

Saskia Windisch¹, Ditmar Kurtz^{1,3}, Francisco Nunez^{1,3}, Uta Dickhöfer², Folkard Asch¹

¹ University of Hohenheim, Institute of Plant Production and Agroecology in the Tropics and Subtropics, Garbenstr. 13, 70599 Stuttgart, Germany

² University of Hohenheim, Institute of Animal Production in the Tropics and Subtropics, Fruwirthstraße 31, 70599 Stuttgart, Germany

³ National Agricultural Technology Institute, E.E.A. Corrientes. Ruta 12km 1008, Corrientes, Argentina

E-mail address: Saskia.Windisch@uni-hohenheim.de

Introduction

Continuous rises in the export of beef trigger changes in the management of traditional farming systems in subtropical grassland of Northern Argentina, Corrientes.

Extensive grazing systems results in large accumulation of dead plant material. The effect of grazing and trampling was suggested to increase productivity and benefit biodiversity.

The aim of this study was to investigate the effect of the “grazing impact” on botanical composition at varying days after impact (DAI).

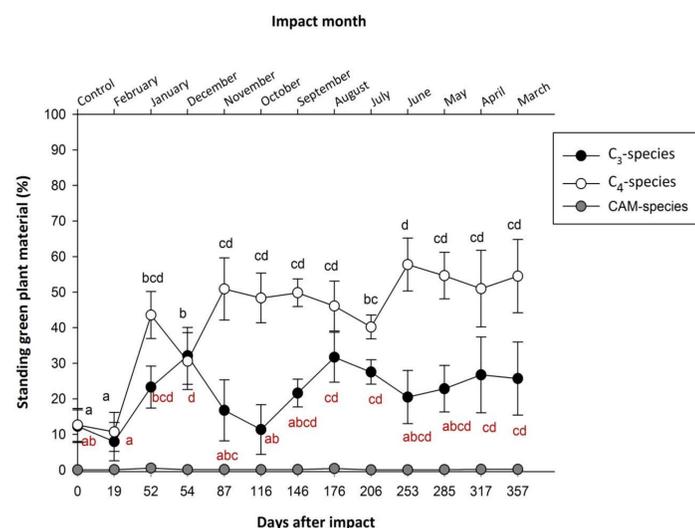


(A) and (B) Extensive grazing system in Corrientes grassland before, and (C) after the grazing impact

Conclusions

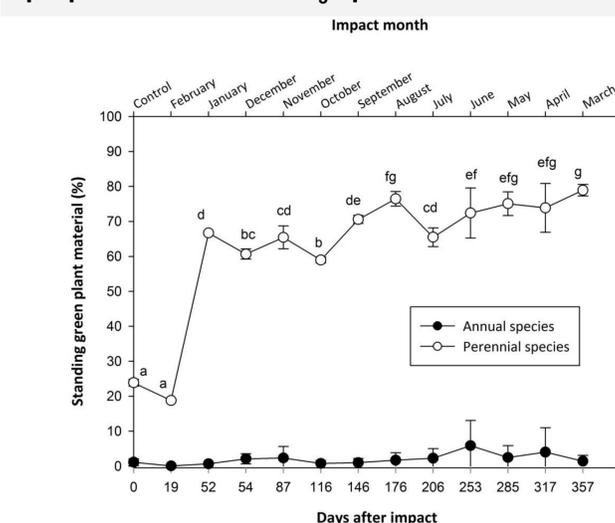
- The biodiversity of species composition in the analysed area was high (Extensively Poaceae-, Cyperaceae species)
- High grazing impact does not damage existing flora, revealed by high biodiversity indices (H) and (E_H)
- The growth of new patterns with favourable fodder plants Poaceae species (C_3 -*Leersia hexandra* Sw., C_4 -*Axonopus fissifolius* (Raddi) Kulm. and C_4 -*Paspalum notatum* Flüge) was enhanced

Plant species characteristics and biomass composition



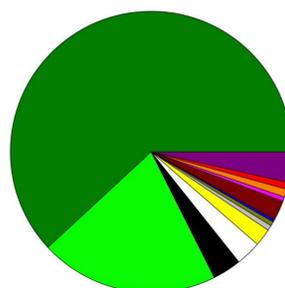
Species composition, based on their standing green plant material (%) at varying days after impact. Means with different letters are significantly different at $p \leq 0.05$.

