

## Physical impediment towards digestive breakdown in leaf blades of *Brachiaria brizantha*

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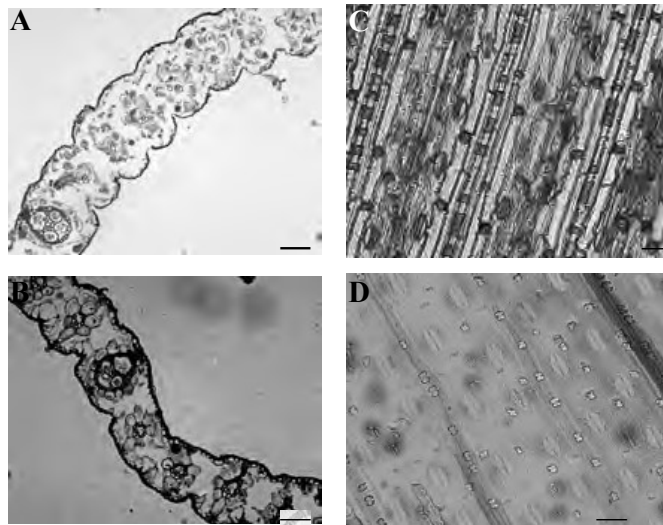
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**Introduction** Consumption of grasses is influenced by the physical properties of forages which confer resistance to digestive breakdown. Such barriers may be the proportion of indigestible tissues, girder structure and epidermal cell arrangements. Anatomical factors, if identified early are invaluable tools in breeding and selection programmes for forages of high quality. The objective of this study was to verify which anatomical attributes might be interfering in the physical resistance to rumen breakdown in *Brachiaria brizantha* ecotypes.

**Materials and methods** Four ecotypes of *Brachiaria brizantha*, B1, B4, B8 and B9, were grazed for two years in 1,000 m<sup>2</sup> paddocks, in two replicates, in Campo Grande, Brazil. After leveling, transect sampling of the second fully expanded leaf and of leaf fragments in oesophageal fistula samples were taken. The leaf fragments of herbage and extrusa were incubated *in vitro* for 24 h. *In situ* dry matter (DM) degradability (6, 24, 36, 48 and 72 h) was done using leaves, analysed according to Van Milgen *et al.* (1991). The residues of *in vitro* digestibility were then fixed, histologically cut (10 µm) and stained for optical microscopy observation (MO). The residues of *in vitro* digestibility from the extrusa were analysed with the samples *in natura*. The epidermis was isolated from leaf fragments using Jeffrey solution followed by MO.

**Results** All genotypes displayed a high frequency (average of 95.6%) of girder I structure along the cross section. This did not interfere in digestive breakdown of B9, however (Figure 1A). The effect of girder I in B4 (Figure 1B), B8 and B1 genotypes (in decreasing order) was attributed to epidermal stigmata (Figure 1C); epidermal silica cells (ESC) lying over sclerenchyma fibers associated with vascular bundles, as caps or girds (Prychid *et al.*, 2003). In B9, ESCs were less associated with the sclerenchyma (Figure 1D). The disappearance of parenchyma bundle sheaths (PBS) also interfered with digestive breakdown: in B4 there was greater liberation of tissues to the incubation media due to greater PBS degradation when compared to B8 and B1. The results of *in situ* degradability agree with the anatomical study. The soluble fraction was 14.9%; 28.7%; 9.7% and 21.3%; potentially degradable fraction was 52.6% ± 2.4; 36.0% ± 4.0; 24.4% ± 1.6 and 57.3% ± 9.4; undegradable fraction was 32.4% ± 2.4; 35.0% ± 3.6; 24.4% ± 1.6 and 66.4% ± 5.3; and rate of DM disappearance was 7.13; 5.05; 7.40 and 5.75%/h for B1; B4; B8 and B9 respectively. Differences among these genotypes could not be detected by chemical analysis including silica content or by IVDMD percentages (Torres, 2002).



**Figure 1** A and B Cross-section of leaf blades of *Brachiaria brizantha*, incubated in buffer for 24 hours (A.B9, B.B4). C and D. Abaxial epidermal cells (C. B4 and D. B9) (— 20 µm)

**Conclusions** The physical impediment to digestive breakdown of leaf blades of *Brachiaria brizantha* is attributed to epidermal stigmata and to parenchyma bundle sheath cells disappearance.

### References

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