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Appendix from N. E. Turley et al., "Contemporary Evolution of Plant Growth Rate Following Experimental Removal of Herbivores"

(Am. Nat., vol. 181, no. S1, p. S21)

Exclosure Information, Mixed-Effects Model, Trait Correlations, and Evolutionary Rates

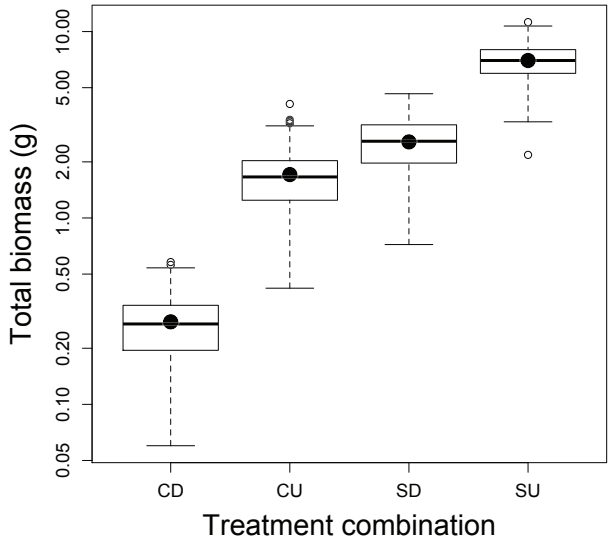

Figure A1: Total above- and belowground biomass of *Rumex acetosa* grown in the greenhouse across four treatment combinations (CD = competition and damage, CU = competition and undamaged, SD = solo [no competition] and damaged, SU = solo and undamaged). Bold horizontal lines of box plots represent the median; boxes show twenty-fifth and seventy-fifth percentiles, and whiskers show the maximum and minimum value, or 1.5 times the interquartile range when outlines (open circles) are present; the large filled circles indicate treatment means. Note the *Y*-axis is log scale.

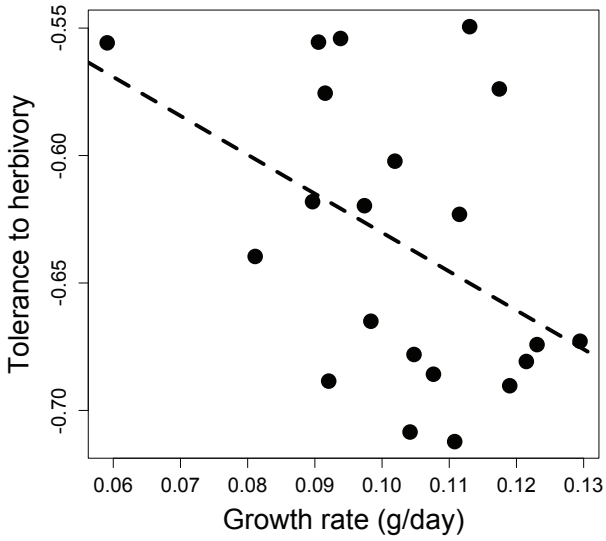

Figure A2: Correlation between plant growth rate and tolerance to herbivory (Pearson's correlation, $r = -0.44, \mathrm{df} = 19, P = .04$). Each point is the average value from one to six *Rumex acetosa* plants collected from a single rabbit exclosure and grown in a common greenhouse environment.

Table A1. Information on rabbit exclosures and Silwood Park, Berkshire, England

Plot no.	Field name	Plot's birth	Plot dimensions (m)	No. plants grown in greenhouse experiment
1	Pound Hill	1996	15 × 15	24
2	Lower Church	2003	7 × 7	24
3	Lower Church	2003	7 × 7	4
5	Upper Church	1993	10 × 10	24
11	Nasher's	1996	10 × 10	24
12	Nasher's	2003	10 × 10	24
13	Nasher's Slope	2003	10 × 10	24
18	Observatory Hill	1995	10 × 8	24
19	Elm Slope	1997	6 × 6	20
21	Pound Hill	1988	20 × 20	24
22	Nursery Field	2001	6 × 6	24
23	Nursery Field	1994	5 × 10	24
24	Cannon Path	1984	20 × 20	4
25	Upper Church (W)	2009	4 × 4	24
29	Nasher's (W)	2009	4 × 4	24
31	Nasher's Slope (N)	2009	4 × 4	24
32	Nasher's Slope (S)	2009	4 × 4	24
36	Silwood Bottom (SW)	2009	4 × 4	24
38	Rookery Slope	2009	4 × 4	24
39	Lower Church	2009	4 × 4	24
41	Upper Church Field	2009	4 × 4	22
44	Heron's Brook	2009	4 × 4	24

Table A2. Results from a linear mixed-effects model showing the effects of damage, competition, and age of exclosure (age) on total biomass of *Rumex acetosa*

Factor	χ^2	*P*
Spatial block in greenhouse	12.24	.002
Competition	857.41	<.001
Damage	669.14	<.001
Age	12.87	<.001
Damage × competition	123.19	<.001
Damage × age	.04	.85
Competition × age	1.20	.27

Note: The full model was total *Rumex* biomass = $\text{mean}_{\text{overall}}$ + spatial block + damage + competition + age + plot(age) + damage × competition + damage × age + competition × age + error. Plot was designated as a random effect nested within age. The interaction parameters damage × age and competition × age test for the evolution of tolerance to herbivory and competitive ability, respectively. The response variable was log-transformed to meet assumptions of homoscedacity of residuals and to follow recommendations by Wise and Carr (2008). The *P* values were obtained from likelihood ratio tests of nested models (Crawley 2007). All tests have 1 df estimated from χ^2 distribution.

Table A3. Pearson's correlations between traits of *Rumex acetosa* collected from rabbit exclosures and grown in a common greenhouse environment

Variable 1	Variable 2	df	*r*	*P*
Growth rate	Tannins	13	.38	.16
Growth rate	Oxalate	11	.04	.90
Growth rate	Tolerance to herbivory	19	−.44	.04
Growth rate	Competitive ability	20	−.33	.13
Tannins	Oxalate	11	−.21	.50
Tannins	Tolerance to herbivory	13	−.42	.11
Tannins	Competitive ability	13	−.03	.92
Oxalate	Tolerance to herbivory	11	.11	.73
Oxalate	Competitive ability	11	−.26	.38
Tolerance to herbivory	Competitive ability	19	.33	.14

Table A4. Evolutionary rates observed for all *Rumex acetosa* traits, measured using means-predicted linear regression models

Treatment	Darwins	Haldanes	*P* value of model
Growth rate, competition −, damage −	14,205.21	.082	.001
Growth rate, competition −, damage +	14,196.90	.075	.004
Growth rate, competition +, damage −	9,570.57	.045	.1
Growth rate, competition +, damage +	17,339.10	.062	.02
Oxalate	3,808.15	.019	.8
Tannins	13,810.19	.035	.4
Tolerance to herbivory, competition −	435.00	.005	.9
Tolerance to herbivory, competition +	1,062.91	.020	.5
Competitive ability, damage −	1,181.07	.019	.5
Competitive ability, damage +	480.49	.014	.6

Note: In calculating Haldanes, we used pooled standard deviation across all plot means and a generation time of 1 year, which makes our estimates conservative.