Metadata - impact_invasive_grasses_cerrado

2022-11-08

About

This document details all data associated with the following study:

Title: Per-capita impacts of an invasive grass vary across levels of ecological organization in a tropical savanna

EIDC data identifier: abcabfe2-612c-4cab-b626-641002fc442e

Projects and funding agencies:

- Neotropical Grassland Conservancy;
- 'Invasions by African grasses and Cerrado restoration: an approach by state-and-transition models'. Funded by Fundação de Amparo à Pesquisa do Estado de São Paulo - FAPESP (Grant 2018/09054-0);
- 'How does fire season affect Cerrado vegetation?'. Funded by Fundação de Amparo à Pesquisa do Estado de São Paulo - FAPESP (Grant 2015/06743-0);
- 'Optimising the long-term management of invasive species affecting biodiversity and the rural economy using adaptive management'. Funded by Natural Environment Research Council - NERC, Newton Grant (Grant NE/S011641/1); and Fundação de Amparo à Pesquisa do Estado de São Paulo - FAPESP (Grant 2018/14995-8)

Collection methods and Quality control

All data presented here was sampled in March/April 2019. Sampling varied according to the data being collected, as described in the sections 'Experimental design' and 'Sampling effort'.

Study areas

All data was sampled inside two areas in the Cerrado (Neotropical savanna) located inside protected areas: Estação Ecológica de Itirapina (EcEI; 700 meters a.s.l; 22º14'40"S 47º52'29"W, Southeastern Brazil) and Parque Nacional de Brasília (PNB; 100 meters a.s.l; 15º41'43"S 47º54'18"W, Central Brazil). In both areas, we chose non-converted landscapes invaded by Urochloa decumbens. Vegetation is characterized by a continuous herbaceous layer dominated by C4 grasses (Gymnopogon foliosus is the commonest species in EcEI and Arthropogon villosus in PNB) with scattered shrubs and small trees and locally known as campo sujo. At both sites, invasion started more than 30 years ago, during the 80's in EcEI and the 90's in PNB.

Experimental design

We adopted a horizontal design based on gradients of invasion considering ground cover by Urochloa decumbens. As spatial heterogeneity of herbaceous vegetation varies according to scale in tropical savannas, we adopted a two-step approach to better characterize the abundance of the IAS. At a coarser scale, we defined an invasion gradient composed by five plots (5 x 5 m) representing 0, 25, 50, 75 and 100% of the IAS cover. We placed six gradients in each study area, totaling 12 gradients and 60 plots (5 plots x 6 gradient x 2 areas). Each plot was established at an independently invaded patch that matched the expected cover by Urochloa decumbens; i.e. the bigger invasion patches selected were sized 5 x 5 m, corresponding to a totally invaded plot (100% of cover by the invasive species). Plots within a gradient were separated apart by at least 10 m, gradients were distant from each other by at least 50 m. To characterize the abundance of plant species at a finer scale, every plot was divided into a core zone (3 x 3 m in the center) and a marginal zone (a 1 m strip at every size of the plot). The core zone was then subdivided into nine subplots (1 x 1 m) where vegetation surveys were conducted. We then calculated the mean cover at the plot level using the values from its nine $1m^2$ subplots.

Sampling effort

Microhabitat

We took hourly measurements of light incidence and air temperature and humidity at soil surface using a kit composed of one HOBO Pendant and one HOBO Pro v2 sensors. We chose to place one kit per plot to avoid pseudo-replication at the plot level. To minimize the effect of environmental heterogeneity, we systematically placed the sensors at the same location in every plot in relation to its vertices. Due to limitations in the number of sensors (40 kits were available), we randomly selected four gradients in each area for this purpose (5 plots x 4 gradient, total 20 kits/area). Sensors simultaneously remained in the field in both areas for at least 130 days from the transition between rainy and dry seasons until the mid of the dry season (April to August 2019).

Vegetation

Vegetation surveys were conducted at nine 1 m2 subplots in the core zone of plots (9 m2). We used a modified Braun-Blanquet method (Wikum and Shanholtzer 1978) to assess community structure and composition. We visually estimated the percentage of cover by every species using values of 0, 1, 5 and then every 10% until 100%. Ground cover of herbaceous plants is traditionally used as an estimate for plant abundance because it accounts for the varying size of individuals (Damgaard 2014). We classified native plant species in functional groups according to their growth form: graminoids, forbs and shrubs. We also recorded the percentage of bare soil and cover by dead biomass (standing dead biomass + litter), separately for native species (total) and Urochloa decumbens.

