Leaf and tiller dynamics in centipede grass and bahia grass

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Introduction Centipede grass (*Eremochloa ophiuroides* (Munro) Hack.) is a warm-season perennial which has received the attention of farmers and researchers as a new forage resource for sown pastures in the low-altitude regions of south-western Japan where bahia grass (*Paspalum notatum* Flügge) has been widely used (Islam & Hirata, 2005). Leaf and tiller dynamics provide the basis to explain variation in production and canopy structure of a grass sward (Rhodes & Collins, 1993), and knowledge of the dynamics can be used as a tool for sward management. However, this information is lacking for centipede grass (Islam & Hirata, 2005). The aim of this study was to obtain information on leaf and tiller dynamics of centipede grass in comparison with bahia grass.

Materials and methods There were eight plots (1×1 m) each of which consisted of a turf (0.3×0.3 m) of centipede grass (cv Common) at the centre with the remainder grown with bahia grass (cv Pensacola). The plots received two levels of N (low=5 g/m^2 per yr, high=20 g/m^2 per yr; 4 plots for each N level). Five vegetative tillers were randomly tagged in each of the grasses in each plot, and rates of leaf appearance (LAR), death (LDR) and detachment as litter fall were measured at monthly intervals by recording number and state of leaves on the tillers. The number of daughter tillers initiating from the axils of the youngest six leaves were also counted.

Results The effects of N on all measures were minimal. LAR was lower in centipede grass than in bahia grass (0–0.13 vs 0–0.23 leaves/tiller per d) while LDR (0.004–0.195 leaves/tiller per d) and leaf detachment rate (0.004–0.184 leaves/tiller per d) were similar for both grasses, resulting in lower number of live leaves per tiller in centipede grass than in bahia grass (1.9–7.1 vs 3.8–10.9). For both grasses LAR was positively related to air temperature with maximal LAR lower in centipede grass than in bahia grass (Figure 1). The number of daughter tillers per tiller in centipede grass was four times higher than in bahia grass (1.45 vs 0.36) due to the higher probability of tillering at axils of leaves. The probability of having daughter tillers at the axil of the sixth leaf in centipede grass and bahia grass averaged 41 and 6% respectively over the growing season (May–Oct.), and 28 and 0% respectively over the remaining time (Nov.–March) (Figure 2).

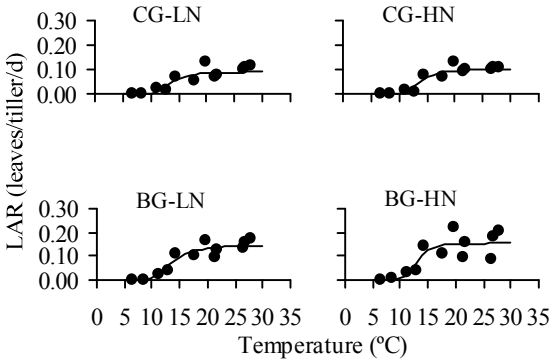

Figure 1 Relationship between LAR and mean daily air temperature in centipede grass (CG) and bahia grass (BG) with low (LN) and high (HN) N. Equations: CG-LN, $y=0.089((x-6.6)/7.0)^{4.5}/(1+((x-6.6)/7.0)^{4.5})$, r=0.89, p=0.004; CG-HN, $y=0.099((x-6.6)/7.0)^{4.5}/(1+((x-6.6)/7.0)^{4.5})$, r=0.94, p=0.003; BG-LN, $y=0.145((x-6.6)/7.1)^{3.6}/(1+((x-6.6)/7.1)^{3.6})$, r=0.93, p=0.006; BG-HN, $y=0.155((x-6.6)/6.5)^{5.3}/(1+((x-6.6)/6.5)^{5.3})$, r=0.84, p=0.019

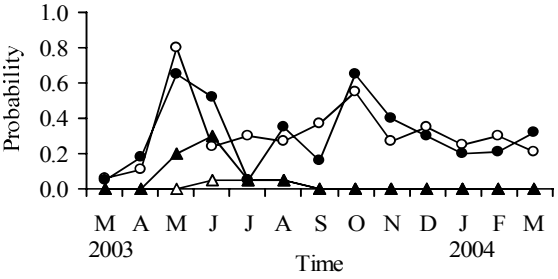

Figure 2 Probability of having daughter tillers at the axil of the sixth youngest leaf for low (○) and high (●) N in centipede grass, and low (Δ) and high (▲) N in bahia grass. Symbols are not visible when overlaping

Conclusions Centipede grass had lower LAR and fewer live leaves per tiller than bahia grass. However, centipede grass showed much higher tillering ability and number of daughter tillers per tiller than bahia grass. This is a key mechanism by which centipede grass forms a denser, leafier sward and attains similar production to bahia grass (Islam & Hirata, 2005).

References

Islam, M.A. & M. Hirata (2005). Centipede grass (*Eremochloa ophiuroides* (Munro) Hack.) – its growth behaviour and multipurpose usages: a review. *Grassland Science*, 51, (in press).

Rhodes, I. & R.P. Collins (1993). Canopy structure. In: A. Davies, R.D. Baker, S.A. Grant & A.S. Laidlaw (eds.) Sward Measurement Handbook. British Grassland Society, 139-156.