Brachiaria brizantha cv. BRS Piatã forage availability under integrated crop-livestock-forestry systems in Brazil

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Introduction

Integrated crop-livestock-forestry (ICLF) systems are increasingly considered for a diversified agricultural production in Brazil.

ICLF systems are a technology for sustainable food production, in order to increase the efficient use of land and obtain benefits of the interaction between the involved components.

Shading varies according to tree densities and the time of the year (inclination, cloud formation, rainy and dry season). Low radiation input and water limitation are decreasing growth rates of forage grasses. Thus, the improvement of ICLF systems demands first of all a comprehensive understanding of the abiotic environment as created by the tree component in interaction with the seasonal climate, followed by the choice of forage grasses with the ability to adapt to shade, drought and grazing.

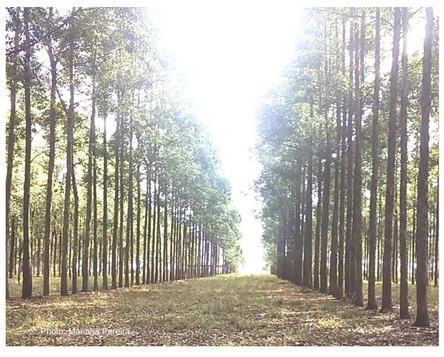

Figure 1: ICLF and ICL systems in Brazil integrating the crop, livestock/pasture and forest components in rotation, succession or combined in the same area.

Objective

Analyze the average (ø) forage availability [t DM ha-1] of *Brachiaria brizantha* cv. BRS Piatã on different integrated systems in Brazilian Cerrado

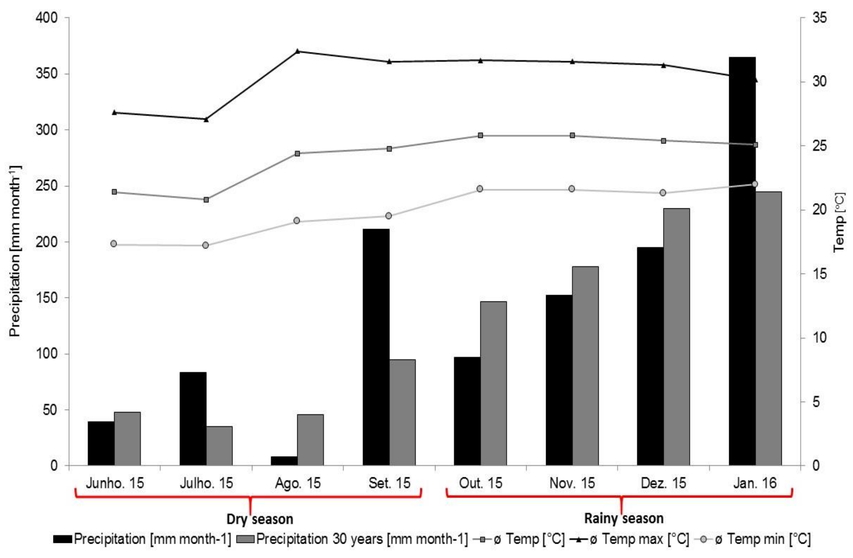

Figure 2: Precipitation and temperature data during the experimental period, Campo Grande, MS, Brazil

Materials & Methods

The analyzed plots with four replicates corresponded to three production systems: Two integrated crop-livestock-forestry systems (ICLF1 and ICLF2) and an integrated crop-livestock system (ICL).

The trees (*Eucalyptus urograndis*) in the ICLF systems were planted in single rows with 2 m between tress and 14 or 22 m between rows, resulting in 357 trees ha-1 (ICLF1) and 277 trees ha-1 (ICLF2), respectively.

The crop component is soy-bean, planted every 4 years. Grass biomass was sampled monthly in a line of five sampling points at equal distance from each other between tree rows to represent the understory shading gradient (Fig 3).

