

Oikos

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Appendix 1

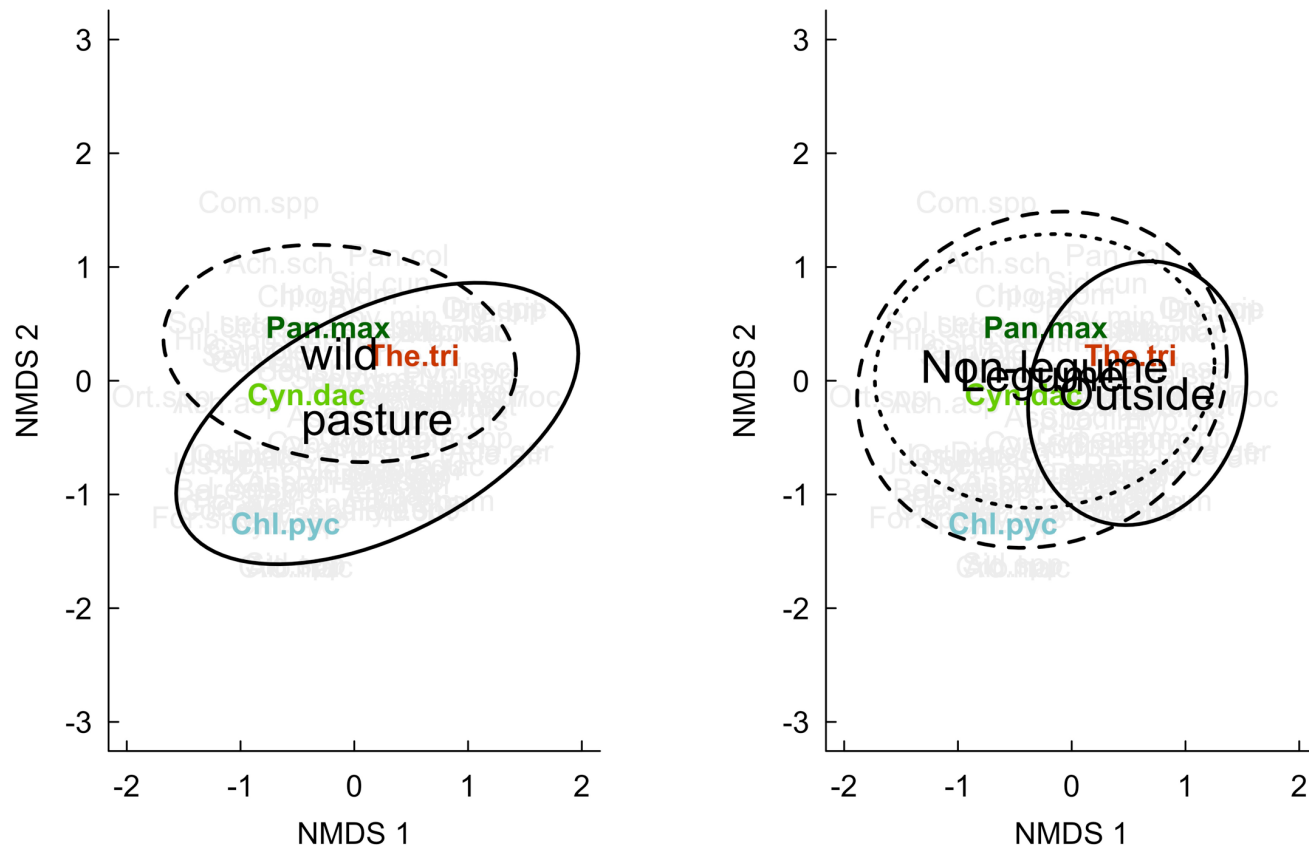


Figure A1. Nonmetric dimensional scaling (NDMS) ordination herbaceous species composition of all burial locations inside and outside the Serengeti National Park. Focal species root litter are shown in colour: *Cynodon dactylon* (light green), *Chloris pycnothrix* (light blue), *Panicum maximum* (dark green) and *Themeda triandra* (red). All other species surveyed in 50 × 50 cm quadrats in June 2016 are shown in light grey. (n = 114). Species associations with land-use (wildlife management and pastureland) and tree canopy type (leguminous tree, non-leguminous tree and outside) are shown using different line types with 95% confidence intervals

