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Appendix 1

Nematode communities, plant nutrient economy, and life-cycle characteristics jointly determine plant monoculture performance over 12-years. - Oikos

Table A1**.** List of plant species used in the monoculture experiment, their abbreviation, assignment to plant functional groups (Roscher et al. 2004) and monoculture performance categories, whether species were resown or not in November 2002 (numbers indicate percentages of initial seed quantity from May 2002) as well as year of extinction (for species in category *zero_BM*$_{2014}$).

Species	Abbreviation	Functional groups	Monoculture performance categories	Resown (%)	Year of extinction
Achillea millefolium L.	*Ach_mil*	Tall herbs	Neg_BM_slope	0	-
Ajuga reptans L.	*Aju_rep*	Small herbs	Neg_BM_slope	0	-
Alopecurus pratensis L.	*Alo_pra*	Grasses	Neg_BM_slope	0	-
Anthoxanthum odoratum L.	*Ant_odo*	Grasses	Neg_BM_slope	0	-
Anthriscus sylvestris (L.) Hoffm.	*Ant_syl*	Tall herbs	Zero_BM_2014	100	2014
Arrhenatherum elatius (L.) J. & C. Presl	*Arr_ela*	Grasses	Neg_BM_slope	0	-
Bellis perennis L.	*Bel_per*	Small herbs	Pos_BM_slope	0	-
Bromus erectus Huds.	*Bro_ere*	Grasses	Neg_BM_slope	50	-
Bromus hordeaceus L.	*Bro_hor*	Grasses	Neg_BM_slope	0	-
Campanula patula L.	*Cam_pat*	Tall herbs	Zero_BM_2014	0	2010
Cardamine pratensis L.	*Car_pra*	Tall herbs	Zero_BM_2014	100	2004
Carum carvi L.	*Car_car*	Tall herbs	Zero_BM_2014	50	2014
Centaurea jacea L.	*Cen_jac*	Tall herbs	Neg_BM_slope	0	-
Cirsium oleraceum (L.) Scop.	*Cir_ole*	Tall herbs	Neg_BM_slope	0	-
Crepis biennis L.	*Cre_bie*	Tall herbs	Neg_BM_slope	0	-
Cynosurus cristatus L.	*Cyn_cri*	Grasses	Zero_BM_2014	0	2010
Dactylis glomerata L.	*Dac_glo*	Grasses	Neg_BM_slope	0	-
Daucus carota L.	*Dau_car*	Tall herbs	Neg_BM_slope	0	-
Festuca pratensis Huds.	*Fes_pra*	Grasses	Neg_BM_slope	0	-
Festuca rubra L.	*Fes_rub*	Grasses	Pos_BM_slope	0	-
Galium mollugo L.	*Gal_mol*	Tall herbs	Pos_BM_slope	0	-
Geranium pratense L.	*Ger_pra*	Tall herbs	Zero_BM_2014	0	2014
Glechoma hederacea L.	*Gle_hed*	Small herbs	Pos_BM_slope	0	-
Helictotrichon pubescens (Huds.) Pilg.	*Hel_pub*	Grasses	Pos_BM_slope	0	-
Heracleum sphondylium L.	*Her_sph*	Tall herbs	Zero_BM_2014	100	2014
Holcus lanatus L.	*Hol_lan*	Grasses	Zero_BM_2014	0	2013
Knautia arvensis (L.) Coult.	*Kna_arv*	Tall herbs	Pos_BM_slope	0	-
Lathyrus pratensis L.	*Lat_pra*	Legumes	Neg_BM_slope	0	-
Leontodon hispidus L.	*Leo_his*	Small herbs	Pos_BM_slope	0	-
Leucanthemum vulgare Lam.	*Leu_vul*	Tall herbs	Pos_BM_slope	0	-

