UNIVERSITI PUTRA MALAYSIA

GROWTH PERFORMANCE AND QUALITY OF *Andrographis paniculata* IN RESPONSE TO ORGANIC SOIL AMENDMENT

MOHD ZAHIR ZAINAL

FP 2015 73

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Mohd Zahir Bin Zainal

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2014/2015

GROWTH PERFORMANCE AND QUALITY OF *Andrographis paniculata* IN RESPONSE TO ORGANIC SOIL AMENDMENT

By

Mohd Zahir Bin Zainal

A project paper submitted to the Faculty of Agriculture

Universiti Putra Malaysia

In fulfillment of the requirement of PRT4999

For the award of degree of

Bachelor of Horticultural Science

FACULTY OF AGRICULTURE

UNIVERSITI PUTRA MALAYSIA

2014/2015

This project paper entitled **Growth Performance and Quality of *Andrographis paniculata* In Response to Organic Soil Amendment** prepared by **Mohd Zahir Bin Zainal** and submitted to the Faculty of Agriculture, Universiti Putra Malaysia in fulfillment of the requirement of PRT4999 (Final Year Project) for the award of degree of Bachelor of Horticulture Science.

Student's name: Student's signature:

MOHD ZAHIR BIN ZAINAL ……...

Certified by:

.....

Prof. Madya Dr. Siti Aishah Hassan

Department of Crop Science

Faculty of Agriculture

Universiti Putra Malaysia

Serdang, Selangor.

Date: .....

ACKNOWLEDGEMENTS

The author wishes to thank Prof. Madya Dr. Siti Aishah Hassan for her helpful advice, suggestions, revisions and comments, invaluable time, motivation and supports throughout this project. Prof. Madya Dr. Siti Aishah Hassan's superb assistance as a supervisor was extremely remarkable in completing this study successfully.

Special thanks to the Agriculture Laboratory staff, Mr. Yusof Mohammad and to postgraduates, Miss Fatin Wahida Rohimin, Miss Suraya Sabri, Mrs Farhana Ismail, and also all the staff at Horticultural and Recreational Unit. Their assistance in the laboratory, field and other related work is highly appreciated.

The author also wishes to thank his parents, Zainal Talib and Dayang Faridah Razak, siblings and friends for their support and encouragement.

The work reported here was funded by the Department of Crop Science, Universiti Putra Malaysia, Serdang, Selangor.

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ABSTRACT

Andrographis paniculata or King of bitters is known for its extremely bitter taste and its medicinal value. It is commonly used for medicinal purposes and offers relief from an array of ailments. On the other hand, the basic purpose of organic soil amendment is to improve soil chemical and physical properties. The objective of this study was to investigate the effect of types and rates of soil amendment on growth and quality of *A. paniculata*. Two types of soil amendment namely biochar and chicken manure with the application rate of 0 (control), 5, 10 and 15 ton/ha were used. The experiment was laid out in a Randomized Complete Block Design (RCBD) with four replications. Analysis of variance indicated that there were significant differences ($P < 0.05$) among the treatments in plant height, total leaf area, fresh weight and dry weight. At 15 ton/ha, both biochar and chicken manure produced higher biomass and yield compared to lower rates of soil amendment and control. Antioxidant activity, total flavonoid and phenolics were also significantly different among the treatments.

ABSTRAK

Andrographis paniculata atau 'King of bitters' merupakan herba yang terkenal dengan rasanya yang sangat pahit disamping kegunaannya bagi tujuan perubatan. Pokok ini kebiasaannya digunakan dalam aspek perubatan dan ianya mampu untuk mengubati pelbagai jenis penyakit. Di sisi yang lain, tujuan asas pindaan tanah organik adalah untuk meningkatkan kualiti dan ciri-ciri kimia dan fizikal tanah. Objektif kajian ini adalah untuk mengkaji kesan jenis dan kadar pindaan tanah pada pertumbuhan dan kualiti *A. paniculata*. Dua jenis pindaan tanah yang digunakan dalam pembelajaran ini adalah biochar dan tahi ayam dengan kadar penggunaan sebanyak 0 (kawalan), 5, 10, 15 tan/ha. Eksperimen ini dibentangkan dalam bentuk "Randomized Complete Block Design" (RCBD) dengan empat replikasi. Analisis varians menunjukkan bahawa terdapat perbezaan yang signifikan ($P < 0.05$) antara rawatan pada ketinggian pokok, jumlah luas daun, berat basah dan berat kering. Pada kadar 15 tan / ha, kedua-dua biochar dan tahi ayam menghasilkan biojisim dan hasil yang lebih tinggi berbanding pindaan tanah dengan kadar yang lebih rendah dan kawalan. Aktiviti antioksidan, jumlah flavonoid dan fenolik juga menunjukkan perbezaan yang ketara antara rawatan

CHAPTER 1

INTRODUCTION

Organic amendment is generally used to improve soil quality by amending it with sufficient nutrients. It increases the population of microorganisms and their biological activity in the soil. It also improved water penetration and lessened soil erosion (Dias et al., 2010).

Biochar is one of the organic soil amendment that reported has improved the quality of soil and plant growth. Biochar is produced through the process called pyrolysis from the combustion of biomass without or little oxygen that used as soil amendment (Gaskin et al. 2008; Lehmann and Joseph, 2009). Studies on a Colombian Oxisols (a soil type) show that biochar had increased the total biomass of plant by 189 percent when 23.2 tons per hectare biochar was applied (Major et al., 2005). Besides, researches also had shown that biochar improved soil water holding capacity and cation exchange capacity (Chan et al., 2008; Glaser et al., 2002), increased soil biological activities (Rondon et al., 2007) and increased plant nutrient availability and soil productivity (Steiner et al., 2007).

On the other hand, chicken manure is also one of the alternative organic materials can be used as soil amendment to improve soil quality and crop yield productivity. Abou el Magd et al. (2005) reported that the application of organic manures as amendment enhance soil water holding capacity and aeration of soil. It also improves both physical and chemical characteristics of soil (El Shakweer et al., 1998).

Chicken manure has high nitrogen content (Eliot, 2005) and high concentration of macro-nutrients (Duncan, 2005) which makes it the most preferred manure amongst other animal wastes.

Andrographis paniculata is one of the potential herbal plant that reported has been used widely around the world for medicinal purpose. *A. paniculata* was reported has the ability to reduce inflammation, fight viral infection and for lung support from colds in traditional Chinese medicinal formulas (Wright, 2009). *A. paniculata* contains andrographolide, neoandrographolide and deoxyandrographolide that responsible for the medicinal activity within the plant (Valdiani et al., 2012). Because of its various uses, it has attracted the attention of many researches to study more deeply as to fulfill consumers nowadays trend which are getting more health consciously consuming organic based medicines.

The objective of this study was to investigate the effect of different types of organic soil amendment and application rates on growth and quality of *A. paniculata*.

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