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## The correlation between plant morphology and dry yield of elephantgrass

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**Key words :** plant morphology ,dry yield ,stem/leaf ration ,elephantgrass ,*Pennisetum purpureum* Schumach .

**Introduction** Elephantgrass (*Pennisetum purpureum* Schumach) , also known as Napiergrass , is a tropical and subtropical perennial bunchgrass . Elephantgrass , due to its high productive potential , and nutrient quality , has been highlighted as one of the most important tropical forages for the improvement of dairy grazing system in the tropics . The feed value of elephantgrass is not ideal because it has low leaf/stem ratio , coarse texture and lower palatability . Elephantgrass is used not only as forages crop but also as one of the most promising biomass crops in Europe due to its very high yields of energy . The objectives of this study were to examine the relationship between yield and plant morphology , and select proper elephantgrass as potential biomass crop and forage crop .

**Materials and methods** The experiment was conducted during 2007 at the Jiangsu Academy of Agricultural science , Nanjing , Jiangsu province (118°48' E , 32°32' N) , where the mean rainfall was about 1000mm/year . 17 elephantgrass lines and one pearl millet-elephantgrass hybrid and used and a random blocks design was made with three replicates . Plots were two rows , each 4-m long with 0 .7m between rows , and the plant spacing within rows was 0 .5m . Urea was broadcastly-fertilized at the rate of 40 kg N ha<sup>-1</sup> (20 kg ha<sup>-1</sup> in June and 10kg ha<sup>-1</sup> after harvest respectively) . Plots were planted using root divisions on May 23 . Plots of two replications and one row of the third replication were harvested to determine yield on July 25 and October 7 , respectively . The other row of the third replication was harvested once on October 19 . Fresh weight was quantified , and a subsample was taken from each plot and hand-separated into leaf , stem+leaf sheath fractions . The fractions were dried in a oven at 65°C to until constant weight to measure dry matter . Data were treated in Excel and analyzed in SAS .

**Table 1** Morphology and yield of elephantgrass when harvested one time and harvest two times for 4 groups of clustering analyse .

Group	Line	Dry yield (kg/ha <sup>-1</sup> )	Stem/leaf	Stem diameter (cm)	Leaf breadth (cm)	Leaf length (cm)	Plant height (cm)	Tillering number	dry yield 1 <sup>+</sup> (kg/ha <sup>-1</sup> )	Stem/leaf 1 <sup>+</sup>
Group 1	e48	8331	0.70	0.960	1.3	44.2	106.7	47.7	6241	0.34
Group 2	e23 , e71 , e81 , e97	19872	1.39	1.217	2.7	74.7	191.8	25.4	7371	0.45
Group 3	e1 , e58 , e73 , e88 , e94 , e955 , e106 , e114 , e115	36386	2.07	1.382	3.4	104.4	290.5	17.6	7392	0.58
Group 4	e33 , e112 , e121 , PME	60617	2.85	1.502	4.2	97.0	351.3	17.9	12156	1.01

Note : 1<sup>+</sup> indicate the two harest results , PME : pearl millet-elephantgrass hybrid

**Results** There were significant differences ( $p < 0.01$ ) in plant morphology and yield of elephantgrass lines . Dry yield positively correlated ( $p < 0.01$ ) to stem/leaf ratio , stem diameter , leaf breadth and plant height ; stem/leaf ratio positively correlated ( $p < 0.01$ ) to stem diameter , leaf death , leaf length and plant height , and negatively to tillering number (data not shown) . The elephantgrass lines were divided into 4 groups (table 1) by clustering analyse based on dry yield , stem/leaf ratio , and plant height . The first group included e48 line , with a dwarf , numerous tillers , low stem/leaf ratio butchgrass , and low dry yield . The second group included 4 lines in which dry yield , plant height and stem/leaf ratio were higher than the first group . The third group included 9 lines in which dry yield , plant height and stem/leaf ratio were higher than the second group . The forth group including 3 lines and pearl millet-elephantgrass hybrid offered the highest dry yield , plant height and stem/leaf ratio in all the groups .

**Conclusions** Although dry yield of elephantgrass when harvested one time per season was significantly higher ( $p < 0.01$ ) than two times per season (table 1) , it is proper to harvest two times per season for line e1 , e33 , e115 and pearl millet-elephantgrass hybrid harvested two times per season were proper for forage crop , and to harvest one time per season for e33 , e112 , e121 and pearl millet-elephantgrass hybrid harvested based on dry yield and stem/leaf ratio .

### References

- Woodard , K .R . , Prine , G .M . , Bates , D .B . (1991) . Silage characteristics of elephantgrass as affected by harvest frequency and genotype . *Agronomy journal* , 83 :547-551 .
- Claessens , A . , Michaud , R . , Belanger , G . , Mather , D .E . (2005) . Leaf and stem characteristics of timothy plants divergently selected for the ratio of lignin to cellulose . *Crop science* , 45 :2425-2429 .