

APPENDIX A. Supplemental tables and figures.

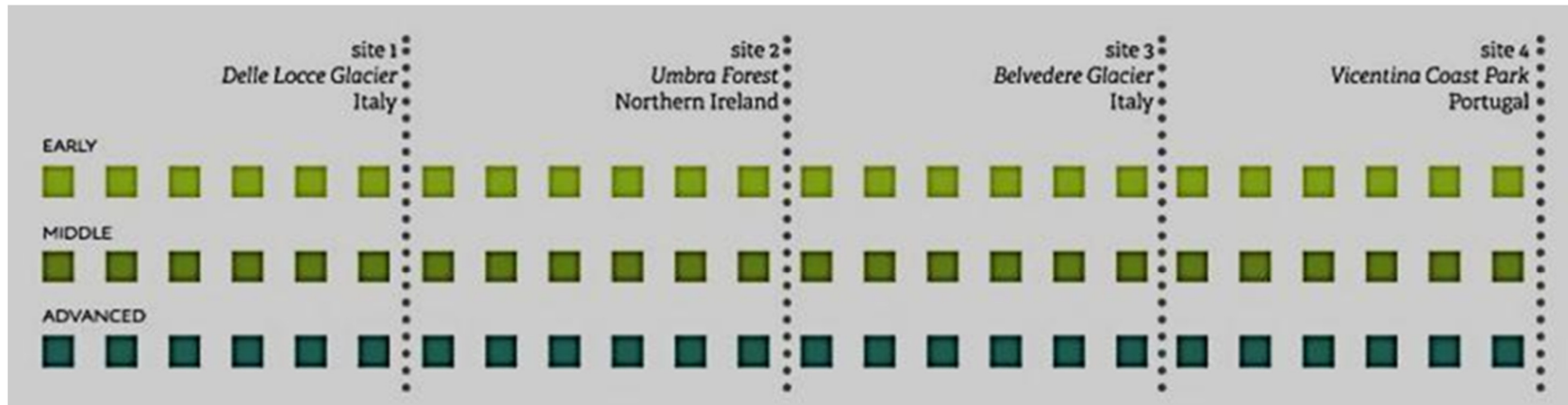


FIG. A1. Study design: 4 block sites, 3 successional stages, 6 plant species collected within each stage (i.e., 2 legume, 2 grass, 2 forb species).

TABLE A1. Details of the four primary successions. The age of each successional stage has been estimated from literature: *a* Moura *et al.* 2006; Dias *et al.* 2000; Clark and Rendell 2006; *b* Wilson *et al.* 2004; Wilson P. 1987; *c* Caccianiga and Andreis 2004; Monterin 1919; Sacco 1938; Smiraglia 1992; Korner 2003.

Study sites	Annual Mean	Annual Mean	Soil pH	Succession Age		
	Temperature (°C)	Precipitation (mm)		Early	Middle	Advanced
Carrapateira Dunes ^a	15.9	563	8.7	<50	200-600	>1000
Umbra Dunes ^b	8.5	1065	8.6	<50	200-600	>1000
Belvedere Glacier ^c	5	1695	5.5	<50	200-600	>1000
Locce Glacier ^c	5	1695	5.2	<50	200-600	>1000

TABLE A6. List of the plant species collected at the four study sites and separated between the three broad plant functional groups.

