

Supplementary material

Article title: **High-resolution mapping of seagrass biomass dynamics suggests differential response of seagrasses to fluctuating environments**

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Table S1 Two-way ANOVA results of season (wet vs. dry) and site (Dakwan vs. Nanwan) on environmental parameters collected in southern Taiwan.

Variable	Factor	MS	<i>F</i> value	<i>p</i> value	Holm–Sidak test	Transformation
Water temperature	Season	109.451	12.125	0.004	Wet > Dry	Square root
	Site	0.020	0.002	0.963		
	Season × Site	0.191	0.021	0.886		
Light extinction coefficient	Season	0.104	0.248	0.627		
	Site	1.030	2.464	0.141		
	Season × Site	0.689	1.648	0.222		
DIN	Season	5.455	6.628	0.022	Wet > Dry	
	Site	0.108	0.131	0.723		
	Season × Site	0.039	0.047	0.832		
DIP	Season	0.011	0.966	0.342		
	Site	0.003	0.282	0.604		
	Season × Site	0.001	0.072	0.792		
Sediment depth	Season	0.093	0.007	0.935		
	Site	198.025	14.611	0.002		
	Season × Site	14.003	1.033	0.327		
Grain size	Season	0.003	0.056	0.817		
	Site	0.180	3.33	0.089		
	Season × Site	0.004	0.079	0.782		
Silt/Clay (%)	Season	0.019	0.007	0.935		
	Site	37.681	13.322	0.003		
	Season × Site	0.691	0.244	0.629		
Sorting coefficient	Season	0.002	0.014	0.908		
	Site	0.012	0.082	0.779		
	Season × Site	0.000	0.001	0.975		

Statistically significant findings ($p < 0.05$) are highlighted in bold font.

Table S2 The results of Student's *t test*, Welch's *t test* and Mann–Whitney U test of the effects of season (wet vs. dry) and site (Dakwan vs. Nanwan) on flow velocity and salinity measured in southern Taiwan.

Variable	Group		n	Mean (Median)	<i>p</i> value		
	I	II			Student's <i>t test</i>	Welch's <i>t test</i>	Mann– Whitney U test
Salinity	Wet		6	33.1	<0.001	-	-
	Dry		10	34.7			
	Dakwan (D)		8	34.6	-	-	0.645
	Nanwan (N)		8	34.4			
	Dakwan	Wet	3	33.2	<0.001	-	-
		Dry	5	34.8			
	Nanwan	Wet	3	33.0	0.005	-	-
		Dry	5	34.6			
	Wet	D	3	33.2	0.684	-	-
		N	3	33.0			
	Dry	D	5	34.8	0.297	-	-
		N	5	34.6			
	Wet		23	43.3	-	0.513	-
	Dry		24	42.0			
Flow velocity (loss %)	Dakwan		23	47.0	-	-	<0.001
	Nanwan		24	40.0			
	Dakwan	Wet	11	43.7	<0.001	-	-
		Dry	12	49.8			
	Nanwan	Wet	12	41.5	-	-	0.102
		Dry	12	37.0			
	Wet	D	11	43.7	-	0.128	-
		N	12	40.3			
	Dry	D	12	49.0	-	-	<0.001
		N	12	37.0			

Statistically significant findings ($p < 0.05$) are highlighted in bold font.

Table S3 Three-way ANOVA results of season (dry vs. wet), site (Dakwan vs. Nanwan) and species (*Thalassia hemprichii* vs. *Halodule uninervis*) on seagrass variables measured in southern Taiwan.

