AGRONOMIC PERFORMANCE OF BRACHIARIA MULATO II AS AFFECTED BY FERTILIZER RATE AND CUTTING AGE

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ABSTRACT

A 12 week study was conducted to investigate the agronomic performance of Brachiaria mulato II In a randomized complete block design using 4x3 factorial arrangement with 4 cutting age and 3 fertilizer quantity. Data collected were plant height (PH), numbers of tillers (NT), leaves per tiller (LT), leaf length (LL) leaf width (LW) and herbage yield. All data were subjected to analysis of variance using a general linear model of SAS (2000) and means were separated using Duncan's multiple range test (DMRT) 5% probability level. The highest and lowest PH (98.98vs 58.71cm) was recorded at 12 and 3 weeks, fertilizer quantity had no effect on plant height. NT were significant (P=0.0032) for age and fertilizer quantity.LT were not affected by age (P=0.061) and fertilizer application (P=0.051). Age had effect (P=0.041) on LL and LW (P=0.012).herbage yield was affected by age (P=0.0018) but not by fertilizer application (P=0.12). It could be concluded that age improved the agronomic performance of Brachiaria mulato II.

Keywords: *Brachiaria mulato* II, Plant height, Agronomic performance, Cutting frequency, Fertilizer Quantity.

INTRODUCTION

Livestock production and productivity per head of animal is low in Nigeria due to lack of good quality and adequate feed during the dry season (FAO, 2019). There has been several attempts to solving this challenges (Adedokun, 2022) using crop residual and concentrate but the increase in the cost of these materials make natural pasture a means to sustainable ruminant production as ruminant majorly depends on natural pastures. (Aderinola, 2007)

FAO, (2016) stated that if improved forages are combined and produced at local level in a maintainable manner, livestock productivity will be improved. The use of such forages for ruminant animals not only provides required nutrients in adequate quantity but also reduces enteric methane emission (Hristov *et al*., 2022). Moreover, the amalgamation of improved forage crops in agricultural systems has many benefits, including soil conservation and reduced weeds, and diseases. One of such forage of noticeable characteristics is *Brachiaria* grass which is one of the diverse aspirant forages that have a multipurpose function in the farming systems in tropics (Cheruiyot *et al*., 2020). *Brachiaria* grass, especially Mulato II, is a preferred grass among farming communities in Africa because of its high stages of drought and disease resistance combined with having high palatability, nutritional and considerable high biomass yield that increased productivity of animals (Adnew *et al*., 2021)

When plants are fertilized, they often experience a surge in growth, with increased production of leaves and stems. Resulting in higher biomass (Lima *et al.,* 2014). The effect of cutting age on the agronomic performance of *Brachiaria mulato* II has been document (Argel *et al*., 2007) as consistent cutting can increase herbage to about 19ton/h under proper management. However, there should be a point where fertilizer quantity and age at harvest will meet to get the best out of this great forage plant. In view of this, the study investigate the effect of Fertilizer quant and age at harvest on the agronomic performance of *Brachiaria mulato* II.

MATERIALS AND METHODS

Site Selection and Land Preparation

The experimental land measuring 10m × 147m was mapped out at the pasture demonstration plot of teaching and research farm of LAUTECH, Ogbomoso and partitioned into 12beds of 2 by 3m with 1m walking spacing between the beds. Data collection comes after the experiment has been established at 3 weeks interval.

Planting Material, Planting

Crown split of *Brachiaria Mulato* II obtained from an already established plot was cut into 10 cm and transplanted at a spacing of 50cm between plants with 2 tiller per stand. Urea fertilizer was applied 2 weeks after transplant.