No direct trend is noticeable for an increasing proportion of SGM of C_3 -species related to the DAI.

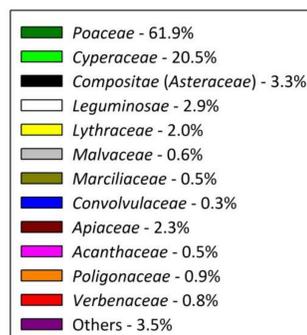


Species composition, based on their standing green plant material (%) at varying days after impact. Means with different letters are significantly different at $p \leq 0.05$.

The proportion of SGM of perennial species was constantly higher than of annual species.



The twelve most common plant families and their proportion of SGM (%) in the experimental area



Favorable fodder plants (D) C_3 -*Leersia hexandra* Sw., (E) C_4 -*Paspalum notatum* Flüge and (F) C_4 -*Axonopus fissifolius* (Raddi) Kulm

The Shannon-Wiener index (richness, diversity (H) and equitability (E_H))

Effect	Richness	H	E_H
Grazing impact <i>per se</i>	0.420 ns	0.946 ns	0.587 ns
Number of grazing impacts	0.066 ns	0.018 *	0.029 *
Impact month	0.231 ns	0.221 ns	0.631 ns

Significance level: * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$; ns > 0.05

Means \pm standard deviations of the Shannon-Wiener index (richness, diversity (H) and equitability (E_H)) at varying days after impact

Days after impact	Impact month	Number of grazing impacts	Richness	H	E_H
-	Control	-	48.0 \pm 6.9	2.6 \pm 0.3	0.6 \pm 0.06
19	February	2	22.3 \pm 5.4	1.8 \pm 0.3	0.5 \pm 0.07
52	January	2	42.0 \pm 5.4	2.5 \pm 0.1	0.6 \pm 0.001
54	December	2	43.0 \pm 6.0	2.4 \pm 0.1	0.6 \pm 0.04
87	November	2	43 \pm 6.1	2.6 \pm 0.2	0.6 \pm 0.04
116	October	2	36.3 \pm 5.3	2.5 \pm 0.2	0.6 \pm 0.03
146	September	2	36.3 \pm 5.3	2.4 \pm 0.1	0.6 \pm 0.07
176	August	2	40.7 \pm 7.2	2.4 \pm 0.2	0.6 \pm 0.06
206	July	2	44.3 \pm 7.2	2.5 \pm 0.3	0.6 \pm 0.05
253	June	1	51.7 \pm 7.7	2.9 \pm 0.1	0.7 \pm 0.01
285	May	1	45.7 \pm 7.8	2.8 \pm 0.2	0.7 \pm 0.03
317	April	1	44.0 \pm 7.7	2.6 \pm 0.3	0.7 \pm 0.03
357	March	1	50.0 \pm 6.5	2.7 \pm 0.1	0.7 \pm 0.05

Means for richness, H and E_H in impact months were not significantly different at $p \leq 0.05$.

The grazing impact revealed no loss on species richness in the grassland.

Slight variations were revealed for H and E_H in impact months with one or two grazing impacts

- Impact months with two grazing impacts DAI > 253, longer time period for re-growth of plant material in comparison to impact months with one grazing impact DAI \leq 206.

Materials and Methods

- 150 cattle $ha^{-1} day^{-1}$ were established on a 24 ha large grassland area, split into three paddocks with 12 plots and a control. High impact trampling (monthly) was conducted in spatially confined paddocks
- An assessment of biodiversity on the changes in botanical composition took place in 8 m² sampling areas
- Total soil coverage of plant biomass, bare ground, litter and biodiversity parameters were estimated using a plant sampling assessment scale related to the dominant abundance of plants of Braun-Blanquet
- Statistical analyses were conducted using a mixed model with serial and spatial variance covariance structure