Ecography

ECOG-00833
Pellissier, L., Roger, A., Bilat, J. and Rasmann, S. 2014. High elevation *Plantago lanceolata* plants are less resistant to herbivory than their low elevation conspecifics: is it just temperature? – Ecography doi: 10.1111/ecog.00833

Supplementary material

Appendix 1

Table A1. Site description for the 13 *P. lanceolata* population selected in the Western Swiss Alps for measuring herbivory levels and natural levels of iridoid glycosides. Coordinates are displayed using the Swiss CH1903 projection system.

Population	Description	X	Y	Elevation (m)
1	hayfield	568153	124507	675
2	pasture	568580	124554	784
3	hayfield	570178	124427	978
4	hayfield	571471	124992	1127
5	pasture	571494	125331	1181
6	pasture	572848	125767	1237
7	pasture	575102	125775	1289
8	pasture	576545	126182	1439
9	pasture	576981	126661	1505
10	pasture on forest hedge	576908	126842	1567
11	High altitude pasture	577616	127106	1685
12	High altitude pasture	578072	127011	1749
13	High altitude pasture	578613	126698	1853

Table A2. Coordinates for the 5 high and 5 low *Plantago lanceolata* populations used for measuring temperature effect and local adaptation in defenses and resistance. Coordinates are displayed using the Swiss CH1903 projection system.

Population	Site	Elevation	X	Y	Elevation (m)
1	La Forclaz	High	566211	100785	1529
2	Les Miaux	High	585798	102196	1726
3	Anzeindaz	High	578364	126973	1799
4	La Croix	High	576059	130216	1766
5	Aldescio	High	708072	147472	1559
6	Bex	Low	566644	120705	500
7	Fully	Low	572664	108285	489
8	Dorigny	Low	533879	152658	400
9	Faido	Low	704835	147940	691
10	Mazembroz	Low	577170	111485	477

Table A3. Three-way interaction ANOVAs for of iridoid glycosides, catalpol, aucubin, and aucubin to catalpol ratio in *P. lanceolata* plants grown at three elevation sites (500, 1000 and 1500 m a.sl.). Half of the plants were either inoculated with mycorrhizae or left uninoculated. Additionally, 4-5 plants per altitude and mycorrhiza treatment served as control (undamaged plants), whereas other 3-6 plants were damaged by the generalist herbivore *S. littoralis* for 7 days (den df = 49).

Response variable	Factor	Df num	F value
Catalpol	E	2	2.62°
	M	1	0.10
	H	2	4.84*
	E*M	1	2.24
	E*H	2	1.55
	M*H	1	0.06
	E*M*H	2	1.84°
Aucubin	E	2	5.12***
	M	1	0.15
	H	2	0.36
	E*M	1	0.53
	E*H	2	0.78
	M*H	1	0.64
	E*M*H	2	0.94
Aucubin/Catalpol	E	2	0.43
	M	1	1.81
	H	2	0.12
	E*M	1	1.88
	E*H	2	0.38
	M*H	1	1.44
	E*M*H	2	0.65
C/N	E	2	35.72***
	M	1	0.89
	H	2	42.98***
	E*M	1	0.45
	E*H	2	0.17
	M*H	1	0.13
	E*M*H		0.70

° $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A4. Two-way interaction ANOVAs for the plant traits of plants grown at three different elevations. Half of the plants were inoculated with the AM fungi *R. irregularis*. *Spodoptera littoralis* larval weight after 7 days of growth was measured on the same plants placed in a glasshouse to remove the effect of elevation on insect growth.