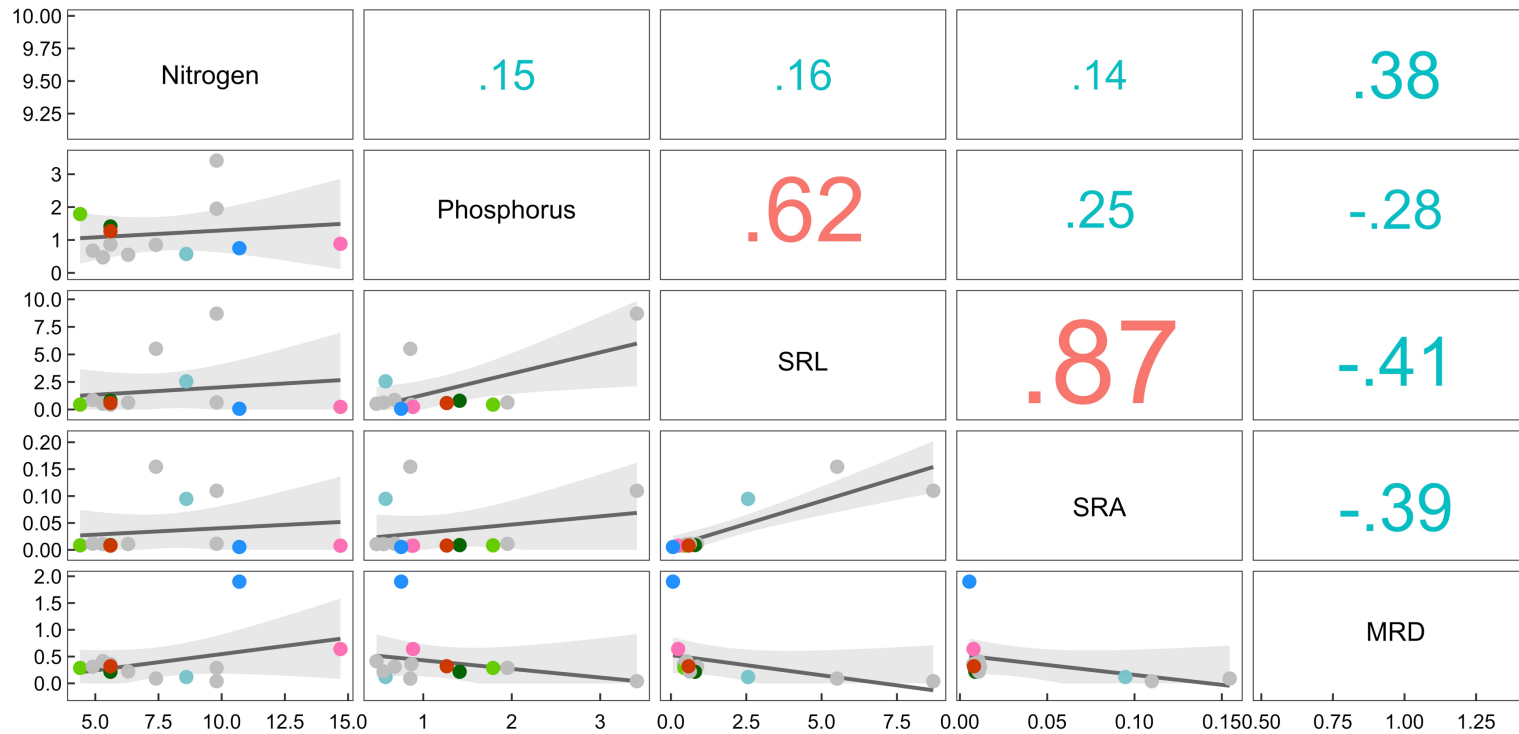


Figure A2. Correlation matrix of roots traits measured for species used in the common garden experiment plotting relationships and Pearson's correlation coefficients. Measured root traits include: nitrogen (mg g^{-1}), phosphorus (mg g^{-1}), specific root length (SRL) (m g^{-1}), specific root area (SRA) ($\text{m}^2 \text{g}^{-1}$) and mean root diameter (MRD) (mm) (Table A2). In the correlation plots, each symbol represent a species with focal species across the study experiments coloured whereas all other species are coloured in grey and include: *Chloris pycnothrix* (light blue), *Cynodon dactylon* (light green), *Indigofera volkensii* (pink), *Panicum maximum* (dark green), *Solanum incanum* (blue) and *Themeda triandra* (red). Dark grey lines of best fit have been fitted with a linear model with light grey shaded 95% confidence intervals. A higher Pearson's correlation score is shown as a larger text size on the upper right panel and red text when the score exceeds a 0.5 threshold.

Table A1. Location, climate and soil properties of the sites for land-use root decomposition experiment. Cumulative precipitation and average soil temperature (depth 10 cm) are for the duration of the root litter incubation May 2017 to May 2018 (Huffman 2017, McNally et al. 2017). Soil properties are from six replicate cores, i.e. at each plot, collected to a depth 0–15 cm comprising ~220 g oven dry soil and then bulked within each block. Soil texture was determined via particle size analysis using the hydrometer method (Gee and Bauder 1986) and organic carbon content using wet oxidation following the Walkley–Black method (Kalembasa and Jenkinson 1973). Underlying soil type follow the World Reference Base (2006) Groups (ISRIC 2018).