Lotus corniculatus L.	*Lot_cor*	Legumes	Neg_BM_slope	0	-
Luzula campestris (L.) DC	*Luz_cam*	Grasses	Zero_BM_2014	50	2014
Medicago lupulina L.	*Med_lup*	Legumes	Neg_BM_slope	0	-
Medicago x varia Martyn	*Med_var*	Legumes	Neg_BM_slope	0	-
Onobrychis viciifolia Scop.	*Ono_vic*	Legumes	Zero_BM_2014	0	2010
Pastinaca sativa L.	*Pas_sat*	Tall herbs	Neg_BM_slope	50	-
Phleum pratense L.	*Phl_pra*	Grasses	Zero_BM_2014	0	2014
Pimpinella major (L.) Huds.	*Pim_maj*	Tall herbs	Zero_BM_2014	0	2014
Plantago lanceolate L.	*Pla_lan*	Small herbs	Pos_BM_slope	0	-
Plantago media L.	*Pla_med*	Small herbs	Neg_BM_slope	0	-
Poa pratensis L.	*Poa_pra*	Grasses	Neg_BM_slope	0	-
Poa trivialis L.	*Poa_tri*	Grasses	Neg_BM_slope	0	-
Primula veris L.	*Pri_ver*	Small herbs	Pos_BM_slope	50	-
Prunella vulgaris L.	*Pru_vul*	Small herbs	Neg_BM_slope	0	-
Ranunculus acris L.	*Ran_acr*	Tall herbs	Pos_BM_slope	0	-
Ranunculus repens L.	*Ran_rep*	Small herbs	Neg_BM_slope	0	-
Species	**Abbreviation**	**Functional groups**	**Monoculture performance categories**	**Resown (%)**	**Year of extinction**
Rumex acetosa L.	*Rum_ace*	Tall herbs	Neg_BM_slope	0	-
Sanguisorba officinalis L.	*San_off*	Tall herbs	Pos_BM_slope	0	-
Scorzoneroides autumnalis (L.) Moench	*Sco_aut*	Small herbs	Neg_BM_slope	0	-
Taraxacum officinale Kirschner & Štěpánek	*Tar_off*	Small herbs	Neg_BM_slope	0	-
Tragopogon pratensis L.	*Tra_pra*	Tall herbs	Neg_BM_slope	0	-
Trifolium campestre Schreb.	*Tri_cam*	Legumes	Neg_BM_slope	50	-
Trifolium dubium Sibth.	*Tri_dub*	Legumes	Zero_BM_2014	50	2013
Trifolium fragiferum L.	*Tri_fra*	Legumes	Pos_BM_slope	0	-
Trifolium hybridum L.	*Tri_hyb*	Legumes	Zero_BM_2014	0	2014
Trifolium pratense L.	*Tri_pra*	Legumes	Pos_BM_slope	0	-
Trifolium repens L.	*Tri_rep*	Legumes	Neg_BM_slope	0	-
Trisetum flavescens (L.) P. Beauv.	*Tri_fla*	Grasses	Zero_BM_2014	0	2014
Veronica chamaedrys L.	*Ver_cha*	Small herbs	Neg_BM_slope	0	-
Vicia cracca L.	*Vic_cra*	Legumes	Pos_BM_slope	0	-

Table A2. Summary of hurdle analyses of viable seeds in topsoil and seedling density related to monoculture performance categories. Listed are estimate, standard error (SE), z-values (Z) and p-values (p) for count models and for zero hurdle models. Significant effects ($p < 0.05$) are given in bold, and marginally significant effects ($p < 0.1$) are given in italics.

	Count model				Zero hurdle model			
	Estimate	SE	Z	p	Estimate	SE	Z	p
Seeds in topsoil								
Zero_BM_{2014}	6.819	0.019	357.18	**< 0.001**	- 1.390	0.646	- 2.15	**0.032**
Neg_BM_{slope}	- 0.322	0.022	- 14.83	**< 0.001**	1.253	0.742	1.69	*0.091*
Pos_BM_{slope}	0.818	0.021	39.27	**< 0.001**	1.253	0.827	1.51	0.130
Seedling density								
Zero_BM_{2014}	3.912	0.082	47.91	**< 0.001**	- 1.390	0.646	- 2.15	**0.032**
Neg_BM_{slope}	0.993	0.085	11.74	**< 0.001**	1.386	0.742	1.87	*0.062*
Pos_BM_{slope}	1.916	0.083	23.04	**< 0.001**	2.773	0.913	3.04	**0.002**

Table A3. Summary of PCA results for studied variables (soil biota, nutrient economy, life-cycle characteristics). Listed are loadings for PC1 and PC2.

	PC1	PC2
Soil biota		
Nematode communities		
Total number of nematodes	-1.25	0.36
Genus richness	0.52	0.45
Genus diversity	-0.04	0.76
Plant-feeding nematodes	-0.82	0.26
Plant feeder type diversity	0.50	0.82
Fungal-feeding nematodes	-1.03	0.11
Bacterial-feeding nematodes	-1.02	0.50
Predatory nematodes	0.09	-0.44
Predator-prey ratio	0.55	-0.56
Omnivorous nematodes	-0.01	0.64
Nutrient economy		
Leaf nitrogen slope	-0.58	-0.59
Specific leaf area slope	-0.10	-0.31
Life-cycle characteristics		
Viable seeds in topsoil	-0.32	-0.72
Seedling density	-0.15	-0.82
Seed survival	-0.47	-0.64

Table A4. Pearson correlation matrix for studied variables (soil biota, nutrient economy, life-cycle characteristics). Listed are p-values (p) and correlation coefficient (r). Significant effects ($p < 0.05$) are given in bold, and marginally significant effects ($p < 0.1$) are given in italics.

