UNIVERSITI PUTRA MALAYSIA

EFFECT OF DIFFERENT RATE OF NITROGEN FERTILIZATION ON PRODUCTION AND NUTRITIVE VALUE OF SUPER NAPIER PAKCHONG 1

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FP 2017 118

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SERDANG, SELANGOR DARUL EHSAN
2016/2017

EFFECT OF DIFFERENT RATE OF NTROGEN FERTILIZER ON PRODUCTION AND NUTRITIVE VALUE OF SUPER NAPIER PAKCHONG 1

BY

MOHAMAD HIDAYAT BIN JALIL

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

Faculty of Agriculture

Universiti Putra Malaysia

2016/2017

CERTIFICATION

This project entitled **"EFFECT OF DIFFERENT RATE OF NITROGEN FERTILIZATION ON PRODUCTION AND NUTRITIVE VALUE OF SUPER NAPIER PAKCHONG 1"** is prepared by **MOHAMAD HIDAYAT BIN JALIL** and submitted to Faculty of Agriculture in fulfilment of the requirements of the course SHW 4999 (Final Year Project) for the award of the degree Bachelor of Agriculture (Animal Science).

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ACKNOWLEDGEMENT

In the name of Allah S.W.T the most merciful and compassionate, Alhamdulillah praise to Allah S.W.T with his blessing given me the strength to complete this project. After an a few month, it has been a period of intense learning for me, not only in the scientific area but also my personal development level. I would like to reflect on people who have supported and helped me so much throughout period in direct and indirect. First and foremost, I would like to thank my project supervisor, Dr. Shokri Bin Jusoh, lecturer in Department of Animal Science, Faculty of Agriculture, University Putra Malaysia (UPM), for providing me valuable guidance and for all the opportunities I was given to conduct my research from the start until my project completed. I also would like to thank to Final Year Project Coordinator, Professor Dr. Jothi Malar Panandam for provided us with tools that I needed and direction and successfully complete my thesis. Besides that, I would like to thank to all staffs that in charged for Nutrition Laboratory and Ladang 2 for all their cooperation and guide during my experimental period. In addition, I am grateful to my family especially both of my beloved parents, Hj. Jalil Bin Ahmad and Hjh. Latifah Binti Mohsan who always gave me wise counsel and sympathetic ear and supported me until my project successfully completed. Moreover, there are my friends especially Fateen Syifa Nadhirah Bt Mohamad Mazalan who supported me greatly and were willing to help me a lot during my project period. Finally, I would like to thank to all lecturers in Department of Animal Science, Faculty of Agriculture, UPM for sharing the knowledge and comment that helping me to complete my final year project report.

Thank you very much everyone.

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LIST OF ABBREVIATION

N	Nitrogen
kg	Kilogram
ha	Hectare
RCBD	Randomise Complete Block Design
SNP1	Super Napier Pakchong1
cm	Centimetre
m	Metre
DM	Dry matter
CP	Crude protein
NDF	Neutral detergent fibre
ADF	Acid detergent fibre
ADL	Acid detergent lignin
IVDMD	*In-vitro* dry matter digestibility
ANOVA	Analysis of variance
^{o}C	Degree Celsius
ml	Millilitre

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ABSTRACT

The common forage use by farmers is Napier grass *(Pennisetum purpureum)*. It is because this type of grass easily be grown by farmers and suitable with tropical condition. Nowadays there are research in producing hybrid Napier grass known as Super Napier Pakchong1 (SNP1). Addition of nitrogen may increase the yield of Napier grass (Gasim, 2001) and nutritive value such as increasing in crude protein content (Mohamed, 2010). The general objective of this study is to determine performance of Super Napier Pakchong1 on different rate of nitrogen fertilization. More specifically, this study was conducted to determine agronomic properties, yield, digestibility and nutritive value of Super Napier Pakchong1 on different rate of nitrogen fertilization. The study was conducted on Super Napier Pakchong1 at Ladang 15, Universiti Putra Malaysia, Serdang. The nitrogen fertilization source is urea. The five treatment in this study were 0 kg N/ha, 50 kg N/ha, 100 kg N/ha and 200 kg N/ha. Each plot was fertilized according to treatment in the beginning of experiment. The plots were assigned to each treatment and replicate randomly