Legume Species	Graminoid Species	Forb Species
<p><u>Early Stage</u></p> <p><i>Lotus creticus</i></p> <p><i>Lotus sp.</i></p> <p><i>Anthyllis vulneraria</i></p> <p><i>Vicia cracca</i></p> <p><i>Trifolium pallescens</i></p> <p><i>Trifolium pallescens</i></p>	<p><u>Early Stage</u></p> <p><i>Ammophila arenaria</i></p> <p><i>Cyperus nigra</i></p> <p><i>Ammophila arenaria</i></p> <p><i>Festuca rubia subsp. arenaria</i></p> <p><i>Poa alpina</i></p> <p><i>Agrostis schraderiana</i></p> <p><i>Poa alpina</i></p> <p><i>Agrostis schraderiana</i></p>	<p><u>Early Stage</u></p> <p><i>Malcolmia littorea</i></p> <p><i>Balduina angustifolia</i></p> <p><i>Hypochaeris radicata</i></p> <p><i>Veronica arvensis</i></p> <p><i>Achillea moscata</i></p> <p><i>Linaria glacialis</i></p> <p><i>Campanula excisa</i></p> <p><i>Achillea moscata</i></p> <p><i>Leucanthemopsis alpina</i></p> <p><i>Oxyria digyna*</i></p>
<p><u>Middle Stage</u></p> <p><i>Lotus creticus</i></p> <p><i>Coronilla emerus</i></p> <p><i>Anthyllis vulneraria</i></p> <p><i>Trifolium campestre</i></p> <p><i>Trifolium pallescens</i></p> <p><i>Lotus alpinus</i></p> <p><i>Trifolium pratense</i></p>	<p><u>Middle Stage</u></p> <p><i>Lagurus ovatus</i></p> <p><i>Anagallis monelli</i></p> <p><i>Anthoxanthum odoratum</i></p> <p><i>Anthoxanthum aristatum</i></p> <p><i>Agrostis schraderiana</i></p> <p><i>Poa laxa</i></p> <p><i>Poa alpina</i></p> <p><i>Festuca halleri</i></p>	<p><u>Middle Stage</u></p> <p><i>Balduina angustifolia</i></p> <p><i>Plantago lanceolata</i></p> <p><i>Pilosella officinarum</i></p> <p><i>Plantago lanceolata</i></p> <p><i>Cerastium pedunculatum</i></p> <p><i>Rumex scutatus</i></p> <p><i>Achillea moscata</i></p> <p><i>Adenostyles leucophylla</i></p> <p><i>Rhinanthus alpinum</i></p>
<p><u>Later Stage</u></p> <p><i>Lotus creticus</i></p> <p><i>Anthyllis vulneraria</i></p> <p><i>Lotus corniculatus</i></p> <p><i>Lotus alpinus</i></p> <p><i>Trifolium pratense</i></p> <p><i>Trifolium alpinum</i></p>	<p><u>Later Stage</u></p> <p><i>Dactylis hispanica</i></p> <p><i>Lagurus ovatus</i></p> <p><i>Dactylis glomerata</i></p> <p><i>Helicotrichon pratense</i></p> <p><i>Poa alpina</i></p> <p><i>Phleum alpinum</i></p> <p><i>Avenella flexuosa</i></p> <p><i>Poa alpina</i></p>	<p><u>Later Stage</u></p> <p><i>Pilosella officinarum</i></p> <p><i>Anagallis arvensis</i></p> <p><i>Plantago lanceolata</i></p> <p><i>Pilosella officinarum</i></p> <p><i>Geum montanum</i></p> <p><i>Phyteuma betonicifolia</i></p> <p><i>Geum montanum</i></p> <p><i>Phyteuma hemisphericum</i></p> <p><i>Rhinanthus minor</i></p> <p><i>Laserpitium halleri</i></p>

TABLE A7. Effects of two factors (FGs and stages) and their interaction (FG*stage) on Leaf C:N showing which level of each factor is significant within the model.

Parameter Estimates					
Term	Estimate	Std Error	DFDen	t Ratio	Prob> t
Intercept	30.680885	2.963501	7	10.35	<.0001*
Stage[1 Early]	-1.250984	4.285216	7	-0.29	0.7788
Stage[2 Middle]	-2.729042	3.995984	7	-0.68	0.5166
Functional group[1 L]	-12.30636	3.995984	7	-3.08	0.0178*
Functional group[2 F]	-5.670716	4.556123	7	-1.24	0.2533
Functional group[1 L]*Stage[1 Early]	0.3939255	5.721379	7	0.07	0.9470
Functional group[1 L]*Stage[2 Middle]	3.1013684	5.508084	7	0.56	0.5910
Functional group[2 F]*Stage[1 Early]	-4.195214	6.686561	7	-0.63	0.5503
Functional group[2 F]*Stage[2 Middle]	11.831223	5.927003	7	2.00	0.0861