Region	Block	Latitude	Longitude	Elevation (m)	Precipitation (mm)	Soil temperature (°C)	Soil				Type
							Clay (%)	Silt (%)	Sand (%)	Organic carbon (%)	
Ololosokwan (pasture)	1	-1.891856	35.302367	1910	543	29.3	29.6	5.3	65.1	1.4	Phaeozems
	2	-1.888357	35.307594	1927	538	29.3	28.6	4.3	67.1	2.0	Phaeozems
	3	-1.887899	35.309003	1935	538	29.3	10.6	4.3	85.1	0.8	Phaeozems
	4	-1.888301	35.311669	1928	538	29.3	27.6	5.3	67.1	1.8	Phaeozems
Serengeti Klein's gate (wild)	1	-1.878602	35.203499	1725	543	29.3	19.6	5.3	75.1	1.9	Phaeozems
	2	-1.872372	35.203169	1728	543	29.3	21.6	7.3	71.1	2.7	Phaeozems
	3	-1.878869	35.195954	1725	543	29.3	19.6	7.3	73.1	1.8	Phaeozems
	4	-1.884245	35.198306	1735	543	29.3	23.6	8.3	68.1	2.4	Phaeozems
Park Nyigoti (pasture)	1	-2.018422	34.655890	1380	765	29.6	29.6	33.3	37.1	2.3	Phaeozems
	2	-2.024879	34.652867	1375	765	29.6	33.6	27.3	39.1	3.0	Phaeozems
	3	-2.032495	34.652248	1368	765	29.6	24.6	18.3	57.1	2.6	Phaeozems
	4	-2.038536	34.652323	1368	765	29.6	40.6	22.3	37.1	2.4	Phaeozems
Ikorongo Game Reserve (wild)	1	-2.012615	34.664560	1383	765	29.6	34.6	25.3	40.1	3.5	Phaeozems
	2	-2.016367	34.663192	1387	765	29.6	28.6	24.3	47.1	2.4	Phaeozems
	3	-2.019579	34.660788	1380	765	29.6	28.6	20.3	51.1	2.0	Phaeozems
	4	-2.028845	34.659773	1363	765	29.6	34.6	18.3	47.1	2.9	Phaeozems
Serонера, Serengeti (wild)	1	-2.439428	34.838299	1521	494	29.6	22.0	6.6	71.4	1.1	Solonchaks
	2	-2.438247	34.836088	1519	494	29.6	39.6	7.3	53.1	1.8	Solonchaks
	3	-2.435042	34.833869	1517	494	29.6	25.6	8.3	66.1	2.3	Solonchaks