Specific leaf area

Specific-leaf area measurements followed Pérez-Harguindeguy and collaborators (2013). From vegetation surveys, we identified the dominant species in the community, which together summed up to 80% of ground cover in the plot. For those species, we collected fully-expanded and not damaged leaves from 10 distinct random individuals (three leaves/individual). Leaves were carefully stored, re-hydrated at the laboratory using petri dishes filled with water; and then measured using a LI-COR LI-3000C. Species with delicate leaflets were measured using a scanner Epson V800 and the P-trap software (Al-Tam et al. 2013). After being dried at 80ºC for 48 hours in a drying oven, all leaves were individually weighted in an electronic balance with 0.1 mg precision.

Ecosystem properties

Biomass accumulation was assessed by sampling the aboveground biomass (three samples/plot) in 0.25 m^2 plots. At the laboratory, biomass was sorted out into dead and live Urochloa decumbens; native live grasses, forbs and shrubs; and total native dead biomass. CO2 soil efflux, a proxy to carbon dynamics, was estimated by soda-lime incubation for 24 h as proposed by Keith & Wong, (2006). We systematically placed one incubation chamber in every plot after removing aboveground biomass. We used petri dishes containing 25 mg of dried soda-lime incubated under opaque plastic chambers with a diameter of 24 cm. Litter decomposition rates were assessed using litterbags containing 5 g of Urochloa decumbens standing dead biomass. We opted to use biomass of the IAS instead of litter from the plot-level community to standardize the parental material across the invasion gradient. Litterbags were left directly on the ground for 90, 120 and 160 days following the methodology described in Karberg, Scott, & Giardina (2008).

Details of data structure & Nature and Units of recorded valuess

The data is composed of seven distinct tables:

- microhabitat, containing information about microhabitat conditions: illuminance, air temperature and humidity at ground level
- specific_leaf_area, containing information about specific leaf area of dominant species in the community
- cover, containing information about plant cover in communities
- biomass, containing information about biomass sampling
- richness, containing information about species richness at the plot (5x5m) level
- decomposition, containing information about decomposition rates
- co2_efflux, containing information about CO2 soil efflux

Microhabitat

Where the columns represent:

- area: The conservation unit where the sample was collected (Brasilia or Itirapina)
- block: The combination of a letter indicating the area (B for Brasilia and I for Itirapina) and the block number (from 1 to 3)
- plot: The combination of a letter indicating the treatment plots will be submitted in the future (not assessed by this study; Q for burning, C for control) and a number indicating the percentage of cover by Urochloa decumbens in the plot (0 for 0%, 2 for 25%, 5 for 50%, 7 for 75% and 1 for 100%)
- sen.light: The reference name of the sensor measuring luminosity
- sen.humi: The reference name of the sensor measuring air temperature and humidity
- time: The time in which the measurement was taken, in the format 'day/month/year hour/minute/second'
- PAR: The measurement of illuminance, in lux
- temperature: The measurement of air temperature, in °C
- humidity: The measurement of air humidity, in %

Specific leaf area (SLA)

Where the columns represent:

- area: The conservation unit where the sample was collected (Brasilia or Itirapina)

