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Influence of cutting interval on yield and quality of purple Guinea grass (*Panicum maximum* TD58) under irrigation

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Introduction

Most of dairy farmers in the northeast of Thailand are smallholders. They have limited pasture area led to lack of good quality roughage throughout the year, especially during the dry season. Farmers usually fed their cattle with agricultural by products, which have low quality and supplemented with commercial concentrate feed. It leads to high milk production cost and more problems of cattle performance. It is necessary to develop and improve the feed quality and quantity, especially pasture, the cheapest and major source of cattle feed. Due to the limited pasture area, intensive pasture system is recommended. They need a suitable technology to manage a small area to produce enough good quality roughage to meet the needs of the dairy cattle. Therefore, it is necessary to use high yielding varieties of forage crops with an appropriate management to achieve high productivity and quality throughout the years. Horne and Stur (1999) suggest that purple guinea grass (*Panicum maximum* TD58) grows well in moderate to high fertility soils with a good drainage and response to water and fertilizer as well. This experiment was conducted on the influence of cutting interval to improve yield and quality of purple guinea grass under intensive management of nitrogen in combination with manure and irrigation during the rainy and dry seasons. Its aim to be beneficial to forage crop production and use as a guide for the efficiently area utilization to forage preparation for dairy farmers.

Materials and Methods

The experiment was conducted at Khon Kaen Animal Nutrition Research and Development Center, KhonKaen, Thailand from May 2009 to December 2011. The experimental design was a randomized complete block, treatments consist of four cutting intervals (25, 30, 35 and 40 days) with 4 replications. The area was ploughed twice. For establishment of purple guinea grass, fertility of the soil was corrected by applying 912.5 kg/ha of lime, compound fertilizer (15-15-15) at 312.5 kg/ha and 12.5 t/ha of manure base on soil analysis result. Nitrogen fertilizer in the form of urea (46-0-0) was applied at a rate of 1,250 kg/ha/year after cutting in each cut. Twelve and half t/ha/year of manure was applied manually every two months. Forty five days purple guinea grass shoots were planted by using 3 shoots/hole with 40x50 cm plant spacing. Irrigation using sprinkler irrigation system was applied at a time consecutively for 10 days after planted. In rainy season, water was supplied all the time when no rain fell consecutively for 3 days, the amount of water at the level of field capacity. In dry season, water supplied every other day. The standardizing cut was made 60 days after planting after that plots were cut according to treatments by cutting above ground at a height of 5-10 cm. Height of the grass was measured one day before cutting. The ratio of leaves to stems was proportioned. Samples from all harvests were dried in a forced-dry oven at 65 °C for 72 hours to determine DM content. The samples were ground in a Wiley mill to pass a 2 mm. screen and thereafter analyzed for Nitrogen (N) content according to the AOAC (AOAC, 2000). The CP content was calculated as 6.25 x N. Neutral detergent fiber (NDF) and acid detergent fiber (ADF) content were determined according to the procedure of Goering and Van Soest (1970). The digestibilities of dry matter (DMD) were determined according to the procedure of the Nylon bag technique (Orskov *et al*., 1980). The data were analyzed with Analysis of Variance in RCBD using SAS and comparing the average by DMRT (Steel and Torrie, 1980).

Results and Discussion

Dry matter yield of four various cutting intervals of purple guinea grass were adjusted experimental collection period to 360 days equally, it showed that dry matter yield of 30 days cutting interval was significantly higher than 25, 35 and 40 days cutting interval ($p<0.05$). Leaf per stem ratio of the most frequent cutting interval (25 days) was higher than ($p<0.01$) longer cutting intervals (30, 35 and 40 days). Number of tillers per square meter of frequent cutting intervals (25 and 30 days) were significant higher than longer cutting intervals (35 and 40 days) ($p<0.01$). But the height of the plant of longer cutting interval was significant higher than frequent cutting intervals ($p<0.01$). The nutrient of the plant showed that dry

matter content, ADF and NDF of frequent cutting interval was highly significant lower than longer cutting intervals ($p<0.01$). But CP and DMD of frequent cutting interval was highly significant higher than longer cutting intervals ($p<0.01$) (Table1). Delayed cutting affected the composition of the harvested forage. As harvesting is delayed, leaf to stem ratio declined, which would be expected to lower the digestibility of the grass.

Table 1: Dry matter yields and major agronomic trait

Cutting Intervals (days)	Dry matter yield			Leaf to Stem Ratio	No. of Tiller/m2 (tillers)	Plant Height (cm.)	Chemical composition (%)				
	t/ha/year	t/ha/cut	t/ha/360d				DM	CP	ADF	NDF	DMD
25	24,070b	1,605c	23,375b	3.64a	370.05a	45.99d	15.12c	11.56a	43.78c	70.54b	80.48a
30	26,805a	2,234b	26,805a	3.26b	345.24a	60.54c	16.62b	10.18b	44.53b	73.16a	77.86b
35	26,556a	2,414b	25,063b	2.54c	282.68b	73.32b	16.64b	10.11b	45.18ab	73.69a	77.32b
40	24,126b	2,681a	24,125b	2.46c	281.79b	78.02a	16.87a	8.85c	45.64a	74.96a	74.70c
Average	25,389	2,233	24,842	2.97	319.94	64.47	16.31	10.17	44.78	73.08	77.59
p- value	0.0218	<0.0001	0.0193	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	0.0016	0.0075	<0.0001
C.V. (%)	5.10	5.72	5.04	5.96	5.79	2.82	0.60	3.00	1.03	1.84	0.77

Conclusion

Cutting interval had a marked effect on forage composition of Purple guinea grass. Cutting interval at 30 and 35 days seem to provide maximum yield with an acceptable leaf to stem ratio and crude protein content.

References

AOAC, 2000. *Official Methods of Analysis*. Association of Official Analytical Chemists, Inc. Washington, D.C., USA

Goering, H. K. and P. J. Van Soest. 1970. *Forage Fiber Analyses* (Apparatus, Reagent, Procedures and some Applications).

Agriculture Handbook No. 379. United States Development of Agriculture. Washington, D.C. 20402, U.S.A. 20p.

Horne, P. M. and W. W. Stur. 1999. *Developing forage technologies with smallholder farmers: How to select the best varieties to offer farmers in Southeast Asia*. ACIAR Monograph No. 62. (ACIAR and CIAT: Vientiane, Lao PDR).

Orskov, E. R., F. D. De, B. Hovell and F. Mould. 1980. The use of nylon bag technique for the evaluation of feedstuffs. Tropical Animal Production, 5: 195-213.

Steel, R.G.D. and J. H. Torrie. 1980. *Principles and Procedures of Statistics*. *A Biometrical Approach* 2nd edition. McGraw-Hill, Book Company, Inc. New York.

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