	Total number (n=60)		Genus richness (n=60)		Genus diversity (n=60)		Plant feeder (n=60)		PFT diversity (n=60)		Fungal feeder (n=60)		Bacterial feeder (n=60)		Predators (n=60)		Predator-prey ratio (n=60)		Omnivores (n=60)	
	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r
Genus richness	0.504	-0.09																		
Genus diversity	*0.077*	0.23	**0.002**	0.39																
Plant feeder	**<0.001**	0.70	0.284	0.14	*0.094*	0.22														
PFT diversity	0.406	-0.11	*0.078*	0.23	**0.014**	0.32	0.317	-0.13												
Fungal feeder	**<0.001**	0.72	*0.053*	-0.25	0.282	0.14	*0.054*	0.25	0.585	-0.07										
Bacterial feeder	**<0.001**	0.79	0.687	0.05	**0.002**	0.38	**0.001**	0.41	0.871	0.02	**<0.001**	0.53								
Predators	0.477	0.09	**0.002**	0.40	0.134	0.20	0.107	0.21	0.446	-0.10	0.981	0.00	0.900	0.02						
Predeator-prey ratio	**0.016**	-0.31	**0.016**	0.31	0.967	0.01	**0.007**	-0.35	0.821	0.03	0.200	-0.17	*0.075*	-0.23	**<0.001**	0.80				
Omnivores	0.312	0.13	0.963	-0.01	0.332	0.13	**0.042**	-0.26	**0.022**	0.30	*0.083*	0.23	0.309	0.13	**0.004**	-0.37	0.200	-0.17		
AMF	0.168	-0.27	0.672	0.09	0.104	-0.32	0.278	-0.22	*0.097*	-0.33	*0.097*	-0.33	0.504	-0.13	0.588	-0.11	0.732	0.07	0.925	0.02
SLA	0.794	-0.04	0.810	0.04	0.162	0.21	0.645	-0.07	0.526	0.09	0.385	0.13	0.429	0.12	0.535	0.09	0.326	0.15	0.796	0.04
SLA slope	0.562	-0.08	0.385	-0.12	0.505	-0.09	0.864	0.02	0.666	-0.06	0.670	0.06	0.538	-0.08	0.920	-0.01	0.943	0.01	0.103	-0.21
Leaf nitrogen conc.	0.762	0.05	0.715	0.05	*0.053*	0.28	0.889	-0.02	0.132	0.22	0.643	0.07	0.193	0.19	0.788	0.04	0.715	0.05	0.773	-0.04
Leaf nitrogen slope	*0.081*	0.23	0.210	-0.17	0.795	-0.03	0.225	0.16	0.119	-0.21	**0.033**	0.28	*0.083*	0.23	0.106	0.21	0.215	0.16	0.490	-0.09
Seed bank	0.569	0.08	**0.025**	-0.29	0.683	-0.05	0.878	-0.02	**0.033**	-0.28	0.345	0.12	0.562	0.08	0.667	0.06	0.881	0.02	0.176	-0.18
Seedlings	0.973	0.00	0.662	-0.06	**0.022**	-0.29	0.606	-0.07	*0.051*	-0.25	0.690	0.05	0.552	-0.08	0.382	0.11	0.170	0.18	0.174	-0.18
Seed survival (N=58)	0.398	0.11	**0.013**	-0.32	0.342	-0.13	0.780	-0.04	**0.007**	-0.35	0.320	0.13	0.458	0.10	0.874	0.02	0.932	0.01	0.817	0.03

Table A4 continued.

