



UNIVERSITI PUTRA MALAYSIA

**EVALUATION OF GROWTH PERFORMANCE OF BAMBOO
(*GIGANTOCHLOA* SP.) IN INTEGRATION WITH BANANA (*MUSA
PARADISIACA* L.) AND MISAI KUCING (*ORTHOSIPHON STAMINEUS
BENTH.*)**

NORHIDAYAH BT CHE SOH

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By

NORHIDAYAH BT CHE SOH

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in
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September 2011

Special Dedicated To

Mak and Pak

My Husband and My Daughter

My Brothers and My Sisters

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science.

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September 2011

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Agroforestry is one of the agricultural designs which integrate woody perennial and agricultural crop. The choice of species and system in agroforestry practice is very important to ensure its productivity. In Malaysia, various agroforestry designs were introduced but the application still limited due to the socio economic problems and also lack of knowledge. Bamboo is one of the suitable species for agroforestry practices because of its various uses and fast growing botanical species.

The objectives of the study are to determine the best species between *Orthosiphon stamineus* and *Musa paradisiaca* suitable for integrating with *Gigantochloa brang* in term of growth performance and secondly to determine the best fertilizer between NPK and chicken dung and its rate produce highest growth performance for *Gigantochloa brang* with *Orthosiphon stamineus*, and *Musa paradisiaca* L. in Peninsular Malaysia.

Three different plots were established with the first plot consisting of bamboo integrated with Pisang berangan (*Musa paradisiaca*), the second plot consisting of bamboo integrated with Misai kucing (*Orthosiphon stamineus*), and the third plot consisting of only bamboo species. Planting distance of bamboo culm in each plot was 4m x 4m while banana and *O. stamineus* were planted in between of bamboo rows. Two types of fertilizers used were Chicken dung and NPK with four different rates applied. The rates were 0, 0.5, 1.0 and 1.5 kg per clump for bamboo and banana while for each Misai kucing 0, 0.05, 0.1, and 0.150 g were applied for both fertilizers. The experiment involved eight replicates with 24 treatments all together. Growth performance data were collected every month for a period of six months and analyzed by using statistical analysis ANOVA.

There were some significant difference present on bamboo growth which is for dbh and the number of culm. Bamboo integrated with *O. stamineus* gave the highest growth for both parameter compared with other plot. For various type of fertilizer's application, there were significant differences detected in every parameter, but further analysis for different rates of fertilizer, only two parameters showed significant differences which

were dbh and number of culm. Application of 0.5 kg NPK per clump gave the highest growth performance of dbh and number of culm. For banana growth, the significant differences were shown for every parameter (stem DBH, height, number of shoot and fruit) when analyzed with different rate of fertilizers. The application of 1.0 kg of chicken dung gave the highest height and bigger DBH. Highest number of shoots and banana bunch were produced with the application of 1.5 kg chicken dung. There were no significant difference in height and crown of *O. stamineus* but there was a significant difference found on the wet and dry weight of it. Application of 0.1 kg of NPK gave the highest wet weight and 0.05 kg of NPK produced the highest dry weight.

The most suitable species to integrate with bamboo in term of producing best growth rate is *O. stamineus* and application of 0.5 kg NPK was the best rate of fertilizer applied to produce the highest growth for bamboo. Further studies on different planting distance of bamboo are recommended and the soil chemical characteristic should be done before study was carried out. Besides that, time of study should be longer to get more accurate observation.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains.

**PENILAIAN KADAR PERTUMBUHAN BULUH (*GIGANTOCHLOA SP.*)
DITANAM BERSAMA PISANG (*MUSA PARADISIACA L.*) DAN MISAI KUCING
(*ORTHOSIPHON STAMINEUS BENTH*)**

Oleh

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Perhutanan tani adalah salah satu kaedah pertanian yang melibatkan percampuran antara tumbuhan berkayu dan tanaman pertanian. Di Malaysia pelbagai sistem perhutanan tani telah diperkenalkan, walaubagaimanapun kaedah ini kurang mendapat sambutan untuk dilaksanakan disebabkan oleh faktor kekurangan ilmu dan masalah ekonomi. Perhutanan tani mampu memberikan kesan positif yang pelbagai, antaranya meningkatkan pendapatan para petani, memperbaiki stuktur tanah, membantu dalam perubahan cuaca dan banyak lagi. Buluh adalah salah satu spesis yang sesuai bagi mempraktikkan perhutanan tani kerana kegunaannya yang pelbagai dan buluh juga adalah sejenis tumbuhan yang sangat cepat membesar. Tujuan kajian ini dijalankan adalah untuk

mengkaji spesies tempatan yang paling sesuai ditanam bersama buluh dan mengkaji apakah jenis baja dan berat baja yang paling sesuai digunakan dalam tanaman campuran ini di Semenanjung Malaysia.

