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Appendix 1

Illustration of an assemblage plate

Figure A1. An example of assemblage plate used in the experiment. Assemblage plate corresponds to a monospecific *L. incrustans* assemblage with *C. tamariscifolia* as canopy species.

Appendix 2

Estimates of biomass

Initial and final biomass of *Corallina* spp., *C. crispus*, *M. stellatus*, *C. tamariscifolia* and *S. muticum* were estimated from maximum length (L) and maximum circumference (C) of fronds on each rock or PVC piece, using the method by Åberg (1990). The biomass of 60 fronds of each species was previously measured and the linear regression of the dry weight of each alga on LC^2 was calculated using log-transformed data. R^2 ranged from 0.85 to 0.94 depending on the species. In general, *C. tamariscifolia* and *S. muticum* individuals had similar lengths, but differed in initial biomass because of their different structures (Biomass, $F_{1,4} = 54.21$, $p = 0.002$; 19.90 ± 9.80 g and 5.80 ± 2.80 g for *C. tamariscifolia* and *S. muticum*, respectively).

References

Åberg, P. 1990. Measuring size and choosing category size for a transition matrix study of the seaweed *Ascophyllum nodosum*. – Mar. Ecol. Prog. Ser. 63: 281–287.

Appendix 3

Simplification procedures in analyses of biomass

Table A1. Summary of the ANCOVA model simplification procedures for testing the effects of tank (T), canopy species (Ca) and initial biomass (IB, time 0) on the final biomass (time 2) of assemblages (log-transformed data): (a) number of estimated parameters (n, intercept included) of complete and simplified models, AIC values and adjusted R^2 ; (b) summary of ANOVA for comparison of the simplified model (individual tanks considered) and the final minimal model (tanks with ambient CO_2 concentration and 15ºC, and high CO_2 and 15ºC respectively pooled). Y_{klmj} = j replicate observation of the response variable (final biomass); μ = mean intercept; β_i = regression slopes.

(a)

ANCOVA model	n	AIC	Adjusted R^2
Complete: $Y_{klmj} = \mu + T_k + Ca_l + \beta_1 IB + [T\ Ca]_{kl} + \beta_2 T_k\ IB + \beta_3 Ca_l\ IB + \beta_4\ [T\ Ca]_{kl}\ IB + \varepsilon_{klm}$	32	–532.45	0.84
Simplified: $Y_{kj} = \mu + T_k + \beta_1 IB + \beta_2 T_k\ IB + \varepsilon_{kj}$	16	–557.45	0.85

(b)

	Residual DF	Residual SS	DF	SS	F	p
Simplified	107	1.02				
Final minimal model	111	1.08	–4	–0.06	1.64	0.168

Table A2. Summary of the ANCOVA model simplification procedures for testing the effects of tank (T), canopy species (Ca) and initial biomass (IB) on the final biomass of the understory component of assemblages: (a) number of estimated parameters (n, intercept included) of complete and simplified models, AIC values and adjusted R^2; (b) summary of ANOVA for the comparison of the simplified model (individual tanks considered) and the final minimal model (tanks with high CO_2 concentration and 20ºC, and the rest of the treatments pooled, respectively). Y_{klmj} = j replicate observation of the response variable (final biomass); μ = mean intercept; β_i = regression slopes.

(a)

ANCOVA model	n	AIC	Adjusted R^2
Complete: $Y_{klmj} = \mu + T_k + Ca_l + \beta_1 IB + [T\ Ca]_{kl} + \beta_2 T_k\ IB + \beta_3 Ca_l\ IB + \beta_4 [T\ Ca]_{kl}\ IB + \varepsilon_{klmj}$	32	–263.42	0.68
Simplified: $Y_{kj} = \mu + T_k + \beta_1 IB + \varepsilon_{kj}$	9	–379.09	0.73

(b)

	Residual DF	Residual SS	DF	SS	F	p
Simplified	86	1.45				
Final minimal model	92	1.56	–6	–0.11	1.06	0.393

Appendix 4

Environmental parameters in tanks

Table A3. Seawater carbonate chemistry in tanks with different experimental treatments. DIC, pH, salinity and temperature were used to derive all other parameters using the program csys.m (Zeebe and Wolf-Gladrow 2001). Values for each treatment (n = 2) show the average and the standard error from day 3 (i.e. when seawater chemistry reached a dynamic equilibrium after the start of the gas bubbling) to the end of the experiment except for the treatment with ambient CO_2 and 15ºC where the last 3 values were also excluded (see Environmental parameters in the Results section). CO_2 concentration is reported in units of parts per million (ppm), and concentrations of CO_2, HCO_3^-, CO_3^{2-}, DIC and total alkalinity (A_T) in µmol C kg^{-1}.

	Ambient CO_2 – 20ºC	Ambient CO_2 – 15ºC	High CO_2 – 20ºC	High CO_2 – 15ºC
pH	8.04 ± 0.01	7.99 ± 0.03	7.68 ± 0.02	7.91 ± 0.05
CO_2 (ppm)	591 ± 13	704 ± 47	1859 ± 122	897 ± 108
[CO_2]	19.13 ± 0.38	26.41 ± 1.77	59.49 ± 3.54	33.10 ± 3.93
[HCO_3^-]	1914 ± 4	2044 ± 12	2603 ± 37	2173 ± 50
[CO_3^{2-}]	138 ± 3	116 ± 8	82 ± 4	106 ± 12
DIC	2060 ± 4	2206 ± 12	2726 ± 41	2295 ± 49
A_T	2275 ± 6	2345 ± 10	2808 ± 45	2446 ± 379