TABLE A8. Effects of two factors (FGs and stages) and their interaction (FG*stage) on Root C:N showing which level of each factor is significant within the model

Parameter Estimates					
Term	Estimate	Std Error	DFDen	t Ratio	Prob> t
Intercept	42.001884	1.733595	8	24.23	<.0001*
Stage[1 Early]	-0.326187	2.389596	8	-0.14	0.8948
Stage[2 Middle]	2.8357455	2.571337	8	1.10	0.3022
Functional group[1 L]	-17.28108	2.571337	8	-6.72	0.0001*
Functional group[2 F]	3.6202868	2.389596	8	1.52	0.1682
Functional group[1 L]*Stage[1 Early]	-1.44558	3.46719	8	-0.42	0.6877
Functional group[1 L]*Stage[2 Middle]	0.2835306	3.953205	8	0.07	0.9446
Functional group[2 F]*Stage[1 Early]	-4.380406	3.334636	8	-1.31	0.2254
Functional group[2 F]*Stage[2 Middle]	6.5885965	3.46719	8	1.90	0.0939

TABLE A9. Effects of two factors (FGs and stages) and their interaction (FG*stage) on Stem C:N showing which level of each factor is significant within the model.

Parameter Estimates					
Term	Estimate	Std Error	DFDen	t Ratio	Prob> t
Intercept	34.713849	2.597059	8	13.37	<.0001*
Stage[1 Early]	-1.673003	3.852061	8	-0.43	0.6755
Stage[2 Middle]	0.4834024	3.579799	8	0.14	0.8959
Functional group[1 L]	-11.32281	3.579799	8	-3.16	0.0133*
Functional group[2 F]	1.8198385	3.852061	8	0.47	0.6492
Functional group[1 L]*Stage[1 Early]	-0.483494	5.194118	8	-0.09	0.9281
Functional group[1 L]*Stage[2 Middle]	2.5384907	4.995543	8	0.51	0.6251
Functional group[2 F]*Stage[1 Early]	-6.831383	5.922206	8	-1.15	0.2820
Functional group[2 F]*Stage[2 Middle]	4.5132979	5.194118	8	0.87	0.4102

TABLE A10. Effects of two factors (FGs and stages) and their interaction (FG*stage) on Leaf C:P showing which level of each factor is significant within the model.

Parameter Estimates						
Term	Estimate	Std Error	DFDen	t Ratio	Prob> t	
Intercept	363.92129	65.43873	7	5.56	0.0008*	
Stage[1 Early]	-33.01193	94.62424	7	-0.35	0.7374	
Stage[2 Middle]	-0.815095	88.23756	7	-0.01	0.9929	
Functional group[1 L]	35.613277	88.23756	7	0.40	0.6985	
Functional group[2 F]	-156.9174	100.6063	7	-1.56	0.1628	
Functional group[1 L]*Stage[1 Early]	-74.44268	126.337	7	-0.59	0.5742	
Functional group[1 L]*Stage[2 Middle]	108.74167	121.6271	7	0.89	0.4010	
Functional group[2 F]*Stage[1 Early]	-47.38763	147.6497	7	-0.32	0.7576	
Functional group[2 F]*Stage[2 Middle]	102.20473	130.8775	7	0.78	0.4604	

TABLE A11. Effects of two factors (FGs and stages) and their interaction (FG*stage) on Stem C:P showing which level of each factor is significant within the model.