	AMF (N=27)		SLA (N=47)		SLA slope (N=59)		Leaf nitrogen conc. (N=47)		Leaf nitrogen slope (N=59)		Seed bank (N=60)		Seedling density (N=60)	
	P	r	P	r	P	r	P	r	P	r	P	r	p	r
SLA	0.149	-0.29												
SLA slope	**0.039**	-0.40	**<0.001**	0.49										
Leaf nitrogen conc.	0.800	-0.05	**<0.001**	0.51	0.551	-0.09								
Leaf nitrogen slope	0.343	-0.19	0.190	0.19	0.108	0.21	0.640	0.07						
Seed bank	0.280	0.22	0.982	0.00	0.739	0.04	0.809	-0.04	0.167	0.18				
Seedling density	0.376	0.18	0.374	-0.13	0.736	0.04	**0.006**	-0.40	0.564	0.08	**0.032**	0.28		
Seed survival (N=58)	0.434	0.16	0.414	-0.12	0.805	-0.03	0.637	-0.07	**0.013**	0.33	0.127	0.20	**0.042**	0.27

Table A5. Summary of regression analyses of biomass slope against biomass production (without *Onobrychis viciifolia* Scop.) and leaf nitrogen slope against leaf nitrogen concentrations from 2002 to 2014. Listed are direction of the relationship (r), coefficients of determination (R^2) and p-values (p). Significant effects ($p < 0.05$) are given in bold, and marginally significant effects ($p < 0.1$) are given in italics.

	Biomass slope against Biomass production			Leaf nitrogen slope against leaf nitrogen concentration		
Year	r	R^2	p	r	R^2	p
2003	-0.280	0.079	**0.032**	-0.370	0.137	**0.005**
2004	-0.269	0.072	**0.040**	-0.427	0.182	**< 0.001**
2005	-0.269	0.066	**0.050**	-0.201	0.040	0.531
2006	-0.144	0.021	0.278	-0.204	0.042	0.183
2007	-0.111	0.012	0.401	-0.160	0.026	0.225
2008	-0.037	0.001	0.780	-0.291	0.084	0.201
2009	> -0.001	< 0.001	0.999	NA	NA	NA
2010	0.061	0.004	0.644	NA	NA	NA
2011	0.247	0.061	*0.059*	0.146	0.021	0.302
2012	0.407	0.166	**0.001**	0.109	0.012	0.440
2013	0.419	0.175	**0.001**	NA	NA	NA
2014	0.487	0.237	**< 0.001**	0.070	0.005	0.640

Figure A1. Biomass slope plotted against biomass production in 2014 (log-scale). The solid line indicates positive relationship derived from a simple linear regression. Dark grey to light grey circles represent monoculture performance categories. For list of variables, abbreviations and units see Table 1.

