



UNIVERSITI PUTRA MALAYSIA

**THE EFFECT OF NITROGEN FERTILIZER ON NUTRIENT
COMPOSITION AND IN VITRO DIGESTIBILITY OF KENAF
(*Hibiscus cannabinus*)**

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(*Hibiscus cannabinus*).**

By

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A project report submitted to Faculty of Agriculture, Universiti Putra Malaysia, In fulfillment of the requirement of SHW 4999 for the award of the degree of Bachelor of Agriculture (Animal Science)

**FACULTY OF AGRICULTURE
DEPARTMENT OF ANIMAL SCIENCE
UNIVERSITI PUTRA MALAYSIA**

CERTIFICATION

This projects entitles “**The effect of nitrogen fertilizer on nutrient composition and *in vitro* digestibility of kenaf (*Hibiscus cannabinus*)**” was prepared by **Muhammad Salman Bin Abdul Aziz** and submitted to the Faculty of Agriculture in fulfillment of the requirements of the course SHW 4999 (Final Year Project) for the award of the degree of **Bachelor of Agriculture (Animal Science)**.

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LIST OF ABBREVIATIONS

CRD	Completely randomized design
N	Nitrogen
%	Percentage
m	Meter
m ²	Meter square
ml	Millilitre
cm	Centimetre
kg	Kilogram
°C	Degree Celsius
DM	Dry matter
DM yield	Dry matter yield
Ha	Hectare
CP	Crude protein
ADF	Acid detergent fibre
ADL	Acid detergent lignin
NDF	Neutral detergent fibre
OM	Organic material
GP	Gas production
ANOVA	Analysis of variance

ABSTRACT

Feedstuff is an important input to sustain livestock production. In Malaysia, the nutrients from feedstuffs for ruminants, especially forages, often inadequate. A supply of good quality forages is necessary in order to meet ruminant nutrient requirements. This study was conducted to compare the effect of different levels of inorganic nitrogen fertilizer on nutrient compositions and *in vitro* digestibility of kenaf (*Hibiscus cannabinus*). There were five different levels of additional inorganic nitrogen fertilizer (urea: 0, 20, 40, 60, 80 Kg/ha) and were given to Kenaf V36 which initially on NPK (15:15:15) fertilizer. Kenaf V36 seeds were obtained from National Kenaf and Tobacco Board and used as planting materials. The treatments, which is the fertilization was applied twice, at the 10th and 20th day after planting respectively. Kenaf were watered manually 2 times a day by using hose pipe. The kenaf was harvested at the fifth week of age and analysed for dry matter yield (DM yield), plant height, proximate analysis, Neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL). Digestibility of kenaf was estimated by using *in vitro* gas production procedure. The result shows that the DM yield ranged from 0.55 ton to 0.62 ton per hectare. There were significantly difference ($P < 0.05$) in CP, NDF and ash of kenaf fertilized with different levels of inorganic nitrogen fertilizer. There were highly significance difference ($P < 0.01$) in plant height, DM content and gas production of kenaf fertilized with different levels of inorganic fertilizer application. It was observed that the percentage of crude protein was the highest (20.59%) when the kenaf was fertilized with urea at the rate of 80 Kg/ha but the increase rate of CP started to decline at 40 Kg/ha. However, under the experimental conditions, the expected CP was not achieved because variety and light levels can affect the nutrient composition of kenaf.

