UNIVERSITI PUTRA MALAYSIA

EFFECT OF BIOCHAR AND CHICKEN MANURE ON GROWTH PERFORMANCE AND PHYTOCHEMICALS OF *Orthosiphon stamineus* (MISAI KUCING)

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By

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CERTIFICATION

This project report entitled 'Effect of biochar and chicken manure on growth performance and quality of *Orthosiphon stamineus* (misai kucing)' is prepared by Mohamad Faeez bin Khusaini and submitted to the Faculty of Agriculture in fulfillment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Agriculture Science.

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ABSTRAK

Kajian telah dilakukan bagi menguji keberkesanan biochar dan tahi ayam pada prestasi pertumbuhan dan fitokimia daripada misai kucing (*Orthosiphon stamineus*). Misai kucing telah ditanam dalam rumah kaca yang terletak di Ladang 2, Universiti Putra Malaysia. Dalam eksperimen ini, terdapat 9 rawatan dan 4 replikasi. Sembilan rawatan, 3 Kadar biochar (0, 5 dan 10 ton / ha) dan kadar tahi ayam (0, 2,5 dan 5 ton/ ha) disusun dalam reka bentuk blok rawak lengkap. Tumbuh-tumbuhan telah dituai pada minggu 10 selepas penanaman. Parameter yang diambil ialah ketinggian tumbuhan, hari untuk berbunga, kandungan klorofil, biojisim tumbuhan, berat kering dan kandungan fitokimia (jumlah kandungan fenolik, jumlah kandungan flavonoid, aktiviti antioksidan). Kandungan fitokimia ini diekstrak daripada bahagian keseluruhan tumbuhan dengan kaedah pengekstrakan metanol menggunakan sampel kering *O. stamineus*, kaedah Folin-Ciocalteu untuk penentuan kandungan fenolik, kaedah permeteran warna aluminium klorida untuk penentuan kandungan flavonoid, dan kaedah 2,2-diphenylpicrylhydrazyl untuk penentuan aktiviti antioksidan. Biochar tidak memberi kesan yang besar ke atas ketinggian tumbuhan, hari untuk berbunga dan berat segar mengikut kadar aplikasi biochar. Tahi ayam memberi kesan ketara terhadap ketinggian tumbuhan, hari untuk berbunga, kandungan klorofil, berat basah dan berat kering. Biochar juga memberi kesan pada kandungan fenolik, tetapi tidak memberi kesan ketara daripada kadar tahi ayam yang digunakan. Jumlah kandungan flavonoid tidak menunjukkan signifikan daripada penggunaan biochar dan tahi ayam. Aktiviti antioksidan pula memberi kesan ketara oleh biochar dan tahi ayam yang digunakan sebagai pindaan tanah. Walau bagaimanapun, ia adalah disyorkan bahawa kajian lanjut perlu dilakukan untuk menyiasat kesan-kesan

jangka panjang gabungan biochar dan tahi ayam sebagai pembaik tanah pada prestasi pertumbuhan dan kualiti *O. stamineus*.

ABSTRACT

The effective of biochar and chicken manure on the growth performance and phytochemicals of misai kucing (*Orthosiphon stamineus*) were studied. Misai kucing was planted in a glasshouse at Ladang 2, Universiti Putra Malaysia. In this experiment, there were 9 treatments combinations and 4 replications, from three biochar rates (0, 5 and 10 ton/ha) and three chicken manure rates (0, 2.5 and 5 ton/ha) are arranged in a randomized complete block design. The plants were harvested 10 weeks after transplanting. The parameters measured were plant height, days to flowering, chlorophyll content, fresh and dry weights and phytochemical contents (total phenolic and total flavonoid contents and antioxidant activity). The phytochemical contents were extracted from whole plant by using methanol extraction of dry sample *O. Stamineus*. The Folin-Ciocalteu method was used for phenolic contents determination, aluminum chloride colorimetric method for determination of flavonoid contents and 2,2-diphenylpicrylhydrazyl method for determination of antioxidant activity. Biochar had no significant effect on plant height, days to flowering and fresh weight among the rates of biochar application. Chicken manure significantly affected plant height, days to flowering, chlorophyll content, fresh weight and dry weight. The biochar affected the phenolic contents, but was not significantly affected by the chicken manure rates applied. Total flavonoid contents did not show significance in the presence of biochar and chicken manure. The antioxidant activity was significantly affected by the rates of biochar and chicken manure used as soil amendments. However, it is recommended that further research should be done to investigate the long-term effects of the combination