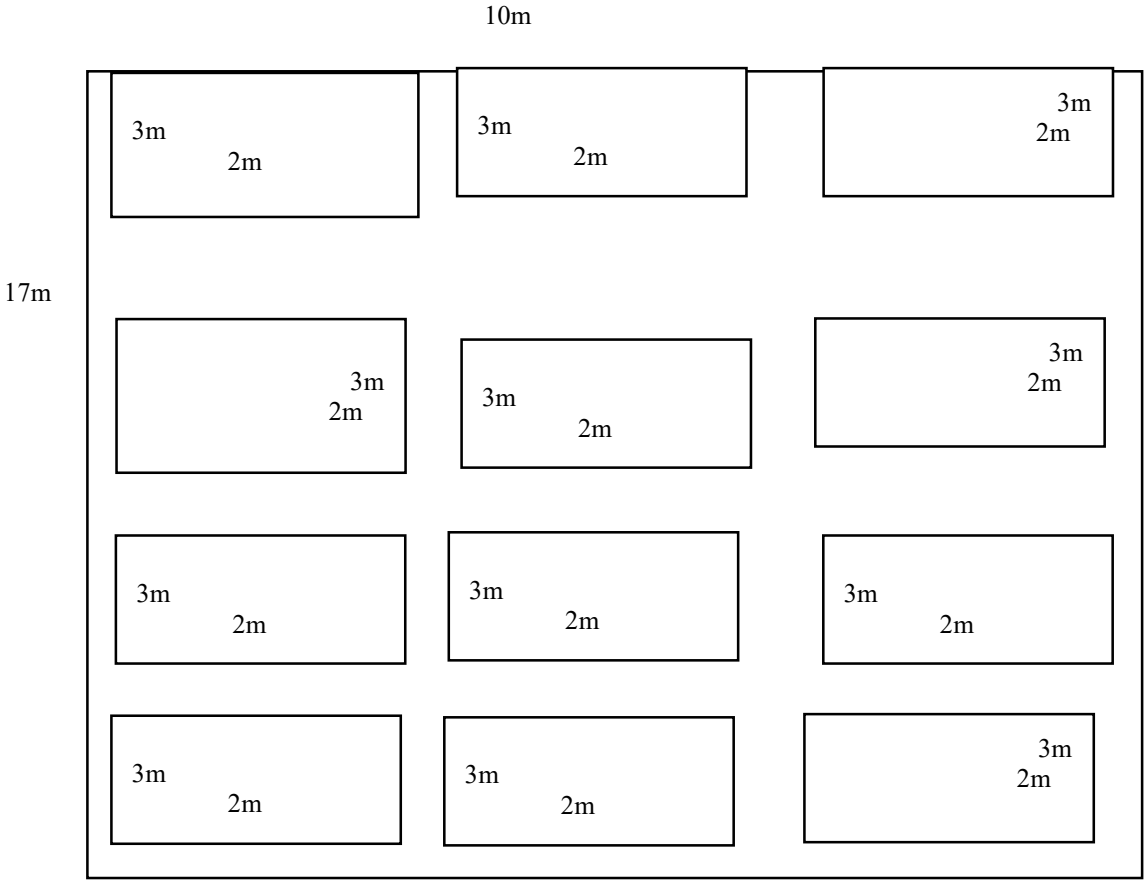
Post planting operation

Weeding was done manually when due. The weeded material were left on the respective plot to decay in order to return the absorbed nutrient back to the soil.

Experimental Design and Plot Management

The experiment was a 4 x 3 factorial arrangement in a randomized complete block design (RCBD) having four (4) fertilizer rate 0 kg/h, 50kg/h, 75kg/h and 100kg/h of Urea fertilizer and 3 cutting age of 3, 6 and 9 weeks.

Fig 3.1: Experimental Field and Layout



Data Collection

Data were collected on plant height, tiller number, leaf length and leave width and herbage yield using a 0.75m^2 quadrant.

Statistical analysis

All data were subjected to analysis of variance using a general linear model of SAS (2000) and the treatment means were separated using Duncan's multiple range test (DMRT) of the same package at 5% of significance.

RESULTS

Table1: Main effect of cutting age on the agronomic performance of *Bracharia mulato II*

The main effect of cutting age on the agronomic performance of *Bracharia mulato II* is presented in the table 1 below. Most of the agronomic performance were significantly affected by the cutting age (P<0.05) except for leaves per till (P>0.05). *Bracharia mulato ii* harvested at week 12 recorded the highest agronomic performance and herbage yield while the lower values were recorded at week 3 and 6.

Table1: Main effect of cutting age on the agronomic performance of *Bracharia mulato II*

Age	Plant height(cm)	NT	LT	Leaf length(cm)	Leaf width(cm)	Herbage yield(t/h)
3	58.71^{c}	4.24^{c}	5.53	22.90^{b}	2.24^{b}	151.78^{c}
6	71.63^{bc}	6.40^{bc}	6.23	42.20^{a}	2.42^{a}	1477.75^{bc}
9	75.22^{b}	9.40^{b}	6.00	43.86^{a}	2.37^{ab}	4493.05^{b}
12	98.98^{a}	20.47^{a}	7.59	50.91^{a}	2.81^{a}	13729.35^{a}
SEM	7.16	1.80	0.61	3.65	0.17	2400.34

^{abc} *means the same superscript in the same column are not significant different (P> 0.05)*

NT=Number of Tillers, LT = Leaf per Tiller, SEM= sum of error means

Table 2: Main effect of fertilizer quality on the agronomic performance of *Bracharia mulato II*

The main effect of fertilizer quantity on the agronomic performance of *Bracharia mulato II* is presented in the table 2. Most of the agronomic performance were not significantly affected by the fertilizer quantity (P>0.05)

except for numbers of tiller (NT) (P<0.05). *Bracharia mulato II* fertilized at 75kg/h had the highest numbers of tillers while 0.00kg/h recoded the lowest numbers of tillers.