Parameter Estimates						
Term	Estimate	Std Error	DFDen	t Ratio	Prob> t	
Intercept	276.91838	19.32062	8	14.33	<.0001*	
Stage[1 Early]	-70.21888	28.65711	8	-2.45	0.0399*	
Stage[2 Middle]	22.850701	26.63164	8	0.86	0.4158	
Functional group[1 L]	53.88406	26.63164	8	2.02	0.0777	
Functional group[2 F]	-64.83592	28.65711	8	-2.26	0.0535	
Functional group[1 L]*Stage[1 Early]	-49.36155	38.64124	8	-1.28	0.2373	
Functional group[1 L]*Stage[2 Middle]	40.666237	37.16396	8	1.09	0.3057	
Functional group[2 F]*Stage[1 Early]	-0.326234	44.05779	8	-0.01	0.9943	
Functional group[2 F]*Stage[2 Middle]	-12.64517	38.64124	8	-0.33	0.7519	

TABLE A12. Effects of two factors (FGs and stages) and their interaction (FG*stage) on Root C:P showing which level of each factor is significant within the model.

Parameter Estimates						
Term	Estimate	Std Error	DFDen	t Ratio	Prob> t	
Intercept	334.83908	36.24848	8	9.24	<.0001*	
Stage[1 Early]	-8.577029	49.96509	8	-0.17	0.8680	
Stage[2 Middle]	-37.98858	53.76519	8	-0.71	0.4999	
Functional group[1 L]	4.9712542	53.76519	8	0.09	0.9286	
Functional group[2 F]	-81.22436	49.96509	8	-1.63	0.1427	
Functional group[1 L]*Stage[1 Early]	-78.28766	72.49697	8	-1.08	0.3117	
Functional group[1 L]*Stage[2 Middle]	25.160131	82.65926	8	0.30	0.7686	
Functional group[2 F]*Stage[1 Early]	-15.63029	69.72535	8	-0.22	0.8282	
Functional group[2 F]*Stage[2 Middle]	17.338361	72.49697	8	0.24	0.8170	