Table 1: Microhabitat

area	block	plot	sen.light	sen.humi	time	PAR	temperature	humidity
itirapina	I2	Q0	cascavel	vellozia	03/08/19 04:00:00	0.0	14.529	96.193
brasilia	B2	C0	pequi	pequi	07/04/19 04:00:00 PM	2152.8	23.617	84.343
itirapina	I2	C7	vellozia	coruja	22/07/19 19:00:00	0.0	15.055	75.680
itirapina	I2	Q2	andropogon	mangaba	27/08/19 09:00:00	14466.8	20.627	79.747
brasilia	B2	Q2	cagaita	dalbergia	11/08/19 22:00:00	0.0	18.889	79.350
itirapina	I1	C7	jararaca	mimosa	16/08/19 08:00:00	1011.8	14.553	84.057
brasilia	B2	C2	bulbostylis	harpalyce	17/08/19 05:00:00	0.0	15.772	82.779
brasilia	B3	C2	kielmeyera	bulbostylis	01/07/19 10:00:00	13777.9	28.543	63.146
brasilia	B3	C7	clitoria	kalunga	25/05/19 21:00:00	0.0	17.368	95.545
itirapina	I2	Q0	cascavel	vellozia	10/08/19 22:00:00	0.0	11.759	81.987
itirapina	I2	C2	buriti	andropogon	03/08/19 13:00:00	5338.9	14.433	89.178
brasilia	B2	Q1	aristida	vochysia	03/08/19 03:00:00	0.0	10.001	88.513
itirapina	I1	C2	mesosetum	cascavel	13/06/19 09:00:00	13089.0	20.841	85.773
brasilia	B3	Q1	tibouchina	pitanga	27/06/19 15:00:00	1237.9	22.537	87.876
itirapina	I2	Q0	cascavel	vellozia	08/06/19 08:00:00	4822.3	10.541	91.915
itirapina	I1	C2	mesosetum	cascavel	03/06/19 05:00:00	5166.7	12.992	92.878
itirapina	I1	C1	fabacea	ouratea	19/07/19 10:00:00	3444.5	23.280	71.595
itirapina	I1	C0	vochysia	kielmeyera	14/06/19 20:00:00	0.0	NA	NA
itirapina	I1	C2	mesosetum	cascavel	11/05/19 18:00:00	10.8	22.178	85.470
itirapina	I1	Q7	veado	alboboda	08/06/19 13:00:00	5166.7	28.543	51.095
itirapina	I1	C0	vochysia	kielmeyera	05/07/19 07:00:00	2325.0	NA	NA
brasilia	B3	C2	kielmeyera	bulbostylis	14/07/19 10:00:00	13089.0	28.568	54.861
itirapina	I2	C2	buriti	andropogon	23/04/19 06:00:00	0.0	17.177	92.769
brasilia	B2	Q0	mimosa	arara	07/07/19 08:00:00	5166.7	10.369	90.295
itirapina	I2	Q5	seriguela	xyris	05/09/19 06:00:00	75.3	16.487	99.610
brasilia	B3	C5	xyris	sucupira	29/06/19 18:00:00	10.8	18.152	75.146
itirapina	I2	C2	buriti	andropogon	20/07/19 00:00:00	0.0	8.519	89.315
itirapina	I1	Q1	hypenia	buriti	04/09/19 15:00:00	9300.1	29.140	84.150
brasilia	B3	Q7	angico	angico	09/07/19 20:00:00	0.0	10.026	82.001
brasilia	B3	C2	kielmeyera	bulbostylis	06/08/19 06:00:00	0.0	13.353	89.968

Table 2: SLA

area	block	plot	species	individual	leaf	area.mm2	weigth.mg	SLA.mm2.mg
itirapina	I1	C0	axonopus_pressus	1	2	633	69.8	9.068768
brasilia	B3	C0	aristida_cf	9	3	230	37.1	6.199461
brasilia	B3	Q2	urochloa_brizantha	3	2	1393	59.4	23.451179
itirapina	I1	Q5	solanum_lycocarpum	8	1	3706	423.9	8.742628
brasilia	B1	Q5	milho_largo	10	3	801	70.6	11.345609
brasilia	B2	Q0	cuphea_cf	1	3	21	1.5	14.000000
brasilia	B3	C2	echinolaena_inflexa	7	2	157	13.7	11.459854
itirapina	I1	C2	urochloa_brizantha	4	1	1812	79.3	22.849937
itirapina	I3	Q2	trichanthecium_cyanescens	7	3	114	6.8	16.764706
brasilia	B1	C2	milho_largo	8	2	521	92.9	5.608181
itirapina	I2	Q5	forsteronia_glabrescens	9	3	311	33.8	9.201183
brasilia	B2	C1	urochloa_brizantha	2	3	1851	92.4	20.032467
brasilia	B3	Q1	urochloa_brizantha	1	3	3051	118.4	25.768581
itirapina	I3	C0	loudetiopsis_chrysothrix	10	1	686	130.2	5.268817
brasilia	B1	Q5	mesosetum_ferrugineum_cf	8	3	393	68.9	5.703919
brasilia	B2	C5	hyptis_cf	7	3	1723	216.4	7.962107
brasilia	B3	Q1	melinis_minutiflora	9	1	676	34.0	19.882353
brasilia	B3	Q0	milho_largo	1	1	901	60.9	14.794745
brasilia	B3	C0	aristida_cf	4	1	176	27.4	6.423358
brasilia	B1	Q5	urochloa_brizantha	5	3	1457	76.3	19.095675
brasilia	B3	Q2	melinis_minutiflora	9	1	711	32.3	22.012384
brasilia	B3	Q2	milho_largo	2	3	932	136.7	6.817849
itirapina	I1	C5	chromolaena_maximilianii	1	1	277	21.2	13.066038
brasilia	B1	Q5	mesosetum_ferrugineum_cf	4	2	1035	486.7	2.126567
brasilia	B2	C1	urochloa_brizantha	9	3	1420	59.4	23.905724
itirapina	I1	C2	urochloa_brizantha	5	3	2343	119.2	19.656040
brasilia	B1	Q0	milho_largo	6	3	1650	127.7	12.920908
brasilia	B1	C7	urochloa_brizantha	6	3	1647	81.8	20.134474
itirapina	I2	Q0	byrsonima_subterranea	10	2	533	71.6	7.444134
itirapina	I1	C1	urochloa_brizantha	8	1	1315	76.0	17.302632