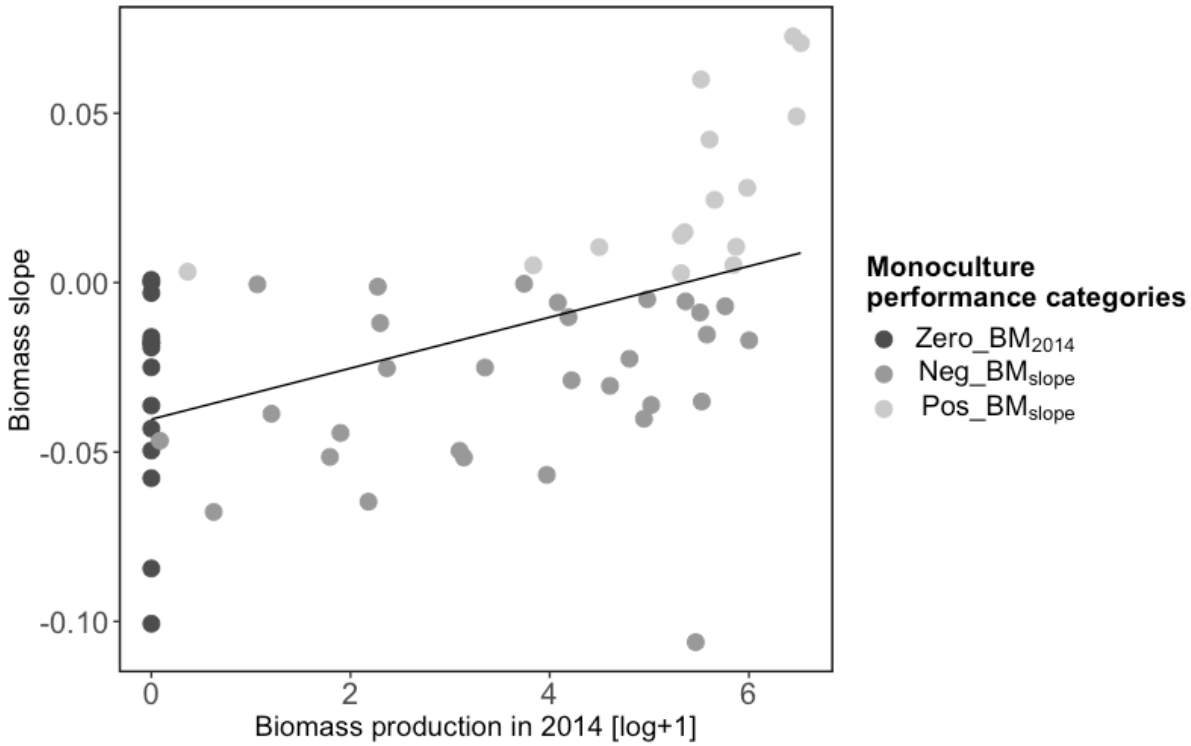


Figure A2**.** Biomass production in 2014 (log-scale) plotted against omnivorous nematodes (log-scale) (a), AMF colonization (b) and specific leaf area in 2014 (c). Dark grey to light grey circles represent monoculture performance categories. Dashed lines indicate marginal significant relationships ($p < 0.1$) according to the results of regression analyses (without species in category Zero_BM_{2014}).