ABSTRAK

Makanan haiwan ternakan merupakan input penting untuk mengekalkan pengeluaran ternakan. Di Malaysia, nutrien daripada bahan makanan untuk ternakan ruminan terutamanya foraj, sering tidak mencukupi. Bekalan foraj yang berkualiti baik adalah perlu untuk memenuhi keperluan nutrien ruminan. Kajian ini dijalankan untuk melihat kesan daripada tahap yang berbeza baja nitrogen bukan organik pada komposisi nutrien dan penghadaman *in vitro* kenaf (*Hibiscus cannabinus*). Terdapat lima tahap baja nitrogen bukan organik tambahan yang berbeza (urea: 0, 20, 40, 60, 80 Kg / ha) dan telah diberikan kepada Kenaf V36 yang pada mulanya diberi baja NPK (15:15:15). Biji benih kenaf V36 diperolehi daripada Lembaga Kenaf dan Tembakau Negara dan digunakan sebagai bahan tanaman. Rawatan, iaitu pembajaan diberi dua kali, pada hari ke-10 dan ke-20 selepas penanaman. Kenaf telah disiram secara manual 2 kali sehari dengan menggunakan hos paip. Kenaf tersebut dituai pada usia lima minggu dan dianalisis untuk hasil bahan kering (hasil DM), ketinggian tumbuhan, analisis proksimat, serat detergen Neutral (NDF), serat detergen asid (ADF) dan asid lignin detergen (ADL). Penghadaman kenaf dianggarkan dengan menggunakan prosedur *in vitro* pengeluaran gas. Hasil kajian menunjukkan bahawa hasil DM adalah dalam lingkungan 0.55 tan kepada 0.62 tan sehektar. Terdapat perbezaan ketara ($P < 0.05$) di CP, NDF dan abu kenaf dibaja dengan tahap yang berbeza baja nitrogen bukan organik. Terdapat perbezaan yang sangat signifikan ($P < 0.01$) dalam ketinggian tumbuhan, kandungan DM dan pengeluaran gas kenaf dibaja dengan tahap yang berbeza daripada penggunaan baja bukan organik. Peratusan protein kasar dilihat menunjukkan nilai tertinggi (20.59%) apabila kenaf dibaja dengan urea pada kadar 80 Kg / ha tetapi kadar peningkatan CP mula menurun pada 40 Kg / ha. Walau bagaimanapun, di bawah syarat-syarat

eksperimen, CP yang dijangkakan tidak tercapai kerana kepelbagai dan tahap cahaya boleh menjejaskan komposisi nutrien kenaf.



CHAPTER 1

1.0 INTRODUCTION

Animal feed is generally a food given to animal reared for specific type of purposes in animal husbandry. Animal feed is also an important input in sustaining a good production system. In ruminant production system, animal feed can be classified into fodder and forage. Fodder is generally refer to plant materials that is cut and carried to the particular animal, whereas forage is a term applied to the plant materials that is grazed by the animal itself.

In Malaysia, the animal feed, especially forage, often provide inadequate nutrients for animal production. A supply of good quality forage is necessary in order to meet the nutrient requirements of the animal. Good quality forage is high in energy and protein. Napier grass, cassava and leucaena are some example of forage found in Malaysia. Among all, kenaf is another fodder crop that can be used to feed the livestock. Kenaf is a short seasonal plant and is majorly produced for its fiber. It is also a natural versatile plant which can make products such as paper, textile, insulator and biocomposite (Abdul Khalil *et al.*, 2010). The high nutritional values in early harvested kenaf are what made it suitable as animal feed.

Kenaf's response to added fertilizers depends on the soil nutrient levels, cropping history, and other environmental and management factors (Alexopoulou *et al.*, 2013). Generally, if the added fertilizers were increased then the yield will also be increased. Fertilizer is an important material used to provide nutrients for the plant. Biologically, fertilizer helps in promoting plant growth. The application of fertilizer is essential to replace the nutrient used by previous crops in the soil which

greatly affects the economic quality and yield. There are many ways to classify the type of fertilizer. One of them is by identifying the specific nutrient they provides which can be nitrogen, phosphorus and potassium. Fertilizer can also be either organic or inorganic. Organic fertilizer is derived from plant and animal matters that have been decomposed. On the other hands, inorganic fertilizer is manufactured by using various chemical treatment.

1.1 Objective

The general objective of the experiment is to evaluate the effect of different levels of inorganic nitrogen fertilizer on nutrient composition and *in vitro* digestibility of immature kenaf.

Specific:

- i. To measure the height and yield of immature kenaf fertilized with different levels of inorganic nitrogen fertilizer.
- ii. To determine the nutrient composition and *in vitro* digestibility of immature kenaf fertilized by different levels of inorganic nitrogen fertilizer.

1.2 Significance of the study

Kenaf can be a good forage crop as its crude protein content is high. A better nutrient composition and *in vitro* digestibility of kenaf can be achieved if additional inorganic nitrogen fertilizer is applied. This study will give new information on height and yield of immature kenaf fertilized with different levels of inorganic nitrogen fertilizer. Besides that, this study will also give the information on

relationship between additional levels of inorganic nitrogen fertilizer application and its effect on nutrient composition and *in vitro* digestibility of immature kenaf.



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