



UNIVERSITI PUTRA MALAYSIA

**AGRONOMIC PROPERTIES AND NUTRITIONAL PROFILE OF GUINEA-
STYLO MIXTURE SOWN AT DIFFERENT PLANTING PATTERN**

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FP 2015 208

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A project report submitted to the
Faculty of Agriculture, University Putra Malaysia,
In fulfilment of the requirements of SHW 4999 (Final Year Report)
for the award of the degree of
BACHELOR OF AGRICULTURE (ANIMAL SCIENCE)

Faculty of Agriculture

University Putra Malaysia

Serdang, Selangor.

(2014/2015)

CERTIFICATION

This project entitled “Agronomic properties and nutritional profile of guinea-stylo mixture sown at different planting pattern” is prepared by Nurulain Binti Mohamed Zain and submitted to the Faculty of Agriculture in fulfilment of the requirement of the course SHW 4999 (Final Year Project) for the award of the degree of Bachelor Agriculture Animals Science)

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ACKNOWLEDGEMENT

Bismillahirrahmanirahim, first and foremost, I would like to express my grateful to Allah S.W.T as for the complete my research project. This research project would not have been possible without the support of many people. I would like to express my gratitude to my supervisor; En Shokri Jusoh who was abundantly helpful. Deepest gratitude also to our coordinator, Prof Dahlan Ismail. Sincere appreciation and grateful are also extended to the staff of Nutrition Laboratory, Department of Animal Science and also to the staff of Field 2 UPM for the technical support and for their assist in conducting experiment. Special thank also to my beloved friends for sharing the literature and invaluable assistance. Lastly I would like to express my appreciation and gratitude to my family for their understanding and endless love, through the duration of my project.

Thanks and may Allah bless all of you.

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ABSTRACT

Guinea-Stylo was established to study the effect of different planting pattern on forage production, agronomic properties and nutritive quality of Guinea-Stylo mixture. The varieties are *Stylosanthes guianensis* CIAT 184 and *Megathyrus maximus* mixture were assessed at ladang 2, University Putra Malaysia from early April until October 2014 by using randomized complete block design (RCBD). The treatment was different types of planting pattern and was arranged in the 3m x 4m plotting system. Production, morphological aspect and nutritive value were assessed in this project. The Guinea-Stylo was sampled at 1st, 2nd, and 3rd harvested. This samples was analysed for crude protein (CP%), acid detergent fiber (ADF%), acid detergent lignin (ADL%), Neutral detergent fiber (NDF%), dry matter basis and ash percentage in the laboratory of Animal Science Department, Faculty of Agriculture (UPM). Botanical composition, number of plant per m², leaves to stem ratio and plant height also were assessed. There are significant differences ($P < 0.05$) in yield production in different planting pattern. The yield of Guinea grass and Stylo were increased at every cutting and this shows that the rate of growth of the plant was very high but it depends on type of different planting pattern. There are also significant differences ($P < 0.05$) on ADF, NDF, ADL, CP and DM but not significant differences on ($P > 0.05$) observed in ash. There are significant difference ($P < 0.05$) on botanical composition, plant number per m², plant height, and leaves to stem ratio observed.

ABSTRAK

Beberapa plot telah dilediakan untuk mengkaji kesan corak penanaman yang berbeza yang memberi kesan kepada sifat agronomi dan kualiti pemakanan kepada tanaman Guinea- Stylo bagi makanan ternakan. *Megathyrus maximus* CIAT 184 dan campuran *Stylosanthes guianensis* telah dinilai di ladang 2, Universiti Putra Malaysia dari awal bulan April hingga Oktober 2014 dengan menggunakan reka bentuk blok rawak lengkap (RCBD). Rawatan yang digunakan ialah sistem kepelbagaian jenis corak penanaman dalam sistem plot 3m x 4m. Pengeluaran, aspek morfologi dan nilai pemakanan dinilai dalam projek ini. Guinea - Stylo telah disampelkan pada 1, 2, dan 3 kali pemotongan. Sampel ini dianalisis untuk protein kasar (CP %), gentian asid detergen (ADF %), lignin asid detegen (ADL %), gentian neutral detergen (NDF %), asas bahan kering dan peratusan abu di makmal Jabatan Sains Haiwan, Fakulti Pertanian (UPM). Komposisi Botani, bilangan pokok per m², nisbah daun dengan batang dan ketinggian tumbuhan yang ditanam juga telah dinilai. Terdapat perbezaan yang signifikan ($P < 0.05$) dalam pengeluaran hasil tanaman dalam corak yang berbeza . Hasil rumput Guinea dan Stylo telah meningkat pada setiap pemotongan dan ini menunjukkan bahawa kadar pertumbuhan tumbuhan itu amat tinggi tetapi ia bergantung kepada jenis corak penanaman yang berbeza . Terdapat perbezaan yang signifikan ($P < 0.05$) pada bahan kering, protein kasar (CP%), gentian asid detergen (ADF %), lignin asid detegen (ADL %), gentian neutral detergen (NDF %) tetapi tidak terdapat perbezaan yang signifikan ($P > 0.05$) pada peratusan abu. Terdapat perbezaan yang signifikan ($P < 0.05$) pada komposisi botani , jumlah tumbuhan per m² , ketinggian tumbuhan , dan nisbah daun dengan batang diperhatikan .