according to block. The experimental design was randomize complete block design with three replicates The pasture field area was divided into fifteen plot (4 m x 6 m each plot). Then, the grass was cut into 20 cm from ground in order to obtain same size of experimental material. Each plot was fertilized according to treatment in the beginning of experiment. The plots were assigned to each treatment and replicate randomly according to block. Data for plant height and number of tiller were collected every week. While data for other parameters were collected at the end of experiment. The result revealed that the plant height, number of tiller and leaf to stem ratio were show no significantly different between treatments. For dry matter yield per hectare also shows no significant different between each treatment. For crude protein, the result shows highly significant different at 200 kg N/ha compared to other treatments. The lowest mean of crude protein is 0 kg N/ha. For percentage of dry matter, ash, neutral detergent fibre (NDF), acid detergent fibre (ADF) and acid detergent lignin (ADL) there were no significant different between each treatment. For *in-vitro* gas production, the result shows highly significant different at 100 kg N/ha compared to other treatments. For *in-vitro* dry matter digestibility, the result shows highly significant different at 200 kg N/ha compared to other treatments. As conclusion, the addition of nitrogen fertilization (urea) increased the nutritive value of crude protein content in Super Napier Pakchong1. Besides that, the dry matter digestibility also increased by addition of nitrogen fertilization.

KEYWORDS

Super Napier Pakchong1, nitrogen fertilization, nutritive value, crude protein, digestibility

ABSTRAK

Penggunaan makanan ternakan yang biasa digunakan oleh penternak ialah rumput Napier (*Pennisetum purpureum*). Ia adalah kerana rumput ini mudah ditanam oleh petani dan sesuai dengan keadaan tropika. Pada masa kini terdapat penyelidikan dalam menghasilkan rumput Napier hibrid dikenali sebagai Super Napier Pakchong1 (SNP1) Penambahan nitrogen boleh meningkatkan hasil rumput Napier (Gasim, 2001) dan nilai pemakanan seperti meningkatkan kandungan protein kasar (Mohamed, 2010). Objektif umum kajian ini adalah untuk menentukan prestasi Super Napier Pakchong1 pada kadar pembajaan nitrogen yang berbeza. Lebih khusus, kajian ini dijalankan untuk menentukan ciri-ciri agronomi, hasil, penghadaman dan nilai pemakanan Super Napier Pakchong1 pada kadar pembajaan N yang berbeza. Kajian ini telah dijalankan di Ladang 15, Universiti Putra Malaysia, Serdang. Sumber pembajaan nitrogen adalah urea, dengan 5 rawatan pembajaan iaitu 0 kg N / ha, 50 kg N / ha, 100 kg N / ha dan 200 kg N / ha. Setiap plot telah dibaja mengikut rawatan di awal eksperimen. Plot yang telah diberikan kepada setiap rawatan dan secara rawak mengikut blok. Reka bentuk eksperimen adalah reka bentuk blok lengkap rawak dengan tiga replikasi. Kawasan telah dibahagikan kepada lima belas plot (4 m x 6 m setiap plot). Kemudian, rumput dipotong kepada 20 cm dari paras tanah bagi untuk mendapatkan saiz sama bahan eksperimen. Setiap plot telah dibaj mengikut rawatan di awal eksperimen. Data untuk ketinggian tumbuhan dan bilangan tunas pucuk telah dikumpulkan setiap minggu. Manakala, data bagi parameter lain telah dikumpulkan pada akhir eksperimen. Hasilnya menunjukkan bahawa ketinggian tumbuhan, bilangan anak pokok dan daun adalah tidak

menunjukkan perbezaan yang ketara antara rawatan baja. Dalam hal hasil kering sehektar juga menunjukkan tiada perbezaan yang signifikan antara setiap rawatan. Untuk protein kasar, hasilnya menunjukkan perbezaan yang amat ketara pada 200 kg N / ha berbanding rawatan lain. Min terendah protein kasar adalah 0 kg N / ha. Peratusan bahan kering, abu, neutral detergen fiber (NDF), asid detergen fiber (ADF) dan asid detergen lignin (ADL) tidak ada perbezaan yang signifikan di antara setiap rawatan. Untuk *in-vitro* pengeluaran gas, hasilnya menunjukkan yang amat ketara berbeza pada 100 kg N / ha berbanding rawatan lain. Untuk *in-vitro* penghadaman bahan kering, hasilnya menunjukkan perbezaan yang amat ketara pada 200 kg N / ha berbanding rawatan lain. Kesimpulannya, penambahan pembajaan nitrogen (urea) meningkat nilai berkhasiat daripada kandungan protein kasar pada Super Napier Pakchong1. Selain itu, penghadaman bahan kering juga meningkat dengan penambahan pembajaan nitrogen.