of biochar and chicken manure as a soil amendment on the growth performance and quality of *O. stamineus*.

CHAPTER 1

INTRODUCTION

Malaysia has a big potential to make a lot of agriculture production and there are many natural resources for agriculture production such as in plantation and livestock. Organic farming is one of the methods of farming that preserve the environment. Organic farming is also a management system that promotes and enhances the agro ecosystem health which includes biodiversity, biological cycle and soil biological activities. Organic farming is a set of management practices that encourages environmental friendly production by avoiding the usage of pesticides and chemical fertilizers and by strongly relying on closed on-farm nutrient cycling, including biological nitrogen fixation and crop rotations to obtain soil fertility by enhancing soil organic matter content (Leifeld, 2012).

Nowadays, the conventional farming system had been replaced by the organic farming system gradually due to increasing demands for organic food and growing environmental concerns (Chin et al., 2011). The demand for organic production is increasing due to awareness from the consumers on the dangers of consuming food from conventional farming that uses chemical fertilizers and pesticides.

Herbs have been famously used for medicinal purposes around the world, including Malaysia, for the treatment of certain sickness. Herbs, consisting of all types of plants or any part thereof, that have their own medicinal value and are used for food (health and supplements), fragrances, odors, cosmetics and toiletries. Herbal plants

consist of ornamental plants, wild plants, medicinal plants, salads and others. According to the statistics on herbs and spices in Malaysia (2011), 20 percent of the Malaysian area is under herbs plantation, about 1,197.9 hectare. Another of 80 percent is concurred by spices plantation, about 4,932.8 hectare. The example of a herb planting in Malaysia is the growing of *Orthosiphon stamineus*, well known as misai kucing or cat whiskers.

Misai kucing or *O. stamineus* have been found growing in open areas such as beside the roads and also in the wasteland either in the lowlands and uplands. *O. stamineus* originated from Southeast Asian countries such as Malaysia, Brunei, Thailand, Indonesia and the Philippines. *O. stamineus* is known as a traditional herb and is widely used in traditional medicine (Liang et al., 2006). *O. stamineus* have also been introduced in the Asian and Western countries in the beginning of the 20th century, and it was introduced to Europe and became a popular herbal tea which began to develop interests among the researchers.

Nowadays, the world demand for organic herb is increasing due to health concern and also to reduce contamination. *O. stamineus* has been proven to effectively treat various ailments, especially those associated with kidney problems. The remedy for kidney stones, gout, diabetes, rheumatism, and for capillary and circulatory disorders can be prepared from the decoction obtained from its leaves. This plant is believed to possess the antihypertensive, anti-allergic, anti-inflammatory and diuretic properties.

Currently, research on biochar and chicken manure application in *O. stamineus* production is still lacking. The uses of biochar and chicken manure as a soil amendment can indirectly treat the soil and improve soil fertility. Through of this application, soil ph

and the efficiency of water and nutrient holding capacity in the soil will increase. This automatically can increase the growth rate of the plant and phytochemicals content in the plant. The production of misai kucing is basically from conventional farming, which uses chemical fertilizer. This research is carried out to reduce contamination in soil and plant by using biochar and chicken manure as soil amendment and also to determine the effects of the amendments on growth and quality of misai kucing. Hence, the objective of the study was to determine the growth and quality of *O. stamineus* by using the combination of biochar and chicken manure as soil amendment.

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