CHAPTER 1

INTRODUCTION

Shortage of feed is one of the major problems faced by Malaysia ruminant industry, where in 2008 the country spent more than RM2.14 billion (USD 621 million) to import animal feed (*Ahmed, 2012*). The ruminant production based on formulated concentrate is expensive and not viable. However, the local feed resources are inherently of low nutritive value, and the attempt to increase the nutritive value of grass forages, research efforts have focused on the use of sown species of grass as well as the incorporation of herbaceous or tree legumes into stands of grass. Livestock assessment of these practices (*Bamikole et al. 2004*) has indicated a significant improvement in livestock performance. Besides that, the cutting management system is important from stand point of forages production as well as forages quality. The nutritive quality of pasture is mainly a function of species composition and its growth stage, which are controlled by climatic factors that affect mineral status, re-growth potential, sward structure and botanical composition.

Stage of maturity at harvesting can be considered as crucial management practice that determines nutritional quality of forages. In most of the cases, pasture grasses in the tropics cannot satisfy even the minimum nutrients requirement of animals due to harvesting of mature grass or legumes forages. Tropical and sub-tropical grassland are characterized by rapid growth during periods of heavy rainfall, leading to mature pasture plants containing high levels of cell wall constituents, low sugar (storage polysaccharides) and often very low in true protein (*Okwori et al., 2010*).

Feed is one of the aspects that should be considered to improve the livestock production with high quality of forage. Guinea grass is one of the good sources of forage to mix with legumes because of high protein content and digestibility. Guinea grass (*Megathyrsus maximus*) is indigenous to the subtropical Africa areas and it occurs mainly in the sub habitat under trees. Guinea grass is the one of grass that suitable and palatable to the animals besides had good nutritive value content needed for the livestock production. Guinea grass is tolerance to drought and can survive for long dry periods. This grass is easy to establish because it can be propagated by seed

or bunch. Besides that, it can also produce high yield but decline in nutritive value with increasing age.

One of the legume-based pastures suitable and palatable to ruminant as their feed is Stylo (*Stylosanthes guianensis*). Stylo is a short shrubby legume and used as a cover crop in plantation and known as pasture legume for humid tropical region. Stylo is useful as a pasture plant because of the high protein and good in their performance and production. Legumes provides extra protein, as they have much higher levels of protein than grasses and also provide essential minerals and vitamins required for animal growth (*Chanphone et al., 2003*). Stylo can adapt to hot humid tropical climates and different type of soil and can be used in continuous or rotational grazing or cut and carry system.

The nitrogen-fixing ability of legumes has been utilized to increase crop and forage production. The countries such as New Zealand and Australia, legumes provide the main source of nitrogen for pastures. In the humid tropics of South-east Asia some attempts have been made to incorporate legume into forage system, as incorporating legumes in pasture has proven to be viable alternative to mitigate short and long term decline in quality and quantity of forage.

Grass-legume mixtures are preferred over pure-grass forage stands throughout the world because they often increase the total yields of herbage and protein and offer balanced nutrition (*Albayrak and Ekiz, 2005*). Mixtures offer several potential advantages over pure grasses or pure legumes. Grass-legume mixtures tend to provide a superior nutrient balance and produce higher forage yields. However, grass-legume mixtures are more difficult to manage than monoculture pastures because of competition for light, water, and nutrients (*Albayrak et al. 2011*). Therefore, the objective of this study was to explore the best planting pattern of Guinea- stylo mixture for cut and carry system.

1.1 OBJECTIVE

The general objective:

- To evaluate the effect of different planting pattern on forage production, agronomic properties and nutritive quality of Guinea-Stylo mixture.

The specific objectives:

- To evaluate the effect of different planting pattern on agronomic properties.
- To determine the effect of Guinea-Stylo mixture on dry matter yield and leaf to stem ratio.
- To determine the nutritive quality of Guinea-Stylo mixture on different types of planting pattern.

1.2 SIGNIFICANCE OF STUDY

Grass-legume mixtures tend to provide a superior nutrient balance and produce higher forage yields than pure grass stand. However, grass-legume mixtures are more difficult to manage than monoculture pastures because of competition for light, water, and nutrient. Therefore, this report was written to explain the best planting pattern to improve the nutritive quality of grass-legume mixture especially in Guinea-Stylo mixture.

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