Table 3: Ground cover

area	block	plot	subplot	functional_group	cover
itirapina	I3	Q7	1	forb	0
itirapina	I2	C1	4	forb	0
itirapina	I2	Q2	5	bare_soil	10
itirapina	I3	Q0	1	live_urochloa	0
brasilia	B1	Q2	1	shrub	40
itirapina	I1	Q0	9	other_invasive	0
itirapina	I3	Q1	6	shrub	40
brasilia	B3	C7	8	palm	0
itirapina	I2	Q7	3	live_urochloa	40
itirapina	I2	C7	6	shrub	0
brasilia	B1	Q0	8	live_urochloa	10
brasilia	B3	C2	5	other_invasive	0
brasilia	B2	C7	4	live_urochloa	80
itirapina	I1	Q2	6	other_invasive	0
brasilia	B2	Q2	3	graminoid	110
brasilia	B2	C1	7	graminoid	0
brasilia	B2	Q1	4	graminoid	20
brasilia	B2	C0	1	dead_urochloa	0
brasilia	B2	Q7	5	dead_native	40
brasilia	B3	Q7	5	other_invasive	0
itirapina	I1	Q5	7	bromelia	0
brasilia	B1	C5	4	bromelia	0
brasilia	B3	C5	4	shrub	95
itirapina	I2	C1	3	live_urochloa	80
brasilia	B3	C5	3	other_invasive	0
brasilia	B2	C2	1	bare_soil	5
brasilia	B1	Q7	2	other_invasive	0
itirapina	I3	Q0	1	bare_soil	5
itirapina	I2	Q0	7	live_urochloa	0
itirapina	I1	C7	8	shrub	120

- block: The combination of a letter indicating the area (B for Brasilia and I for Itirapina) and the block number (from 1 to 3)
- plot: The combination of a letter indicating the treatment plots will be submitted in the future (not assessed by this study; Q for burning, C for control) and a number indicating the percentage of specific_leaf_area by Urochloa decumbens in the plot (0 for 0%, 2 for 25%, 5 for 50%, 7 for 75% and 1 for 100%)
- species: The plant species for which the SLA was sampled
- individual: The number of the individual for which the SLA was sampled (from 1 to 10)
- leaf: The number of th leaf for which the SLA was sampled (from 1 to 3)
- area.mm2: The area of the leaf, in mm2
- weigth.mg: The weight of the leaf, in mg
- SLA.mm2.mg: The SLA for the leaf, in mm2/mg

Ground cover

Where the columns represent:

Table 4: Biomass

area	block	plot	subplot	functional_group	biomass
brasilia	B1	Q5	3	urochloa.viva	0.00
brasilia	B3	C0	2	urochloa.morta	0.00
brasilia	B2	C2	1	andropogon.vivo	0.00
brasilia	B1	Q5	3	palmeira	0.00
brasilia	B3	C2	2	andropogon.vivo	0.00
itirapina	I2	Q1	3	morta.nativa	24.01
itirapina	I1	Q0	2	morta.nativa	44.53
itirapina	I2	Q0	3	andropogon.vivo	0.00
itirapina	I3	C1	2	melinis.morta	0.00
itirapina	I2	Q5	3	melinis.morta	0.00
brasilia	B2	Q5	1	urochloa.viva	0.00
brasilia	B3	C1	2	herbacea	0.00
itirapina	I1	Q5	2	graminea	0.00
itirapina	I1	Q7	1	melinis.morta	0.00
brasilia	B3	Q0	2	urochloa.viva	0.00
brasilia	B2	Q2	2	palmeira	0.00
brasilia	B2	C1	2	urochloa.morta	66.33
itirapina	I3	Q5	2	arbusto	0.00
brasilia	B3	Q2	2	herbacea	0.00
brasilia	B3	C2	3	urochloa.viva	0.00
brasilia	B1	Q2	2	morta.nativa	45.07
itirapina	I2	Q5	1	melinis.morta	0.00
itirapina	I1	C1	1	arbusto	46.17
brasilia	B1	Q2	2	herbacea	0.71
brasilia	B2	Q2	3	andropogon.vivo	0.00
itirapina	I2	Q5	2	morta.nativa	68.57
brasilia	B2	C2	2	urochloa.viva	2.40
itirapina	I2	Q1	2	melinis.viva	0.00
brasilia	B3	Q2	3	urochloa.morta	0.00
brasilia	B2	Q5	2	andropogon.vivo	0.00

- area: The conservation unit where the sample was collected (Brasilia or Itirapina)
- block: The combination of a letter indicating the area (B for Brasilia and I for Itirapina) and the block number (from 1 to 3)
- plot: The combination of a letter indicating the treatment plots will be submitted in the future (not assessed by this study; Q for burning, C for control) and a number indicating the percentage of cover by Urochloa decumbens in the plot (0 for 0%, 2 for 25%, 5 for 50%, 7 for 75% and 1 for 100%)
- subplot: The subplot (1 x 1m) in which the cover was estimated (from 1 to 9)
- functional_group: The functional group for which the cover was estimated (bare_soil, bromelia, dead_native, dead_urochloa, forb, graminoid, live_urochloa, other_invasive, palm, shrub)
- cover: The estimate of cover, in %

Biomass

Where the columns represent:

- area: The conservation unit where the sample was collected (Brasilia or Itirapina)

Table 5: Plant richness

area	block	plot	functional_group	richness
itirapina	I1	Q0	forbs	4
brasilia	B1	Q1	palms	0
brasilia	B3	C1	shrubs	18
itirapina	I1	C1	shrubs	4
itirapina	I1	Q7	shrubs	9
brasilia	B3	C5	forbs	10
itirapina	I2	C7	graminoids	0
brasilia	B3	Q2	graminoids	13
brasilia	B3	Q5	graminoids	11
brasilia	B3	Q5	palms	1
itirapina	I2	C1	shrubs	3
itirapina	I3	C2	palms	0
brasilia	B2	C1	forbs	4
itirapina	I3	C1	forbs	1
itirapina	I3	Q5	graminoids	5
brasilia	B1	Q2	palms	0
brasilia	B2	C2	palms	0
brasilia	B2	Q0	shrubs	8
brasilia	B2	C7	shrubs	5
itirapina	I2	C7	palms	0
itirapina	I1	C2	shrubs	10
itirapina	I2	Q2	graminoids	4
brasilia	B1	C1	forbs	14
itirapina	I2	C5	forbs	0
itirapina	I1	Q0	shrubs	5
brasilia	B1	Q7	graminoids	9
itirapina	I1	C2	forbs	6
brasilia	B1	C5	shrubs	14
brasilia	B1	C1	palms	0
brasilia	B3	C5	shrubs	16

- block: The combination of a letter indicating the area (B for Brasilia and I for Itirapina) and the block number (from 1 to 3)
- plot: The combination of a letter indicating the treatment plots will be submitted in the future (not assessed by this study; Q for burning, C for control) and a number indicating the percentage of biomass by Urochloa decumbens in the plot (0 for 0%, 2 for 25%, 5 for 50%, 7 for 75% and 1 for 100%)
- subplot: The subplot (0.5 x 0.5m) in which the biomass was sampled (from 1 to 3)
- functional_group: The functional group in which the biomass was sorted out (andropogon.morto, andropogon.vivo, arbusto, graminea, herbacea, melinis.morta, melinis.viva, morta.nativa, palmeira, urochloa.morta, urochloa.viva)
- biomass: The measurement of biomass per area, in kg/m2

Species richness

Where the columns represent:

- area: The conservation unit where the sample was collected (Brasilia or Itirapina)