Response variable	Factor	Df den	F
Chlorophyll concentration	Mycorrhizal treatment (M), df = 1	54	1.80
	Elevation (E), df = 2		6.73**
	Treatment*Elevation(M x E), df = 2		1.32
Aboveground biomass	M	54	0.57
	E		54.22***
	M x E		0.08
Belowground biomass	M	18	0.12
	E		21.11***
	M x E		0.05
Root-to-shoot ratio	M	18	0.13
	E		2.78
	M x E		0.14
SLA	M	54	0.92
	E		28.76***
	M x E		0.013
Water content (%)	M	54	16.98***
	E		19.43***
	M x E		0.17

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

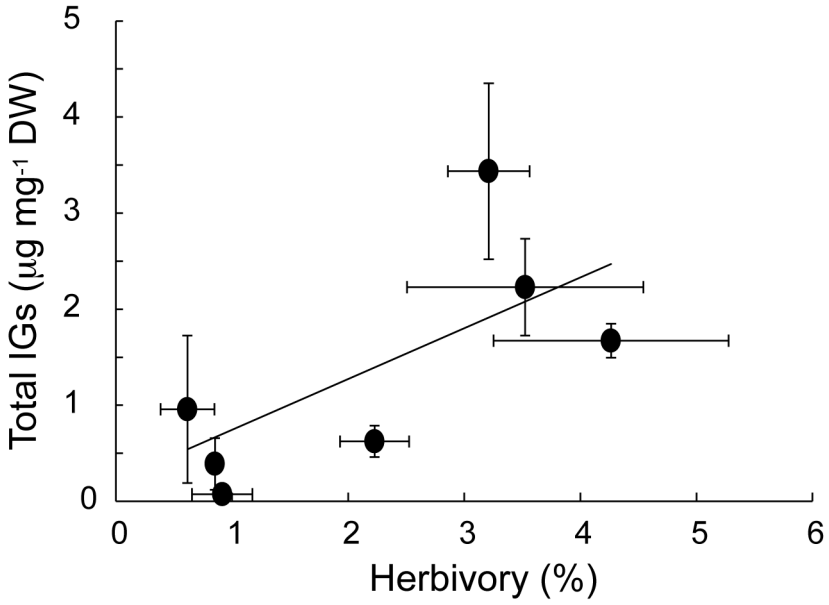

Fig. A1. Elevation effect on the levels of herbivory and the total iridoid glycosides (IGs) on seven populations along elevation gradients spanning 1200 m in elevation in the Swiss Alps. Each dot is the average six plants per elevation (± 1SE).

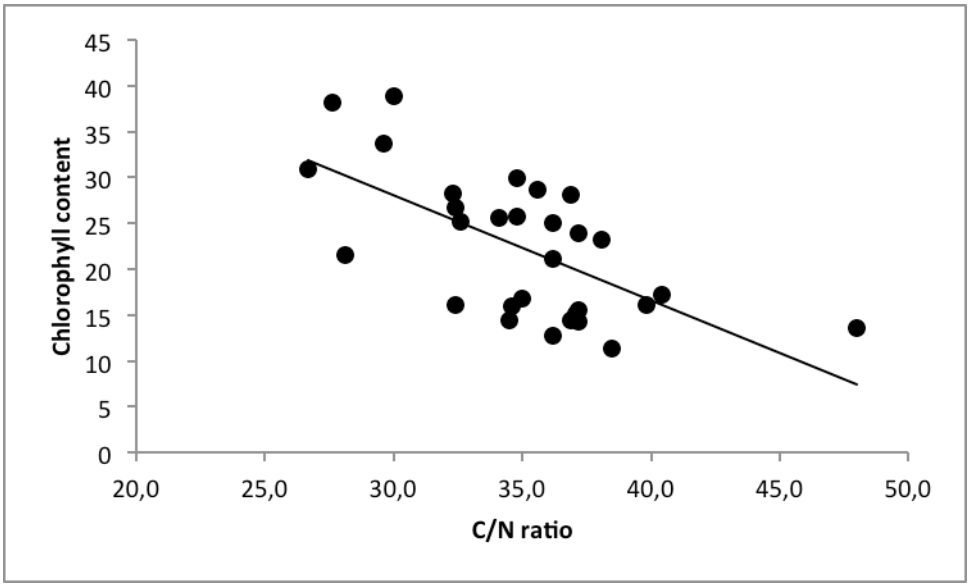

Fig. A2. Phenotypic correlation between carbon to nitrogen ratio (C/N) and chlorophyll content of all *P. lanceolata* plants that were grown at three altitudes for seven weeks (Pearson correlation, $n = 30$, $r = 0.64$, $p < 0.0001$).