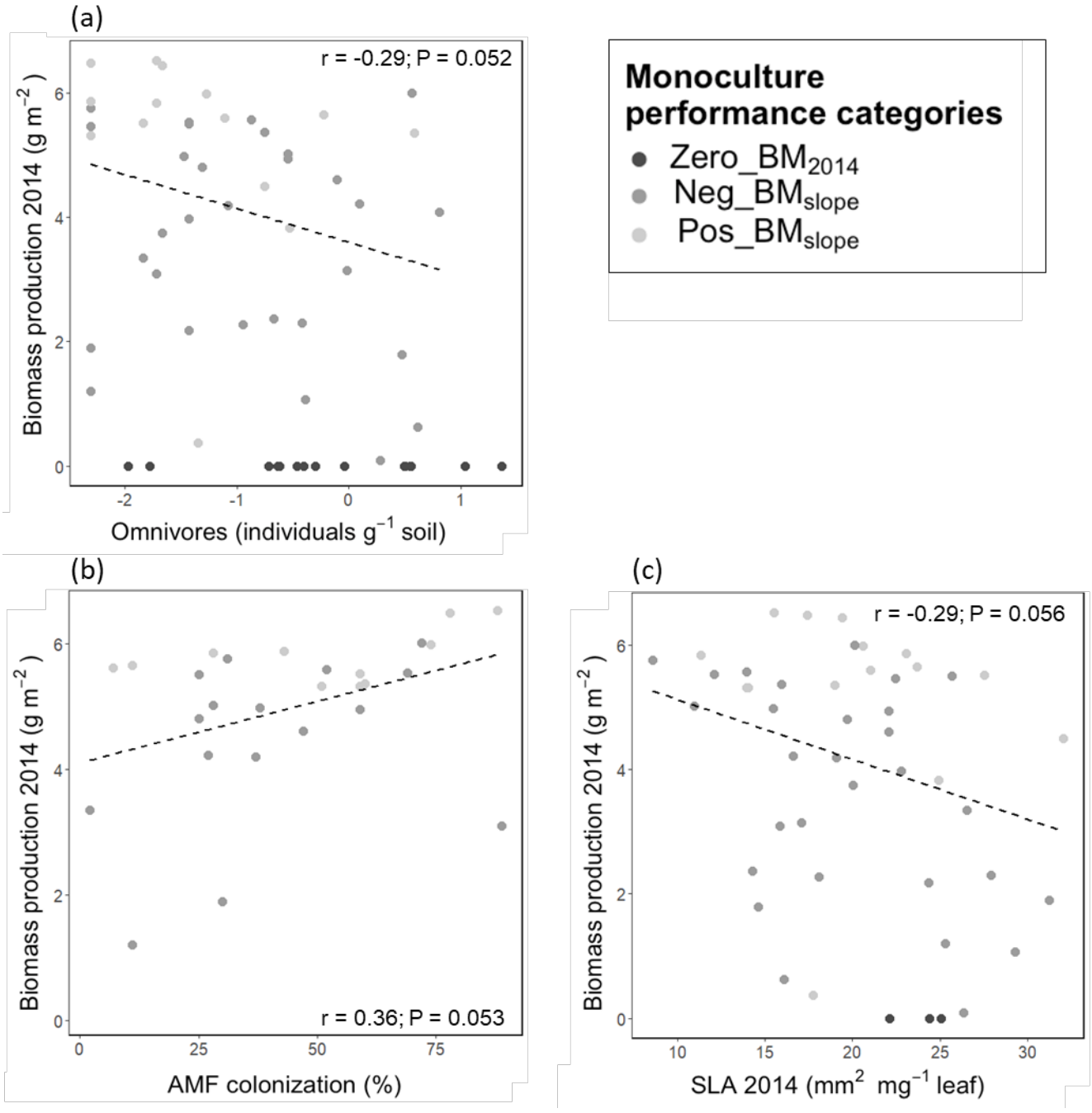


Figure A3. Biomass slope plotted against plant feeder type diversity (a), predator-prey ratio (log-scale) (b) and predatory nematodes (log-scale) (c). Dark grey to light grey circles represent monoculture performance categories. Solid lines indicate significant relationships ($p < 0.05$) and dashed lines indicate marginal significant relationships ($p < 0.01$) according to the results of regression analyses (without the outlier *Onobrychis viciifolia*).

