



UNIVERSITI PUTRA MALAYSIA

**EFFECT OF HARVESTING STAGE ON PLANT GROWTH
CHARACTERISTIC OF *Andrographis paniculata***

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By

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A project report submitted to the Faculty of Agriculture
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in fulfillment of the requirement of PRT4999 (Final Year Project)
for the award of the degree of
Bachelor of Horticultural Science

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CERTIFICATION

This study report entitled “EFFECT OF HARVESTING STAGE ON PLANT GROWTH CHARACTERISTIC OF *Andrographis paniculata*” is prepared by Nur Amiraa Binti Azis and submitted to the Faculty of Agriculture in fulfillment of the requirement of PRT4999 (Final Year Project) for the award of the degree of Bachelor of Horticultural Science.

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LIST OF ABBREVIATIONS

% Percentage

cm Centimeter

m Meter

°C Degree Celcius

± Plus minus

ANOVA Analysis of Variance

kg Kilogram

mg/kg Milligram per kilogram

ton/ha Tonnes per hectare

g Gram

N/ha Nitrogen per hectare

mm Millimeter

ABSTRACT

Hempedu bumi (*Andrographis paniculata*) is widely used in traditional medicine and is one of the local medicinal herbs identified increasing in medical world. The information on the optimum harvesting stage of *A. paniculata* for optimum plant growth characteristics and biomass yield for commercial production is still lacking. *A. paniculata* was planted at Vegetable Unit, Universiti Putra Malaysia. This experiment was conducted to determine the effects of harvest time on plant growth characteristics of *A. paniculata*. The plant was harvested at 7, 8, 9 and 10 weeks after transplanting. The experiment was conducted in a randomized complete block design (RCBD) with four replications. After harvest, the plants were taken to the Postharvest Laboratory, Department of Crop Science, Faculty of Agriculture, Universiti Putra Malaysia for further analysis. The parameters that were evaluated throughout this experiment were plant height, plant canopy diameter, chlorophyll content, leaf area, and fresh and dry weight of aerial yield plant part, leaves and stem.

ABSTRAK

Hempedu bumi (*Andrographis paniculata*) digunakan secara meluas dalam perubatan tradisional dan merupakan salah satu perubatan herba yang dikenalpasti semakin meningkat dalam dunia perubatan. Maklumat mengenai peringkat penuaian *A. paniculata* yang optimum iaitu dari segi ciri-ciri pertumbuhan tanaman yang sesuai dan hasil biomas untuk pengeluaran komersial adalah masih kurang. Hempedu bumi telah ditanam di Unit Sayur, Universiti Putra Malaysia. Ekperimen telah dijalankan untuk menentukan kesan masa penuaian ke atas ciri-ciri pertumbuhan tanaman *A. paniculata*. Tanaman telah dituai pada minggu 7, 8, 9 dan 10 selepas pemindahan anak pokok. Ekperimen ini dijalankan dalam reka bentuk blok rawak lengkap (RCBD) dengan empat replikasi. Selepas dituai, tanaman di bawa ke Makmal Lepas Tuai, Jabatan Sains Tanaman, Fakulti Pertanian, Universiti Putra Malaysia untuk dianalisis. Parameter yang dinilai sepanjang eksperimen ini ialah ketinggian pokok, garis pusat kanopi tanaman, kandungan klorofil, luas daun, berat segar dan kering daun dan batang.

CHAPTER 1

INTRODUCTION

A. paniculata is a herbaceous plant that belongs to Acanthaceae family and has been cultivated for its medicinal values. It is one of the most bitter of all annual herbaceous plant (Mishra and Jain, 2014). However, favorable climate conditions have caused the plant to be introduced as a perennial plant (HCMS, 2010). It is commonly known as kalmegh (king of bitter) (Mishra and Jain, 2014) or hempedu bumi. This herb is originated from Sri Lanka and India. This plant is indigenous to Southeast Asia, China and India. Due to its efficient reproductive capacity, it is often considered as a weed. About 28 species of the *Andrographis* genus of small annual herbs are distributed in tropical Asia, however, only a few species are of medicinal value. *A. paniculata* is one of the most popular species (Niranjan *et al.*, 2010).

A. paniculata is a medicinal plant that is gaining popularity among herbal practitioners. The whole part is used for medicine such as leaves, stems and roots. For centuries, this herb has been used as a medicine in several traditional system of medicine all over the world. According to the Chinese medicine theory, *A. paniculata* 'cools' and relieves internal heat, inflammation and pain and is used for detoxification (Mandal *et al.*, 2001; Chao and Lin, 2010). This plant possessed anti-inflammatory (Mishra and Jain, 2014), antibacterial, antioxidant, antiparasitic, anticarcinogenic and anti HIV activities due to its bitterness that can cured skin eruptions, leprosy, fever, diarrhea, cold and scabies.

Harvesting stage or time is very important to obtain the optimum quality and quantity of the plant biomass. It can be determined by days from the beginning of planting, plant canopy size and shape, and phytochemical contents, colour, smell and taste of the herb. The plant is usually harvested about 2 – 3 months after planting or in the early flower initiation stage maximum herb biomass with high bioactive compound. The harvested material is dried in the shade and then, ground into a powder for use (Animesh *et al.*, 2012; Singh *et al.*, 2010).

Harvesting time can affect the freshness of the herbage, oil content, weight of the plant, height and diameter. If harvested late than suggested data, it may reduce the quality and quantity of the yield. Animesh *et al.*, (2012) reported that at 3-5 months old or at about 50% flower production was the best harvesting time for *A. paniculata* leaves because at this stage, active lactone compound in the leaves was the highest in quantity. Thus, postharvest quality is affected by growth stage and plant size at harvest. However, there is lack of information on the effects of these factors on local production of *A. paniculata*.

The objectives are to determine the effects of harvest time on plant growth characteristics and to determine the suitable harvesting stages for optimum production of *A. paniculata*.

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