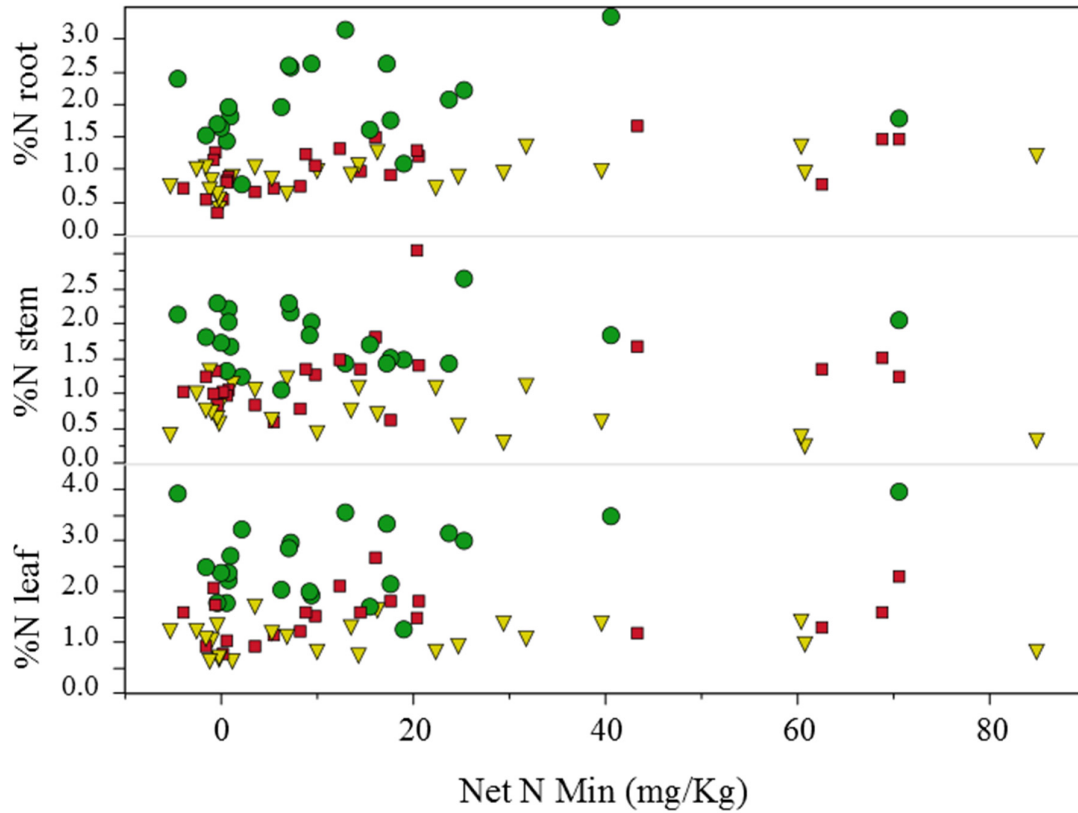


FIG A2. Effect of Net N mineralization in soil on N content in plant compartments (leaf, stem and root). No significant patterns are observed in the distribution of plant N content in relation to changes in soil N mineralization. Yellow triangle=Grass; Green dot=legume; Red square= forb.

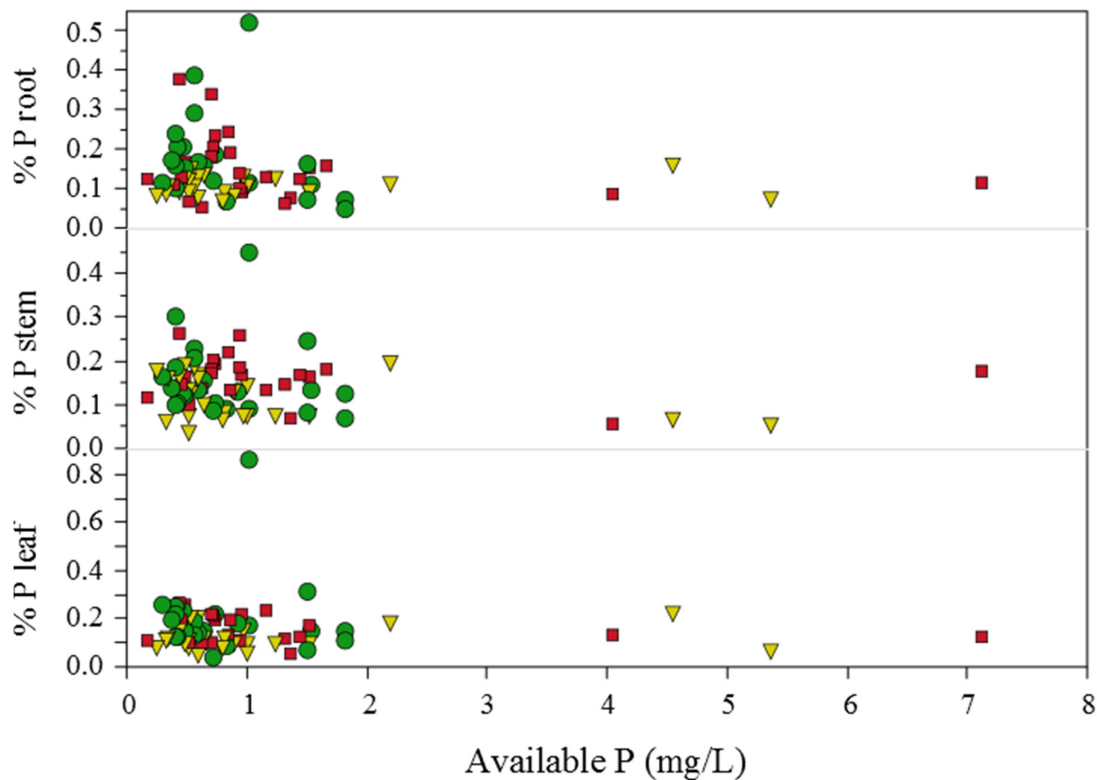


FIG A3. Effect of available P in soil on P content in plant compartments (leaf, stem and root). (Appendix Table A6). Yellow triangle=Grass; Green dot=legume; Red square= forb.

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