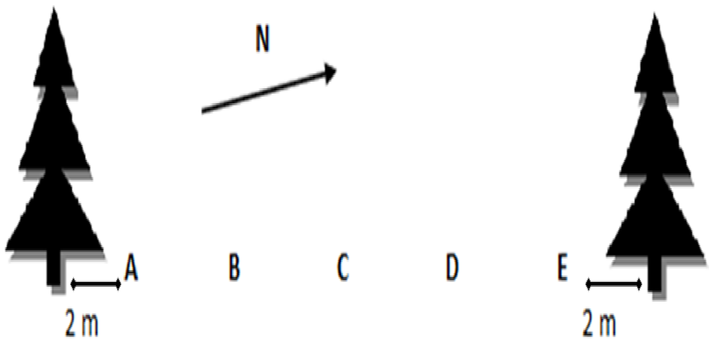

Figure 3: Sampling points between the tree rows

Results

Table 1: ø forage availability (t DM ha^{-1}) and stocking rate (UA ha^{-1}) of different systems and seasons

	ICLF1 (375 trees ha^{-1})	ICLF2 (227 trees ha^{-1})	ICL
ø forage availability			
Dry season	0.5 Bb	0.8 Bb	2.2 Ba
Rainy season	1.6 Ac	2.1 Ab	3.6 Aa
stocking rate			
Dry season	0.1 Bc	0.7 Bb	1.8 Ba
Rainy season	2.1 Ab	3.7 Aa	3.9 Aa

Means followed by the same letter, uppercase in the columns and lowercase in rows do not differ by Scott-Knott test at 5% probability

Table 2: ø forage availability (t DM ha^{-1}) of the different sampling points of ICLF2

	A	B	C	D	E
Dry season	0.5 Bb	0.8 Bb	1.2 Ba	0.9 Ba	0.7 Bb
Rainy season	1.6 Ab	2.7 Aa	2.4 Aa	2.5 Aa	1.4 Ab

Means followed by the same letter, uppercase in the columns and lowercase in rows do not differ by Scott-Knott test at 5% probability

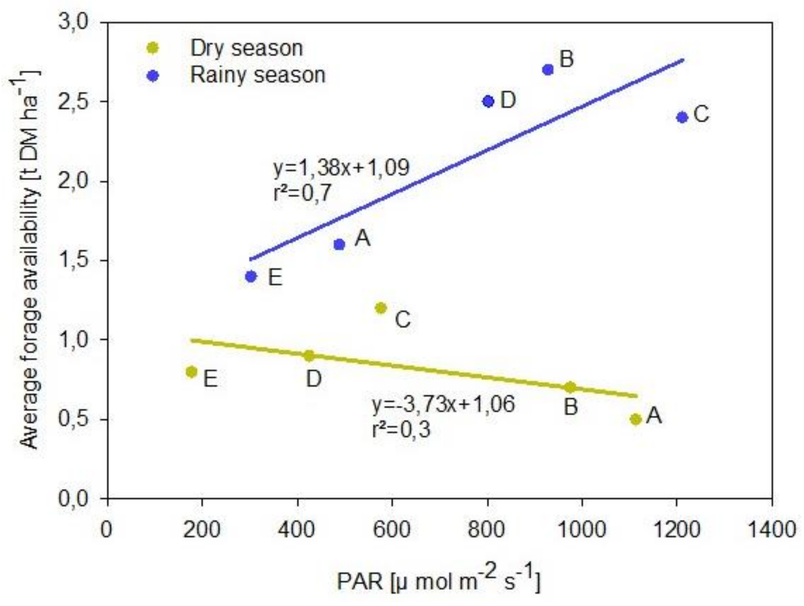

Figure 4: PAR (Photosynthetically active radiation) vs average forage availability for the sampling points between the tree rows (Fig 3)

- ICLF2 shows the same carrying capacity as ICL systems during the rainy season suggesting that Piatã grass is shade tolerant.
- Forage availability was affected by different light intensities found in ICLF systems in rainy season. However, in the dry season this relation was not found, indicating the presence of more severe factors limiting forage availability.

Conclusion

Average forage availability in ICLF systems is seasonally shifting from light limitation (rainy season) to water limitation (dry season).

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