

Table S1: Average traits values among ‘ilima leaves at each site. $SD_{abaxial}$ is the stomatal density per mm^2 on the abaxial (lower) surface; $SD_{adaxial}$ is the stomatal density per mm^2 on the adaxial (upper) surface; $GCL_{abaxial}$ is the guard cell length in μm on the abaxial (lower) surface; $GCL_{adaxial}$ is the guard cell length in μm on the adaxial (upper) surface; Leaf thickness is the length from upper cuticle to lower cuticle in μm ; A is the photosynthetic rate in $\mu\text{mol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$; g_{sw} is the stomatal conductance to water vapor in $\text{mol m}^{-2} \text{ s}^{-1}$.

Site	Island	Habitat	$SD_{abaxial}$	$SD_{adaxial}$	$GCL_{abaxial}$	$GCL_{adaxial}$	Leaf thickness	A	g_{sw}
Kaloko-Honokōhau national historical park	Hawai‘i	coastal	412.99	92.31	14.73	20.32	189.60	17.40	0.123
Puakō petroglyph park	Hawai‘i	coastal	310.12	52.55	13.35	20.94	194.20	17.85	0.134
Kahuku Point	O‘ahu	coastal	420.43	80.80	16.23	22.77	304.24	20.88	0.155
Kaloko beach	O‘ahu	coastal	400.27	109.03	15.69	23.26	399.54	31.28	0.314
Ka‘ena Point	O‘ahu	coastal	370.14	120.34	17.61	22.89	295.82	34.77	0.336
Makapu‘u beach	O‘ahu	coastal	408.28	23.18	15.99	22.03	249.71	32.87	0.349
Hāloa ‘Āina	Hawai‘i	montane	307.94	7.61	16.49	22.59	149.41	13.07	0.116
Ka‘ohe game management area	Hawai‘i	montane	270.24	13.07	14.87	21.51	183.72	12.94	0.130
Koai‘a tree sanctuary	Hawai‘i	montane	318.58	9.55	13.89	22.86	138.89	27.88	0.358
Hawai‘i loa ridge	O‘ahu	montane	329.25	115.56	17.83	21.76	205.97	21.95	0.215
Mau‘umae Ridge	O‘ahu	montane	298.77	138.32	16.53	20.72	162.02	24.60	0.436
Wa‘ahila ridge	O‘ahu	montane	346.75	150.26	17.76	20.61	193.33	13.96	0.194