KATA KUNCI

Super Napier Pakchong1, pembajaan nitrogen, kandungan nutrient, protein kasar, penghadaman

CHAPTER 1

INTRODUCTION

1.1 Background

The most important source of protein in Malaysia population is animal protein (Kaur, 2010). Nowadays, livestock industry in Malaysia is dominated by monogastric industry which are poultry (broiler and layer) and swine production with self-sufficiency 93.87 % and 120.55% respectively (Malaysia Department of Veterinary Service, 2015). While the self-sufficiency for ruminant industry such as cattle, goat, sheep and milk product is too low. Malaysia are still depending on importation from others country such as Thailand, India, Australia and New Zealand to get enough supply of beef, mutton and milk (A'liah and Hifzan, 2015). Availability and nutritional value of feedstuff source is very important to ensure the high production in ruminant industry.

In Malaysia, availability of cheaper feedstuff is quite wide because Malaysia is rich with variety of pasture such as Napier Grass. Napier grass *(Pennisetum purpureum)* originated from Africa (Clayton *et al.*, 2013) and introduced to Malaysia in early 1920'. Nowadays, Napier grass is the most common forage use by farmers because this grass easily to be grown in tropical condition and produce high yield and resistant to short drought. There are many varieties of Napier grass that have been developed in order to obtain higher yield and nutritive value compared to the existing varieties. Recently, new variety has been produced in Thailand known as Super Napier Pakchong1 (SNP1), with the claim that the yield and nutritive value of this variety is higher than other varieties with 16 % to 18 % crude protein compared to only 8 % to 12 % crude protein in other varieties.

Research in pasture or forage production especially is important because forage is the main and cheapest source of feedstuff for ruminant (Njarui, D.M.G. and Wandera, 2004) and easily be grown by farmers. Fertilization management is very important to obtain high yield and can optimized the operational cost to the farmers. Excessive rate of fertilizer also will cause pollution in environment (F.S. Zhang *et al.*, 2013). Nitrogen element is important because it affect the quality of forage yield and the amount decreasing in soil of tropics (Jules, 1974). Nitrogen can improve efficiency of the plants related to water use efficiency (Caviglia and Sadras, 2001, J.W. Fan *et al., 2002* and Ripullone et al., 2004). Nitrogen element in fertilizer also promote the height of the plant and it will result in high quantity of leaf per plant (Akintoye, 1996) which result from increase number and length of internode (Gasim, 2001). Futhermore, addition of nitrogen may increase the leaf stem ratio (Duncan, 1980) and crude protein content (Mohamed, 2010).

The purpose of this study is to determine performance of Super Napier Pakchong1 on different rate of nitrogen fertilization, specifically to determine agronomic properties and yield, nutritive value and digestibility of Super Napier Pakchong1 grown in Malaysia.

1.2 Significant of study

The significant for this study was obtained the optimum rate of nitrogen fertilization to grow the Super Napier Pakchong 1 in good growth, high nutritive value and high productivity in Malaysia. Thus, it optimized the cost of fertilizer and reduced the risk of environmental pollution due to excessive use of nitrogen fertilizer.

1.3 Objectives

The general objective of this study is to determine performance of Super Napier Pakchong1 on different rate of nitrogen fertilization.

The specific objectives of this study are:

1. To determine agronomic properties and yield of Super Napier Pakchong1 grown in Malaysia at different rate of nitrogen fertilization.
2. To determine the nutritive value and of Super Napier Pakchong1 grown in Malaysia at different rate of nitrogen fertilization.
3. To determine digestibility of Super Napier Pakchong1 grown in Malaysia at different rate of nitrogen fertilization.

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