Table 6: Decomposition rate

area	block	plot	weight.start	time	weight.end	interval	k
itirapina	I3	C0	5	121	3.83	T2	0.0022031
itirapina	I3	Q2	5	90	4.42	T1	0.0013700
brasilia	B1	Q7	5	62	4.53	T1	0.0015922
brasilia	B2	Q7	5	113	4.41	T2	0.0011112
brasilia	B1	C1	5	113	4.23	T2	0.0014800
itirapina	I3	C2	5	163	4.13	T3	0.0011728
itirapina	I1	Q1	5	163	3.82	T3	0.0016515
brasilia	B2	C2	5	113	4.45	T2	0.0010313
brasilia	B3	Q1	5	62	4.76	T1	0.0007934
brasilia	B3	C5	5	62	4.26	T1	0.0025834
itirapina	I1	C2	5	163	3.80	T3	0.0016837
brasilia	B1	C7	5	122	4.35	T3	0.0011415
brasilia	B2	Q1	5	122	4.71	T3	0.0004898
itirapina	I3	C5	5	163	3.71	T3	0.0018307
itirapina	I1	C7	5	163	3.79	T3	0.0016998
itirapina	I2	Q1	5	163	4.05	T3	0.0012928
brasilia	B3	C5	5	122	4.39	T3	0.0010665
itirapina	I2	C7	5	90	4.20	T1	0.0019373
brasilia	B2	C0	5	62	4.66	T1	0.0011358
itirapina	I2	C5	5	90	4.42	T1	0.0013700
itirapina	I2	Q2	5	163	4.02	T3	0.0013384
itirapina	I3	Q2	5	121	4.32	T2	0.0012081
itirapina	I3	C1	5	163	3.75	T3	0.0017649
itirapina	I2	C0	5	121	4.18	T2	0.0014804
brasilia	B2	Q5	5	62	4.33	T1	0.0023205
itirapina	I3	Q1	5	90	4.24	T1	0.0018319
brasilia	B3	Q2	5	122	4.33	T3	0.0011793
itirapina	I1	Q2	5	163	3.62	T3	0.0019814
itirapina	I3	C7	5	121	4.36	T2	0.0011319
brasilia	B1	C1	5	122	4.32	T3	0.0011982

- block: The combination of a letter indicating the area (B for Brasilia and I for Itirapina) and the block number (from 1 to 3)
- plot: The combination of a letter indicating the treatment plots will be submitted in the future (not assessed by this study; Q for burning, C for control) and a number indicating the percentage of richness by Urochloa decumbens in the plot (0 for 0%, 2 for 25%, 5 for 50%, 7 for 75% and 1 for 100%)
- functional_group: The functional group for which the richness was sampled (forbs, graminoids, palms, shrubs)
- richness: The number of species richness

Decomposition rates

Where the columns represent:

- area: The conservation unit where the sample was collected (Brasilia or Itirapina)
- block: The combination of a letter indicating the area (B for Brasilia and I for Itirapina) and the block number (from 1 to 3)