Variable	Factor	MS	<i>F</i> value	<i>p</i> value	Holm–Sidak test	Transformation
Aboveground biomass	Season	0.004	0.294	0.592		
	Site	0.168	11.015	0.003	Nanwan > Dakwan	
	Species	1.016	66.727	<0.001	<i>T. hemprichii</i> > <i>H. uninervis</i>	
	Season × Site	0.000	0.001	0.975		
	Season × Species	0.019	1.228	0.277		
	Site × Species	0.007	0.437	0.514		
	Season × Site × Species	0.007	0.486	0.491		
Belowground biomass	Season	4.501	9.055	0.005		
	Site	4.396	8.845	0.006		
	Species	17.502	35.213	<0.001		
	Season × Site	0.842	1.695	0.204		
	Season × Species	2.791	5.615	0.025	<i>T. hemprichii</i> : Wet > Dry <i>H. uninervis</i> : No pattern	
	Site × Species	0.189	0.379	0.543		
	Season × Site × Species	0.303	0.609	0.442		
bg/ag ratio	Season	21.535	8.54	0.007	Wet > Dry	
	Site	0.099	0.039	0.845		
	Species	0.033	0.013	0.910		
	Season × Site	0.635	0.252	0.620		
	Season × Species	1.602	0.635	0.432		
	Site × Species	0.369	0.146	0.705		
	Season × Site × Species	0.300	0.119	0.733		
Shoot density	Season	2.539	2.394	0.133		
	Site	0.249	0.235	0.632		Square root
	Species	71.068	67.011	<0.001	<i>H. uninervis</i> > <i>T. hemprichii</i>	

Canopy height	Season × Site	0.345	0.325	0.573	
	Season × Species	0.009	0.009	0.926	
	Site × Species	0.183	0.172	0.681	
	Season × Site × Species	0.001	0.001	0.981	
	Season	4.481	1.777	0.193	Nanwan > Dakwan
	Site	22.190	8.798	0.006	
	Species	8.450	3.350	0.078	
	Season × Site	0.470	0.186	0.669	
	Season × Species	0.939	0.372	0.547	Dakwan > Nanwan
	Site × Species	0.174	0.069	0.795	
	Season × Site × Species	0.108	0.042	0.838	
	Season	0.001	0.0399	0.843	
	Site	0.150	6.487	0.017	
Efficiency of space occupation (d _{grass})	Species	0.293	12.500	0.001	<i>H. uninervis</i> > <i>T. hemprichii</i>
	Season × Site	0.000	0.017	0.896	
	Season × Species	0.062	2.646	0.115	
	Site × Species	0.004	0.175	0.679	
	Season × Site × Species	0.012	0.506	0.483	
	Season	0.005	0.683	0.416	
	Site	0.008	0.949	0.338	
Periphyton biomass (g 100 cm ⁻²)	Species	0.029	3.606	0.068	Square root
	Season × Site	0.008	1.005	0.325	
	Season × Species	0.003	0.426	0.519	
	Site × Species	0.006	0.724	0.402	
	Season × Site × Species	0.000	0.027	0.872	
	Season	0.001	0.189	0.667	
	Site	0.002	0.311	0.581	
Relative periphyton biomass (g g ⁻¹)	Species	0.003	0.408	0.528	
	Season × Site	0.010	1.141	0.245	
	Season × Species	0.001	0.197	0.661	
	Site × Species	0.007	0.964	0.335	

Leaf productivity (mg 100 cm ⁻² day ⁻¹)	Season × Site × Species	0.001	0.152	0.699	<i>T. hemprichii</i> > <i>H. uninervis</i>	Square root
	Season	4.655	2.903	0.099		
	Site	0.711	0.444	0.511		
	Species	6.903	4.306	0.047		
	Season × Site	1.768	1.103	0.303		
	Season × Species	4.511	2.814	0.105		
	Site × Species	2.234	1.394	0.248		
	Season × Site × Species	0.003	0.002	0.969		
	Season	20.271	4.187	0.05		
	Site	4.054	0.837	0.368		
Specific growth rate (mg g ⁻¹ day ⁻¹)	Species	33.751	6.972	0.013	<i>H. uninervis</i> > <i>T. hemprichii</i>	Square root
	Season × Site	4.458	0.921	0.345		
	Season × Species	1.073	0.222	0.641		
	Site × Species	3.410	0.704	0.408		
	Season × Site × Species	2.538	0.524	0.475		

Statistically significant findings ($p < 0.05$) are highlighted in bold font.