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Soomdat, N. N., Griffin, J. N., McCoy, M., Hensel, M. J. S., Buhler, S., Chejanovski, Z. and Silliman, B. R. 2014. Independent and combined effects of multiple predators across ontogeny of a dominant grazer. – Oikos doi: 10.1111/oik.01579

Appendix 1

Natural variability in prey size

We based prey (snail) sizes and initial densities on those found in surveys (30 × 30 cm quadrats, n = 20) of short *Spartina* areas in local marshes (Dean Creek, 31°39'N, 81°27'W and Airport Marsh, 31°42'N, 81°29'W). These areas are the closest known approximation of prey population structure in the absence of predation – they host very low densities of resident predators and are relatively inaccessible to marine nektonic predators (Silliman and Bertness 2002). These surveys revealed a bimodal snail size-frequency distribution, with peaks at 4 and 8 mm, ostensibly corresponding to cohorts. The snail size classes used in the experiments corresponded to these abundance peaks and were 3.5–4.5 mm ('juvenile' or 'small') and 7.5–8.5 mm ('adult' or 'large').

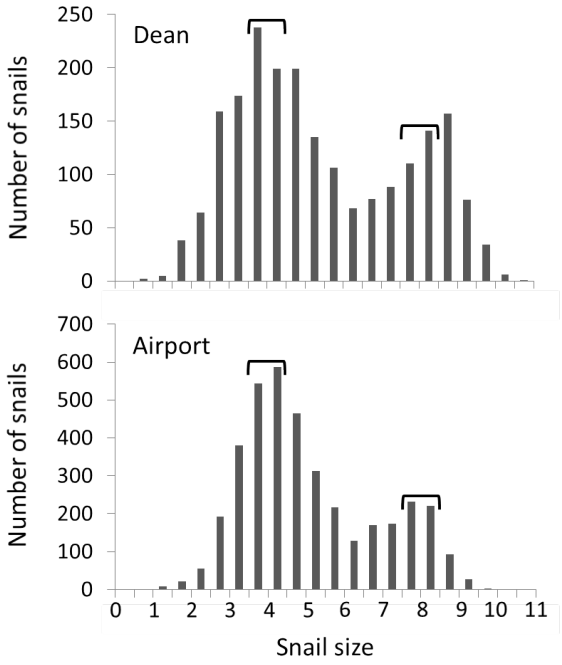

Figure 1. Snail size-frequency distributions within two salt-marshes 2.5 km from (Dean, upper panel) and at (Airport, lower panel) our study site on Sapelo Island, GA, USA. Brackets show the snail size classes used in our experiment.

References

Silliman, B. and Bertness, M. 2002. Trophic cascade regulates salt-marsh primary production. – Proc. Natl Acad. Sci. USA 99: 10500–10505.

Appendix 2

Results of linear contrasts

Table 1. Results of post hoc general linear contrasts for *Littoraria* survival in experiment 1. 'Contrast' column denotes pair of treatments being compared in each row; S = *Sesarma*; E = *Eurytium*; SE = *Sesarma* + *Eurytium* (also called 'combination' in main text); C = predator-free control. p-values reported are adjusted based on the false discovery rate method (Benjamini and Hochberg 1995). Significance codes: p < 0.001***, p < 0.01**, p < 0.05*.

Littoraria size	Contrast	Estimate	Std. error	z-value	Pr(>|z|)	Sig. level
Small	S vs C	–3.5907	0.5261	–6.826	3.50×10^{-11}	***
Small	E vs C	–3.8912	0.5256	–7.403	7.98×10^{-13}	***
Small	SE vs C	–4.7352	0.5263	–8.996	$< 2 \times 10^{-16}$	***
Small	S vs SE	–0.7035	0.5178	–1.359	0.209	
Small	E vs SE	0.1996	0.5047	0.395	0.692524	
Small	S vs E	0.9031	0.5197	1.738	0.109559	
Large	S vs C	–1.2147	0.5739	–2.117	0.05144	
Large	E vs C	–2.4183	0.5625	–4.299	4.12×10^{-5}	***
Large	SE vs C	–3.0627	0.5602	–5.467	1.37×10^{-7}	***
Large	S vs SE	1.848	0.5175	3.571	0.000712	***
Large	E vs SE	0.6444	0.5049	1.276	0.22024	
Large	S vsE	–1.2036	0.5201	–2.314	0.0354	*

Table 2. Results of post hoc general linear contrasts for *Littoraria* climbing height in experiment 1. Treatment codes and methods as described for Table 1.

