Morphogenetic characteristics of *Panicum maximum* cv. Aruana subjected to five defoliation stubble heights and two frequencies

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Introduction Tillers in grass swards are subject to size density compensation and this mechanism has been observed to follow the –3/2 self thinning rule. This theory assumes that tiller components (leaf lamina and stems) have a constant geometry as the sward is taller or shorter. In a re examination of this rule (SackvilleHamilton *et al*., 1995) observed that in grass swards the slope can be different from -3/2 depending on the extremes of defoliation (Hernandez-Garay *et al*., 1999). Therefore, the dimensionless measure, R (ratio tiller leaf area : volume) was proposed to isolate the tiller geometry component from the tiller size. Guinea grass is the second most sown grass in Brazilian pastures and cv. Aruana has been used successfully in the past ten years in sheep grazing systems. Since this bunch grass presents numerous aerial tillers that contribute to yield, the objective of this paper was to evaluate changes in tiller leaf area and volume on plants subjected to high frequency (simulating a continuous grazing), and low frequency defoliation (simulating an intermittent grazing), under different defoliation stubble heights.

Material and methods Treatments corresponded to five defoliation stubble heights (70, 140, 210, 280 and 350 mm above ground level) and two frequencies of defoliation: high (defoliation every 10 days in Spring/Summer and 15 days in Autumn/Winter) and low (defoliation at monthly intervals) in potted plants in a glasshouse during one year. At the end of the experimental period plants were destructively harvested and from each plant all basal and aerial tillers were counted and volume (Sbrissia et al., 2004), leaf area and dry weight of each tiller category calculated. Each frequency was considered a complete and independent experiment on a complete block design with five treatments (cutting heights) and four replicates.

Results A decrease in basal tillers associated to an increase in aerial tillers was observed in both frequencies with an increase in defoliation height (Table 1). Basal tillers dry weight and volume was greater compared to aerial tillers due to the great amount of stem component in both defoliation regimes resulting in smaller ratio leaf area: volume in basal tillers. New studies are being conducted to evaluate the contribution of each tiller group (basal and aerial) to dry matter production of this cultivar.

Table 1 Morphogenetic variables of basal and aerial tillers of Guinea grass cv. Aruana subjected to five defoliation stubble height and two harvest frequencies: High = 31 harvests/year (on the left) and Low = 13 harvests/year (on the right)

Variables	Tiller type	Stubble height (mm)					Mean	sem	Tiller type	Stubble height (mm)					Mean	sem
		70	140	210	280	350				70	140	210	280	350		
Tiller number	Bas	92.0	42.3	10.5	8.5	10.3	32.6	16.11	Bas	44.5	15.0	4.0	3.2	4.2	14.2	4.2
(plant/pot)	Aer	0	42.5	54.3	65.0	58.8	55.1	4.75	Aer	13.9	16.5	26.0	31.7	29.5	23.5	3.54
Dry weight/tiller	Bas	79	130	231	300	424	232	61.4	Bas	366	434	902	645	697	609	96.0
(mg)	Aer	---	55	92	130	181	114	27.0	Aer	212	321	315	402	345	319	30.9
Leaf Area/tiller	Bas	5.2	6.0	11.5	13.0	12.7	9.7	1.69	Bas	42.4	53.7	56.4	42.4	50.8	49.1	2.95
(cm2)	Aer	---	4.2	6.9	9.1	13.9	8.5	2.05	Aer	34.3	38.5	37.7	37.4	42.6	38.1	1.33
Volume/tiller	Bas	0.6	0.8	1.5	1.4	2.5	1.4	0.34	Bas	1.9	2,4	4,6	3,3	3.0	3,0	0,45
(cm3)	Aer	---	0.3	0.7	0.9	1.2	0.7	0.18	Aer	1.2	1.7	1.6	2.0	1.7	1.6	0.12
R	Bas	22.4	19.5	37.2	35.0	30.4	2894	3.46	Bas	143.8	172.7	100.0	92.7	139.7	129.8	14.82
(ratio leaf : area:volume)	Aer	---	28.6	29.5	32.4	46.6	34.3	4.18	Aer	157	151.8	149.3	159.1	165.1	156.4	2.78

Conclusion These results suggest a great phenotypic plasticity in this cv. which provides great flexibility of response to grazing management

References

Hernandez Garay, A., Matthew, C.& Hodgson, J. (1999) Tiller size-density compensation in ryegrass miniature swards subject to differing defoliation heights and a proposed productivity index. *Grass and Forage Science*, 54 (4), p.347-356,

Sackville Hamilton, N.R., Matthew, C. & Lemaire, G. (1995). In defence of the –3/2 boundary rule: a re-evaluation of self-thinning concepts and status. *Annals of Botany*, 76, 569-577.

Sbrissia, A.F., Da Silva, S.C., Molan, L.K., Sarmento, D.O.L., Andrade, F.M.E., Lupinacci, A.V.& Gonçalves, A.C. (2004) A simple methodology for measuring tiller volume. *Grass and Forage Science*, 59 (4), 406-410.