications in countries like China, India, and Java since ancient times, the full potential of the herb is getting unveiled, capturing the attention of the herbal and pharmaceutical markets recently. It has been recognized as a promising herbal remedy, particularly during the height of the COVID-19 pandemic. It is extensively explored for its potential in

addressing a wide array of ailments, including intricate conditions such as HIV/AIDS and the diverse symptoms associated with autoimmune disorders. Scientific evidence has confirmed that the therapeutic benefits of the herb are mainly due to its phytochemical content, especially terpenoids.

7.2 TERPENOIDS FROM HEMPEDU BUMI

A noteworthy part of *hempedu bumi* is its chemical composition, mostly composed of terpenoids, which contribute to its diverse range of medicinal properties. Terpenoids, or isoprenoids, a class of naturally occurring compounds found in plants, are oxygenated terpenes, or hydrocarbons made up of isoprene unit(s). Therefore, they can be classified into monoterpene, sesquiterpene, diterpene, triterpene, and so forth as presented in Figure 7.2. They also play a significant role in giving aroma, flavor, and therapeutic effects to plants. The unique terpenoids in *hempedu bumi* contribute to bitterness, which is reflected in its common name as “King of Bitter”. This bitterness is often associated with many traditional herbal remedies, signifying its potency in the traditional medicine system.

Hempedu bumi has gained increasing attention from researchers and scientists, primarily due to its terpenoids such as andrographolide, neoandrographolide, and other related diterpenoids. Andrographolide has been known as the marker compound of the herb (Figure 7.3). This labdane diterpenoid is present mostly in the leaves of the herb, and it possesses a wide range of biological activities such as antioxidant, anti-inflammatory, neuroprotective, and anti-cancer properties (Lim et al., 2012; Wu et al., 2004). Previous scientific studies recorded that andrographolide possessed multiple pharmacological properties, particularly anti-inflammatory, immune-stimulatory, antiviral, antimicrobial, anti-platelet aggregation, and hepatoprotective effects (Hossain et al., 2014).