Littoraria size	Contrast	Estimate	Std. error	z-value	Pr(>|z|)	Sig. level
Small	S vs C	–0.9382	0.9812	–0.956	0.50842	
Small	E vs C	3.5717	0.9548	3.741	0.00044	***
Small	SE vs C	3.2868	0.945	3.478	0.00101	**
Small	S vs SE	1.2968	1.0418	1.245	0.36552	
Small	E vs SE	0.6869	0.9755	0.704	0.64181	
Small	S vs E	–0.6099	1.0466	–0.583	0.67207	
Large	S vs C	0.2057	1.0523	0.196	0.845	
Large	E vs C	5.3256	1.0224	5.209	7.60×10^{-7}	***
Large	SE vs C	5.7275	1.0185	5.624	2.24×10^{-7}	***
Large	S vs SE	–5.5218	1.0134	–5.449	3.04×10^{-7}	***
Large	E vs SE	–0.402	0.9822	–0.409	0.74441	
Large	S vs E	5.1198	1.0173	5.033	1.45×10^{-6}	***

Table 3. Results of post hoc general linear contrasts for *Littoraria* survival in experiment 2. Treatment codes and methods as described for Table 1, with additional treatments: SS = high density *Sesarma* treatment (two individuals); EE = high density *Eurytium* treatment (two individuals).

Littoraria size	Contrast	Estimate	Std. error	z-value	Pr(>|z|)	Sig. level
Small	S vs C	–1.1567	0.2636	–4.388	6.86×10^{-5}	***
Small	SS vs C	–1.7429	0.2649	–6.58	4.71E-10	***
Small	M vs C	–2.0509	0.2665	–7.697	4.20E-13	***
Small	E vs C	–1.3303	0.2712	–4.904	7.03E-06	***
Small	EE vs C	–1.9477	0.2597	–7.501	9.53E-13	***
Small	S vs SS	–0.5862	0.264	–2.221	0.046546	*
Small	S vs M	–0.8942	0.2656	–3.367	0.002846	**
Small	S vs E	–0.1736	0.2704	–0.642	0.578741	
Small	S vs EE	–0.791	0.2587	–3.057	0.007452	**
Small	SS vs SE	–0.308	0.2668	–1.154	0.310425	
Small	SS vs E	0.4126	0.2716	1.519	0.19306	
Small	SS vs EE	–0.2048	0.26	–0.787	0.497347	
Small	SE vs E	0.7207	0.2731	2.638	0.019223	*
Small	SE vs EE	0.1033	0.2617	0.395	0.693091	
Small	E vs EE	–0.6174	0.2665	–2.317	0.043991	*
Large	S vs C	0.4919	0.3314	1.484	0.196787	
Large	SS vs C	0.3918	0.3284	1.193	0.30372	
Large	SE vs C	–0.5299	0.3162	–1.676	0.14807	
Large	E vs C	–0.7236	0.3229	–2.241	0.046546	*
Large	EE vs C	–0.857	0.3067	–2.794	0.01301	*
Large	S vs SS	0.3918	0.3284	1.193	0.30372	
Large	S vs SE	–0.5299	0.3162	–1.676	0.14807	
Large	S vs E	–0.7236	0.3229	–2.241	0.046546	*
Large	S vs EE	–0.857	0.3067	–2.794	0.01301	*
Large	SS vs SE	0.9217	0.3233	2.851	0.01301	*
Large	SS vs E	1.1154	0.3298	3.382	0.002846	**
Large	SS vs EE	1.2489	0.314	3.977	0.000349	***
Large	SE vs E	0.1937	0.3176	0.61	0.580625	
Large	SE vs EE	0.3272	0.3012	1.086	0.332893	