Table 7: Soil CO2 efflux

area	block	plot	subplot	weight_gain_g	blank_gain_g	time_h	chamber_area	CO2_efflux
itirapina	I2	C2	25	4.851	2.477	24.80000	0.0452389	23.406862
itirapina	I3	C7	22	5.498	2.477	24.18333	0.0452389	30.545604
brasilia	B2	Q7	32	5.414	2.477	23.73333	0.0452389	30.259334
brasilia	B1	C5	56	5.839	2.477	23.11667	0.0452389	35.562039
itirapina	I3	Q1	12	4.303	2.477	24.21667	0.0452389	18.437438
itirapina	I1	Q1	14	2.962	2.477	24.83333	0.0452389	4.775522
itirapina	I1	Q0	24	3.751	2.477	24.61667	0.0452389	12.654772
itirapina	I2	Q1	4	4.906	2.477	24.83333	0.0452389	23.916997
brasilia	B2	Q5	31	6.963	2.477	23.88333	0.0452389	45.928100
itirapina	I2	Q5	23	5.199	2.477	24.53333	0.0452389	27.129745
itirapina	I2	C1	1	5.086	2.477	24.68333	0.0452389	25.845469
brasilia	B1	Q7	54	4.453	2.477	22.93333	0.0452389	21.068514
brasilia	B1	Q1	33	4.013	2.477	22.66667	0.0452389	16.569817
brasilia	B2	C0	46	3.898	2.477	23.53333	0.0452389	14.764705
brasilia	B2	Q1	41	4.490	2.477	23.66667	0.0452389	20.797964
brasilia	B2	C1	60	4.574	2.477	22.58333	0.0452389	22.705158
itirapina	I1	C0	10	4.916	2.477	24.18333	0.0452389	24.660949
itirapina	I3	C1	7	5.412	2.477	24.18333	0.0452389	29.676050
brasilia	B3	C1	40	5.462	2.477	21.86667	0.0452389	33.379198
itirapina	I2	Q7	16	4.617	2.477	24.55000	0.0452389	21.314563
itirapina	I1	Q5	9	4.227	2.477	24.70000	0.0452389	17.324282
brasilia	B3	C2	45	4.749	2.477	21.75000	0.0452389	25.542489
brasilia	B2	C2	39	4.947	2.477	23.46667	0.0452389	25.737105
itirapina	I3	C5	29	5.332	2.477	24.20000	0.0452389	28.847282
brasilia	B1	Q2	47	2.219	2.477	22.86667	0.0452389	-2.758869
itirapina	I3	C0	26	3.940	2.477	24.16667	0.0452389	14.802727
brasilia	B1	C7	53	5.017	2.477	23.01667	0.0452389	26.983945
itirapina	I3	Q7	13	4.487	2.477	24.23333	0.0452389	20.281359
itirapina	I2	Q2	2	4.378	2.477	24.55000	0.0452389	18.934105
brasilia	B1	C0	58	5.755	2.477	23.05000	0.0452389	34.773801

- plot: The combination of a letter indicating the treatment plots will be submitted in the future (not assessed by this study; Q for burning, C for control) and a number indicating the percentage of decomposition by Urochloa decumbens in the plot (0 for 0%, 2 for 25%, 5 for 50%, 7 for 75% and 1 for 100%)
- weight.start: The weight of the biomass at the beginning of the interval, in mg
- time: The time passed for every sampling interval, in days
- weight.end: The weight of the biomass at the ending of the interval, in mg
- interval: The sampling interval in which the decomposition bags were left on field
- k: The decomposition rate, calculated as -log(weight.end/weight.start)/time

Soil CO2 efflux

Where the columns represent:

- area: The conservation unit where the sample was collected (Brasilia or Itirapina)
- block: The combination of a letter indicating the area (B for Brasilia and I for Itirapina) and the block number (from 1 to 3)

- plot: The combination of a letter indicating the treatment plots will be submitted in the future (not assessed by this study; Q for burning, C for control) and a number indicating the percentage of co2_efflux by Urochloa decumbens in the plot (0 for 0%, 2 for 25%, 5 for 50%, 7 for 75% and 1 for 100%)
- subplot: The subplot in which the sampling was taken (from 1 to 3)
- weight_gain_g: The weight gain by the soda lime during incubation, in g
- blank_gain_g: The mean blank weight gain, which accounted for weight gains related to the procedure instead of the factor or interested in the experiment, in g
- time_h: The duration of incubation, in hour
- chamber_area: The area of the chamber used for incubation, in m2
- CO2_efflux: The soil CO2 efflux in (g C)/(m2 day), as calculated according to Keith and Wong (2006)

Reference list

Al-Tam F, Adam H, Dos Anjos A, et al (2013) P-TRAP: a Panicle Trait Phenotyping tool. BMC Plant Biol 13:122

Damgaard C (2014) Quantitative plant ecology: Statistical and ecological modelling of plant abundance. E-book

Karberg NJ, Scott NA, Giardina CP (2008) Methods for Estimating Litter Decomposition. F Meas For Carbon Monit 103–111. https://doi.org/10.1007/978-1-4020-8506-2_8

Keith H, Wong SC (2006) Measurement of soil CO2efflux using soda lime absorption: both quantitative and reliable. Soil Biol Biochem 38:1121–1131. https://doi.org/10.1016/j.soilbio.2005.09.012

Pérez-Harguindeguy N, Díaz S, Garnier E, et al (2013) New handbook for standardised measurement of plant functional traits worldwide. Aust J Bot 61:167–234. https://doi.org/10.1071/BT12225

Wikum DA, Shanholtzer GF (1978) Application of the Braun-Blanquet cover-abundance scale for vegetation analysis in land development studies. Environ Manage 2:323–329. https://doi.org/10.1007/BF01866672