Table 4.2: Main effect of fertilizer quality on the agronomic performance of *Bracharia mulato II*

Fertilizer quantity	Plant height(cm)	NT	LT	Leaf length(cm)	Leaf width(cm)	Herbage yield(t/h)
0.0kg/h	66.70	3.58[c]	6.10	42.49	2.30	781.75
100kg/h	75.99	7.54[bc]	6.07	44.33	2.51	7443.0
50kg/h	84.99	13.10[b]	7.89	43.20	2.49	7591.0
75kg/h	82.46	19.56[a]	5.73	41.05	2.55	4081.75
SEM	8.81	2.19	0.75	4.50	0.20	2954.61

[abc] *means the same superscript in the same column are not significant different (P>0.05)*
NT = Number of Tillers, LT = Leaf per Tiller, SEM= sum of error means

Table 3: The agronomic performance of *Bracharia mulato II* has affected by the interaction effects of fertilizer quantity and cutting age is presented in Table 3.
The interaction effects do not have any significant effects on the agronomic performance and herbage yield of ***Bracharia mulato II.*** **(P<0.05)**

Table3: The agronomic performance of *Bracharia mulato II* has affected by the interaction effects of fertilizer quantity and cutting age.

Fertilizer Quantity	Cutting Age	Plant height(cm)	NT	LP	LL(cm)	LW(cm)	HY(t/h)
0.00kg/h	3	61.33	2.50	5.25	40.88	2.03	75.00
	6	67.44	2.25	6.50	44.67	2.41	653.00
	9	56.11	2.75	4.67	36.26	2.05	1226.00
	12	81.90	6.83	8.00	48.15	2.73	1173.00
50kg/h	3	47.24	3.85	5.23	28.18	1.90	166.00
	6	69.30	9.08	7.08	39.58	2.36	1826.00
	9	88.36	14.33	7.00	48.93	2.28	7706.00
	12	135.06	25.13	12.25	56.13	3.43	20666.00
75kg/h	3	68.68	8.17	6.00	26.08	2.50	202.00
	6	85.44	10.38	5.50	45.56	2.55	240.00
	9	81.71	17.14	5.86	43.86	2.43	725.00
	12	94.00	42.57	5.57	48.71	2.73	15160.00
100kg/h	3	61.21	3.56	5.89	36.00	2.48	159.00
	6	69.89	5.50	6.10	40.29	2.46	3320.00
	9	76.42	14.80	5.80	46.79	2.53	6480.00
	12	96.43	4.37	6.50	54.25	2.58	19813.00
	SEM	17.63	4.37	1.49	8.99	0.52	5909.22

NT= numbers of tillers, LP= leaves per tiller, LL = Leaf Length, LW = Leaf Width, HY=herbage yield, SEM = sum of error means.

DISCUSSION

The observation from this study shows that the cutting age and fertilizer quantity has significant effects on the agronomic performance and herbage yield of B. mulato II which correlate with the report of Wubetie and Bimrew, (2023) that different factors such has rainfall pattern, solar radiation and cultural practices directly influence plant performance. The highest plant height 98.98cm observed at week 12 for this study agreed with the of report of Argel *et al.* (2007) that plant harvested at older age tends to reach their growth peak but further increase in this length may results in competition between plants for space and sunlight. The plant height were not significantly affected for this study yet the plant height recorded were in agreement with other findings (De Souza-Kaneshima *et al*., 2010; Yiberkew *et al.,* 2020)

B. Mulato II had been documented to possess higher tilling characteristics which is one of the reasons for its high adaptability to tropical environment (Argel *et al*., 2007). The numbers of tiller per crown 4.24-25 gotten for this study is lower compared to 64.43 reported by Wubetie and Bimrew (2023) when harvested at 90days after planting. This wide differences could be due to the numbers of tillers use at establishment, the climatic condition, soil profile, age at harvest and adaptability to this environment but an increase in age increases the number of tillers. The leaf length, leaf per tiller and leaf width of pasture plants determines its sward factor, although those parameters may play little to no role in the dry matter herbage yield, but it may determine the quantity of plant to consume and time animals used grazing. Although the fertilizer quantity do not affect these parameters, but the

age at harvest does confirming that age is directly proportional to growth in any living organisms (Kaplan and Robson, 2009)

The leaf length, leaf per tiller and leaf width gotten for this study agreed with the report from previous authors (Jančík *et al*., 2009; Wubetie and Bimrew 2023). The herbage yield determines the quantity of forage harvested over a specific area of a pasture field. Herbage yield can also can be used to determine the productivity a pasture species. The herbage yield gotten from the results were significantly affected by age at harvest. An increase in age increases the herbage yield. The increase in the herbage yield at 12 weeks can be attributed the high number of tiller recorded at 12 weeks. However, the herbage yield gotten from this result is lower compared the report of Wubetie and Bimrew, (2023) who reported 19ton/ h when harvested at 19weeks. The difference could be due to age at harvest, planting density and other cultural practises. However, it is worth noting that fertilizer application had no significant effect on the herbage yield for this experiment due to sudden break in rain fall.

CONCLUSION

It could be concluded based on this study that *Bracharia mulato II* significantly increases as age at harvest increases and a better agronomic performance were achieved at 12 weeks of harvest. Although fertilizer application improves some parameters but its effect were not felt as that of age at harvest.

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