Table A2. Chemical and morphological traits of un-decomposed root, stem and leaf litter for savanna herbaceous species. Mean root diameter (MRD), specific root area (SRA), specific root length (SRL) were all analysed by hand tracing images of air-dried roots using SmartRoot (<<https://smartroot.github.io>>) (Anderson et al. 2007). Total nitrogen and phosphorus concentrations were determined using Kjeldahl and acid digestion followed by spectrophotometry (Allen 1989). All other traits are means from three replicates per species (± 1 SE) apart from common garden litter and leaves from termite cafeteria-style experiment that determined from pooled samples.

Species	Functional type	Root					Leaf	
		N (mg g ⁻¹)	P (mg g ⁻¹)	Mean root diameter (mm)	SRL (m g ⁻¹)	SRA (m ² g ⁻¹)	N (mg g ⁻¹)	P (mg g ⁻¹)
<i>Bothriochloa insculpta</i>	Grass	5.6	0.87	0.36 (± 0.075)	0.43 (± 0.081)	0.008 (± 0.002)	-	-
<i>Chloris pycnothrix</i>	Grass	8.6 (± 0.21)	0.57 (± 0.43)	0.12 (± 0.002)	2.56 (± 0.091)	0.009 (± 0.002)	-	-
<i>Crateostigma plantagineum</i>	Forb	9.8	1.95	0.29 (± 0.012)	0.64 (± 0.034)	0.011 (± 0.007)	-	-
<i>Cynodon dactylon</i>	Grass	4.4 (± 0.70)	1.79 (± 0.86)	0.29 (± 0.026)	0.45 (± 0.075)	0.008 (± 0.005)	8.1	0.15
<i>Digitaria macroblephara</i>	Grass	5.3	0.47	0.41 (± 0.014)	0.52 (± 0.015)	0.012 (± 0.002)	-	-
<i>Heteropogon contortus</i>	Grass	4.9	0.68	0.31 (± 0.015)	0.87 (± 0.070)	0.011 (± 0.008)	-	-
<i>Indigofera volkensii</i>	Legume	14.7 (± 2.61)	0.88 (± 0.12)	0.64 (± 0.125)	0.24 (± 0.024)	0.08 (± 0.026)	-	-
<i>Mariscus amourpus</i>	Sedge	9.8	3.41	0.04 (± 0.001)	8.70 (± 1.606)	0.011 (± 0.021)	-	-
<i>Microchloa kunthii</i>	Grass	7.4	0.85	0.10 (± 0.001)	5.51 (± 0.165)	0.015 (± 0.004)	-	-
<i>Panicum maximum</i>	Grass	5.6 (± 0.99)	1.41 (± 0.18)	0.22 (± 0.029)	0.80 (± 0.165)	0.009 (± 0.027)	-	-
<i>Pennisetum mezianum</i>	Grass	6.3	0.55	0.22 (± 0.039)	0.63 (± 0.006)	0.011 (± 0.019)	-	-
<i>Solanum incanum</i>	Forb	10.7 (± 0.28)	0.75 (± 0.22)	1.90 (± 0.441)	0.07 (± 0.016)	0.005 (± 0.028)	1.5	0.20
<i>Themeda triandra</i>	Grass	5.5 (± 0.46)	1.27 (± 0.79)	0.32 (± 0.053)	0.59 (± 0.119)	0.008 (± 0.026)	0.6	0.13
<i>Zea mays</i>	Crop	5.6	0.87	-	-	-	2.5	0.36
							3.9*	0.22*

*Nitrogen and phosphorus contents for *Zea mays* stems.

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