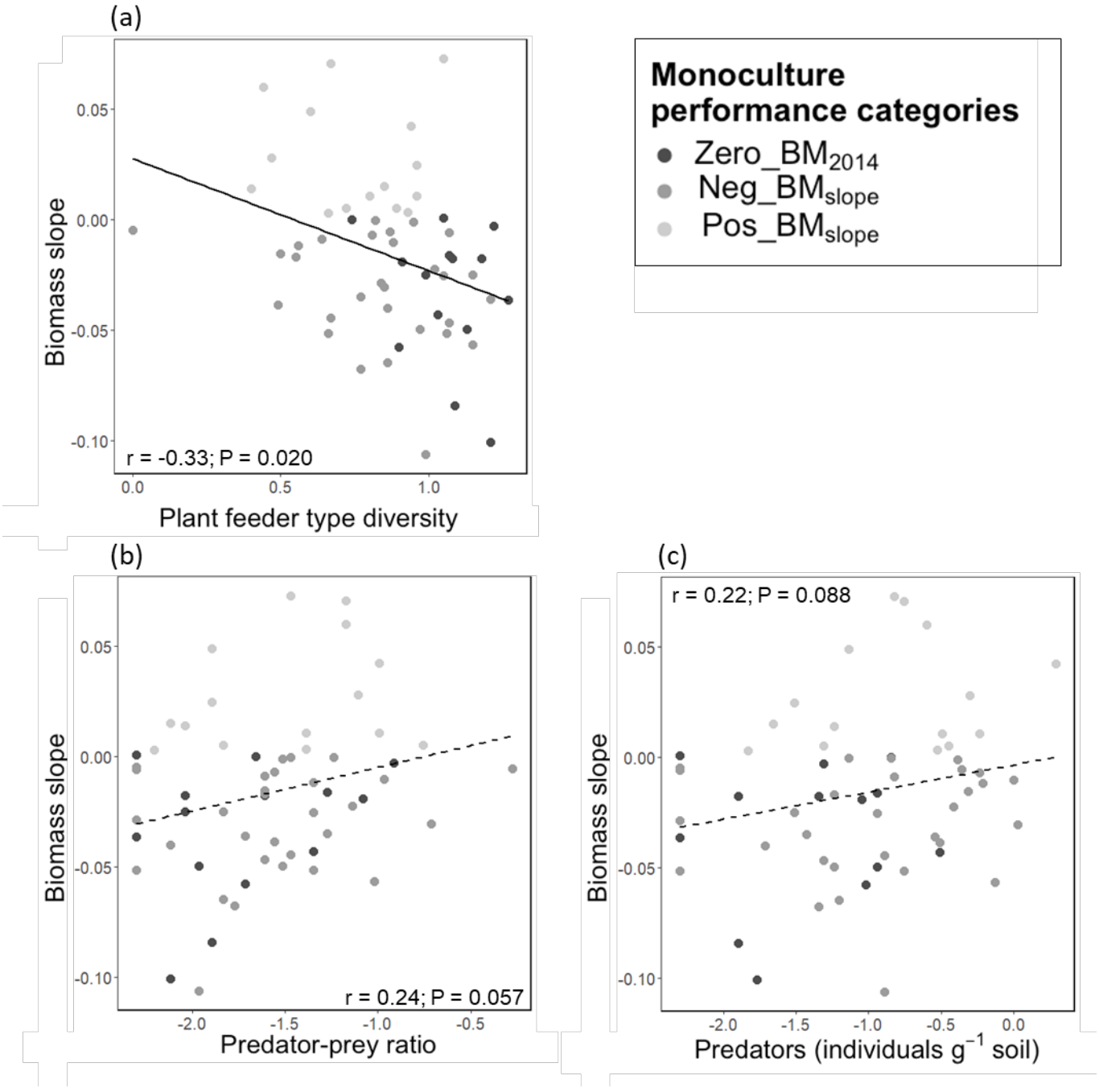


Figure A4. Biomass slope plotted against leaf nitrogen slope (a), viable seeds in topsoil (log-scale) (b) and seedling density (log-scale) (c). Dark grey to light grey circles represent monoculture performance categories. Solid lines indicate significant relationships ($p < 0.05$) and dashed lines indicate marginal significant relationships ($p < 0.01$) according to the results of regression analyses (without the outlier *Onobrychis viciifolia*).

