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EFFECT OF SOILLESS SUBSTRATE COMPONENTS ON THE GROWTH AND QUALITY OF *Brassica oleracea* L. var *alboglabra*

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EFFECT OF SOILLESS SUBSTRATE COMPONENTS ON THE GROWTH AND QUALITY OF *Brassica oleracea* L. var *alboglabra*

BY

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ABSTRACT

A study was conducted to examine the effect of soilless substrate components on the growth and quality of *Brassica oleraceae* L. *var alboglabra* (Kai-lan). A pot experiment was carried out under rain shelter at Ladang 2, Universiti Putra Malaysia, Serdang. The main objective of this study was to evaluate the effect of compost and peatgro and their combination with coconut coir dust and rice husk on the growth, nutrient elements and antioxidant of Kailan. The experiment was arranged in Randomized Complete Block Design (RCBD) with six replications. The treatments (v/v) were 75% compost + 25% coconut coir dust, 75% compost + 25% rice husk, 75% peatgro + 25% coconut coir dust, 75% peatgro + 25% rice husk, 100% compost and 100% peatgro. Substrates were analyzed for water holding capacity, pH and nutrient concentration. Plant height, number of leaves, leaf area, relative leaf chlorophyll content, nutrient concentration and antioxidant compounds were measured. The growth and quality of *Brassica oleracea L. var alboglabra* were enhanced when grown in 75% of peatgro mixed with 25% of coconut coir dust or 25% of rice husk. This combination contributes the high amount of nitrogen and calcium concentration in shoot tissues. Besides that, the plants grown in these substrates had high fresh and dry weight of shoot, number of leaves, total leaf area and plant height. Peatgro alone is not recommended to be used as growing medium because of its low water holding capacity, pH, shoot fresh and dry weight and total leaf area.

ABSTRAK

Satu kajian telah dijalankan untuk mengkaji kesan media tanaman yang berbeza kepada pertumbuhan dan kualiti *Brassica oleraceae* L. *var alboglabra* (Kai-lan). Kajian ini telah dijalankan di bawah rumah lindungan hujan di Ladang 2, Universiti Putra Malaysia, Serdang. Objektif utama kajian ini adalah untuk menilai kesan kompos dan tanah gambut dengan kombinasi habuk kelapa dan habuk padi terhadap pertumbuhan dan kualiti kailan. Media tanaman terdiri daripada 75% kompos + 25% habuk kelapa, 75% kompos + 25% habuk padi, 75% tanah gambut + 25% habuk kelapa , 75% tanah gambut + 25% habuk padi, 100% kompos, 100% tanah gambut. Eksperimen dijalankan menggunakan rekabentuk blok rawak lengkap dengan enam rawatan dan empat replikasi.Analisa media yang dijalankan ialah keupayaan memegang air, pH dan kandungan nutrisi dalam tanah. Analisa yang dijankan untuk mengukur pertumbuhan Kailan ialah tinggi pokok, bilangan daun, lebar daun, relative kandungan klorofil daun, berat basah dan berat kering bagi pucuk dan akar, kepekatan nutrisi dan kandungan antioksidan.Daripada kajian ini, boleh disimpumkan bahawa Kailan mencapai pertumbuhan yang optimum dan pengeluaran hasil yang berkualiti tinggi sekiranya menggunakan kombinasi media tanaman 75% tanah gambut dengan 25% habuk kelapa atau 25% habuk padi. Kombinasi media ini dapat menyumbang kepada kandungan nitrogen dan kalsium yang tinggi. Selain itu, ia juga merekodkan ketinggian pokok, bilangan daun, kelebaran daun, berat basah dan berat kering bagi pucuk yang tinggi. Tanah gambut sahaja tidak sesuai sebagai medium pertumbuhan kerana rendah dari segi berat basah dan berat kering bagi pucuk, keupayaan pegangan air dan kelebaran daun.

CHAPTER 1

INTRODUCTION

Projection by a study reveals that in 2080 around 1300 million people could be at risk of hunger under the most extreme scenarios, that is around 600 million more than that in 1999 (Parry *et al.,* 2004). The Food and Agriculture Organization (FAO) states that over 860 million people in the world are suffering from severe food insecurity and chronic malnourishment and about 95 percent of them are in developing countries (FAO, 2008).

In Malaysia, the agriculture sector is losing its importance to the national economy where services and manufacturing sectors have taken the first and second highest contribution roles respectively. These situation places the agriculture sector as the third engine of economic growth in our country. Use of land by Malaysia's agriculture also continues to decline due to the country's rapid economic development. More agricultural land is being used for housing, constructions and industrial purposes. If this scenario continues, Malaysia has to face severe food insecurity problem in the future.

Recently, the government has introduced Urban Horticulture in Malaysia to overcome the food security issue. Urban Horticulture is still new to Malaysia but it has been practiced by large cities in the world such as Hanoi, New York, Shanghai and Singapore. The main objective of urban horticulture is to encourage the urban people to grow their own food because as cannot fully depend on commercial production for food.

Examples of urban horticulture practiced in our country are rooftop garden, balcony garden and vertical farming. The crops can be grown either on beds or containers. The techniques used in urban horticulture are either conventional or soilless culture. For conventional techniques, the crops are usually grown on the ground. In soilless culture, the crops are grown using hydroponics, drip irrigation or substrate medium. Light medium substrates are preferable for container grown plant. However, each substrate has its own advantages and weaknesses. Various substrates can be found locally. Examples of soilless substrate medium used for this experiment are coconut coir dust, rice husk, peatgro and compost. These substrates medium have been used with different proportions to grow *Brassica oleracea* L. *var alboglabra* under urban horticulture environment.

The specific objective of this study was to determine the effect of growth media substrates on the growth performance and quality of *Brassica oleracea* L. *var alboglabra*.

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