Di dalam kajian ini tiga plot telah dibentuk. Plot pertama ditanam buluh bersama pisang Berangan, plot kedua ditanam buluh bersama pokok herba ubatan Misai kucing dan di plot ketiga hanya buluh sahaja ditanam tanpa campuran pokok lain. Di semua plot buluh di tanam pada jarak 4 m x 4 m. Dua jenis baja digunakan dalam kajian ini iaitu baja tahi ayam dan NPK dengan empat kadar iaitu 0, 0.5, 1.0 dan 1.5 kg bagi buluh dan pisang manakala bagi Misai kucing kadar baja yang digunakan ialah 0, 0.05, 0.1, 0.15 kg. Kajian ini dilakukan sebanyak lapan replikat dan melibatkan 24 jenis rawatan. Data pertumbuhan ketiga tiga spesies tumbuhan di ladang ini diambil selama enam bulan dan akhirnya kesemua data dianalisis menggunakan analisis statistik ANOVA.

Keputusan menunjukkan terdapat dua parameter yang menunjukkan perbezaan pertumbuhan yang ketara di plot yang berbeza iaitu dbh dan bilangan batang. Plot yang menghasilkan pertumbuhan buluh tertinggi ialah plot campuran buluh dan Misai kucing. Bagi penggunaan baja yang berbeza pula, perbezaan yang ketara wujud di semua parameter. Tetapi bagi kadar baja yang berbeza hanya dua parameter menunjukkan perbezaan ketara iaitu DBH buluh dan bilangan batang buluh. Nilai tertinggi bagi dbh dan bilangan batang buluh dihasilkan oleh baja NPK pada kadar 0.5 kg. Bagi pertumbuhan pokok pisang pula perbezaan yang ketara wujud pada semua parameter yang diambil. Baja tahi ayam pada kadar 1 kg menghasilkan pertumbuhan tinggi dan

DBH yang paling optimum manakala penggunaan baja tersebut pada kadar 1.5 kg pula menghasilkan bilangan anak pokok yang tertinggi dan bilangan tandan pisang yang terbanyak. Bagi keputusan kajian Misai kucing, perbezaan yang ketara hanya wujud pada berat basah dan berat kering pokok Misai kucing sahaja dan tidak bagi pertumbuhan pokok. NPK 0.1 kg menghasilkan berat basah yang tertinggi manakala berat 0.05 kg NPK pula menghasilkan berat kering yang tertinggi.

Berdasarkan kajian ini dapat disimpulkan bahawa buluh adalah paling sesuai ditanam bersama Misai kucing dan kadar baja yang terbaik menghasilkan pertumbuhan buluh yang paling tinggi adalah NPK 0.5 kg. Kajian jarak tanaman yang buluh berbeza beza adalah amat sesuai dijalankan bagi mendapatkan jarak tanaman yang paling sesuai bagi sistem tanaman selingan. Selain itu, kajian mengenai ciri-ciri kimia tanah juga adalah sangat perlu dilakukan sebelum sesuatu kajian lapangan diadakan bagi mengetahui kandungan nutrient tanah di sesuatu kawasan. Bagi mengkaji pertumbuhan buluh, tempoh masa kajian perlulah ditambah bagi mendapatkan hasil yang lebih berkesan.

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I verify that a Thesis Examination Committee has met on 22 September 2011 to conduct the final examination of Norhidayah Binti Che Soh on his thesis entitled “Evaluation of growth performance of bamboo (*Gigantochloa* sp.) in integration with banana (*Musa Paradisiaca* L.) and Misai kucing (*Orthosiphon Stamineus*)” in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U. (A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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DECLARATION

I declare that the thesis is my original work except for quotations and citation which have been duly acknowledged. I also declare that it has not previously and is not concurrently submitted for any degree at Universiti Putra Malaysia or other institutions.

NORHIDAYAH CHE SOH

Date: 22 September 2011

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