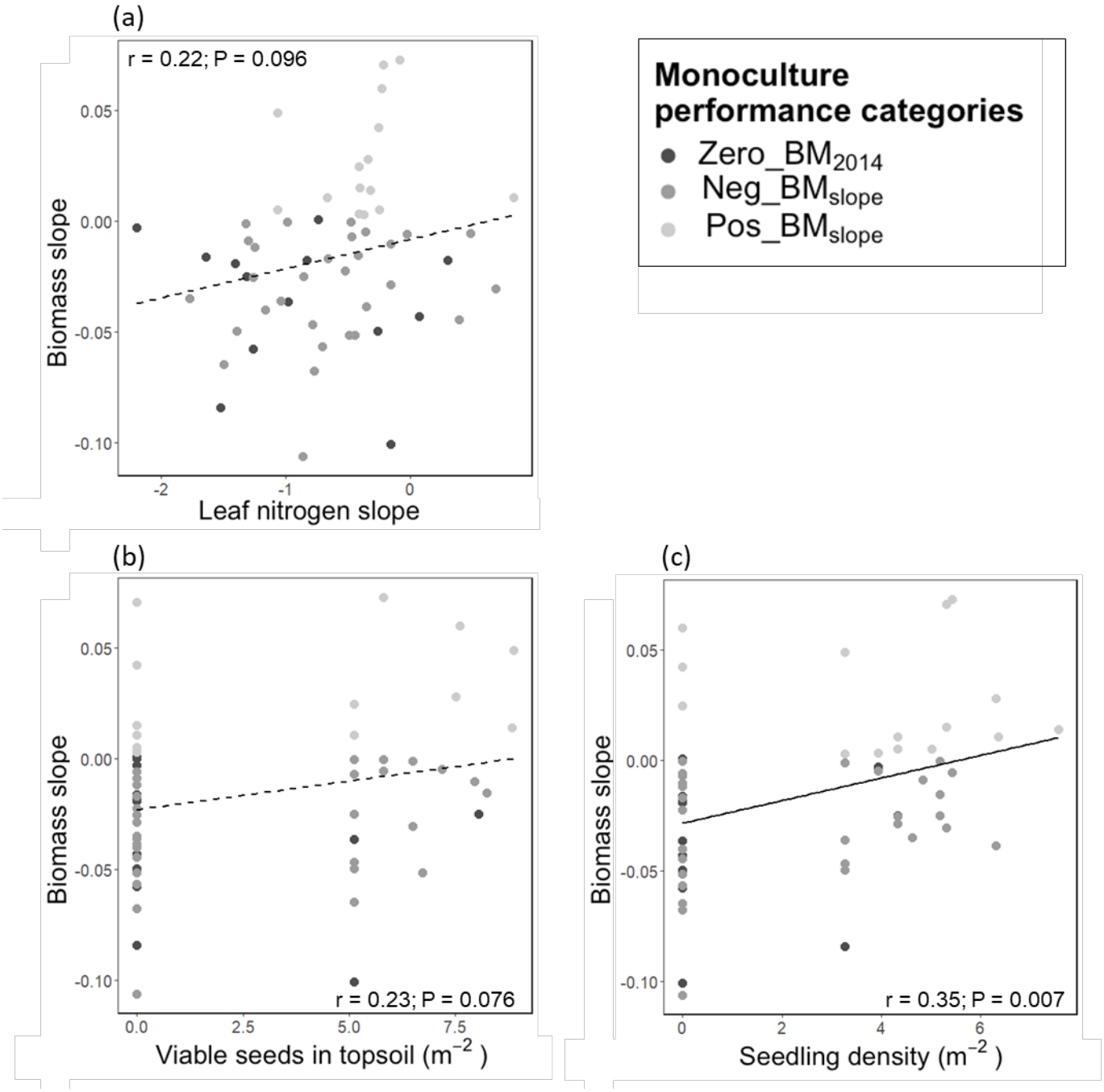
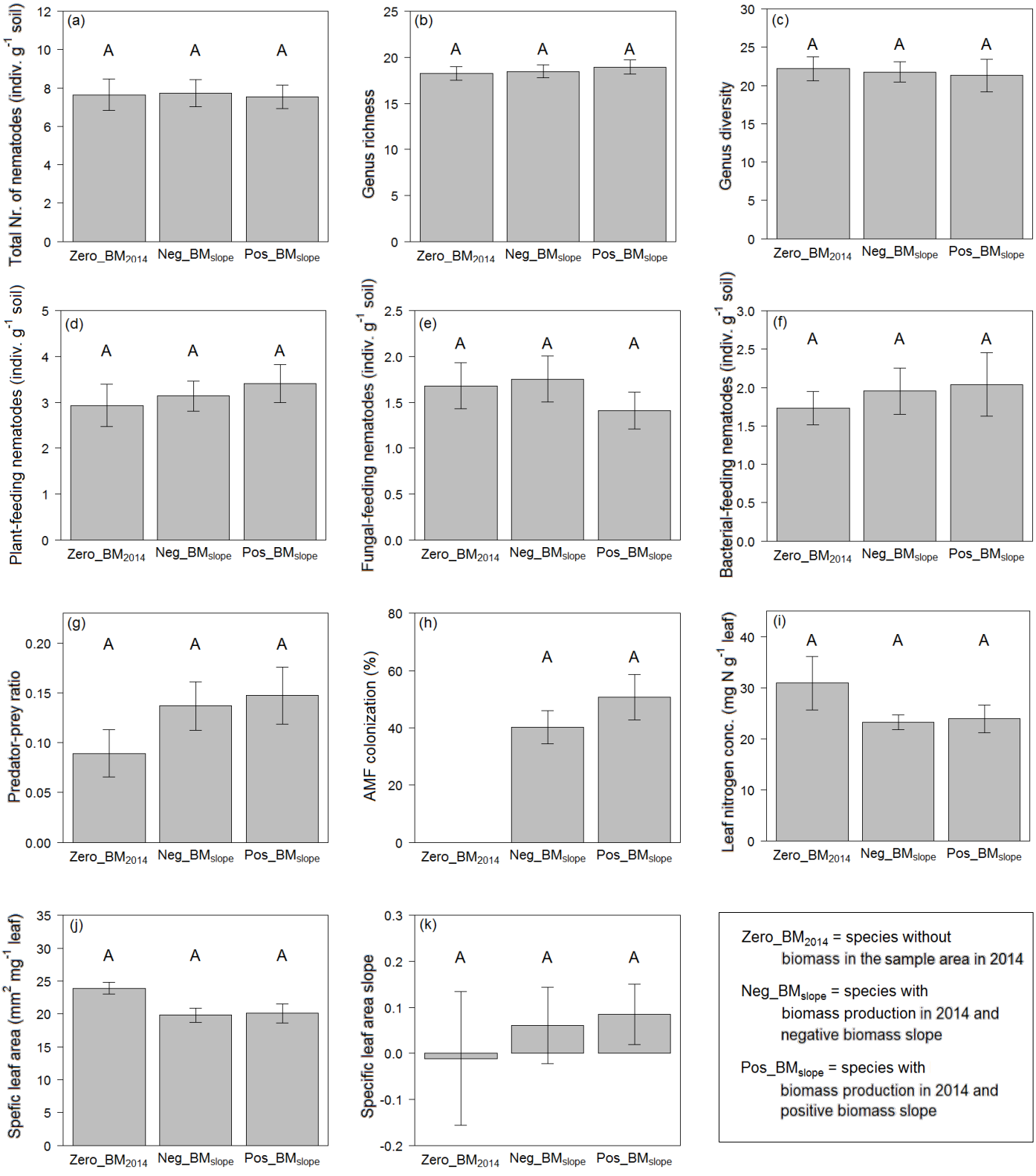


Figure A5. Total number of nematodes (a), genus richness (b), genus diversity (c), plant-feeding nematodes (d), fungal-feeding nematodes (e), bacterial-feeding nematodes (f), predator-prey ratio (g), AMF colonization (h) (a-h = soil biota) and leaf nitrogen concentrations in 2014 (i), specific leaf area (j), SLA slope (k) (i-k = nutrient economy) for monoculture performance categories (*zero_BM*$_{2014}$, *neg_BM*$_{slope}$, *pos_BM*$_{slope}$). Bars show mean values (± 1 SE) for each monoculture performance category.



References

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