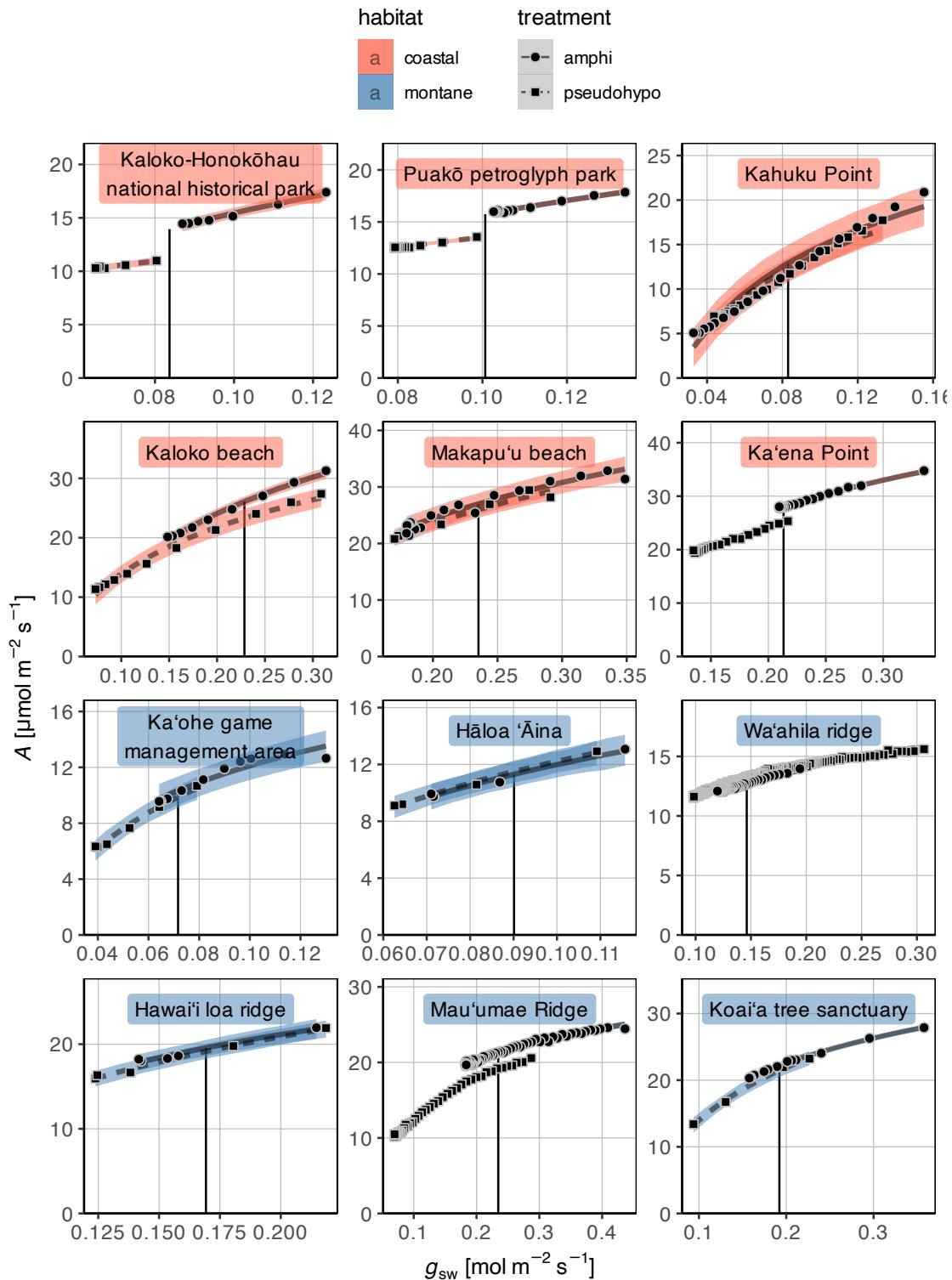


Figure S1: See next page.

Figure S1: (Continued from previous page.) Individual $A-g_{sw}$ curves used to estimate AA. For each leaf, one per site, we measured A (y -axis) over a range of g_{sw} (x -axis) on the same leaf with two treatments: ‘amphi’ (circles, solid line) leaves were untreated; ‘pseudohypo’ (squares, dashed line) leaves had no conductance through the upper (adaxial) surface. In all coastal (orange) and montane (blue) leaves, we fit generalized additive models and 95% confidence ribbons to estimate AA at a g_{sw} where the curves overlap (vertical black line). In leaves from Kaloko-Honokōhau national historical park and Puakō petroglyph park, we extrapolated slightly beyond fitted curves because they did not quite overlap. Symbols: AA, amhistomy advantage; A , photosynthetic rate in $\mu\text{mol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$; g_{sw} , stomatal conductance to water vapor in $\text{mol m}^{-2} \text{ s}^{-1}$.

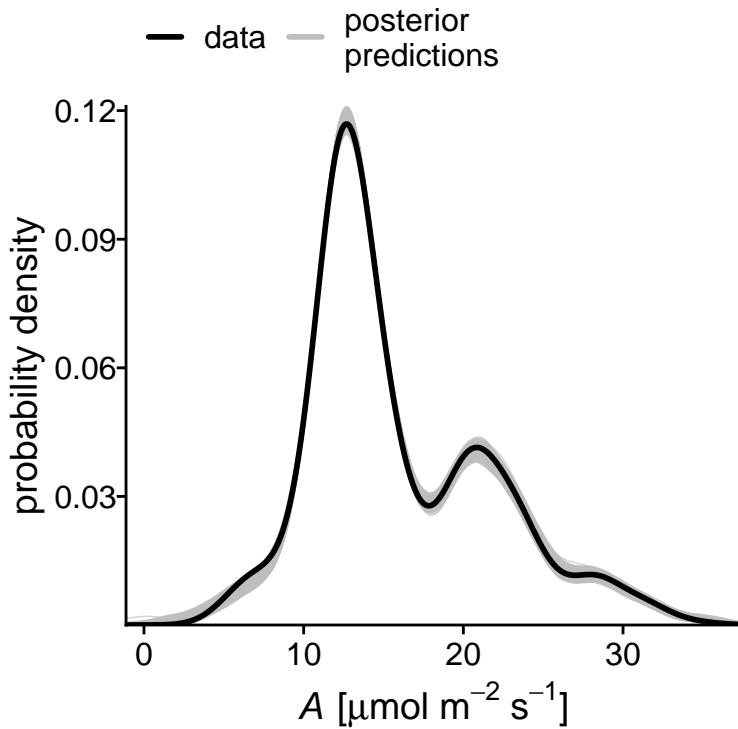


Figure S2: Posterior predictions (thin grey lines) from fitted $A-g_{sw}$ curves closely match the observed distribution (thick black line), indicating that the statistical model adequately captures variation in the response variable over the measured range. Symbols: A , photosynthetic rate in $\mu\text{mol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$; g_{sw} , stomatal conductance to water vapor in $\text{mol m}^{-2} \text{ s}^{-1}$.

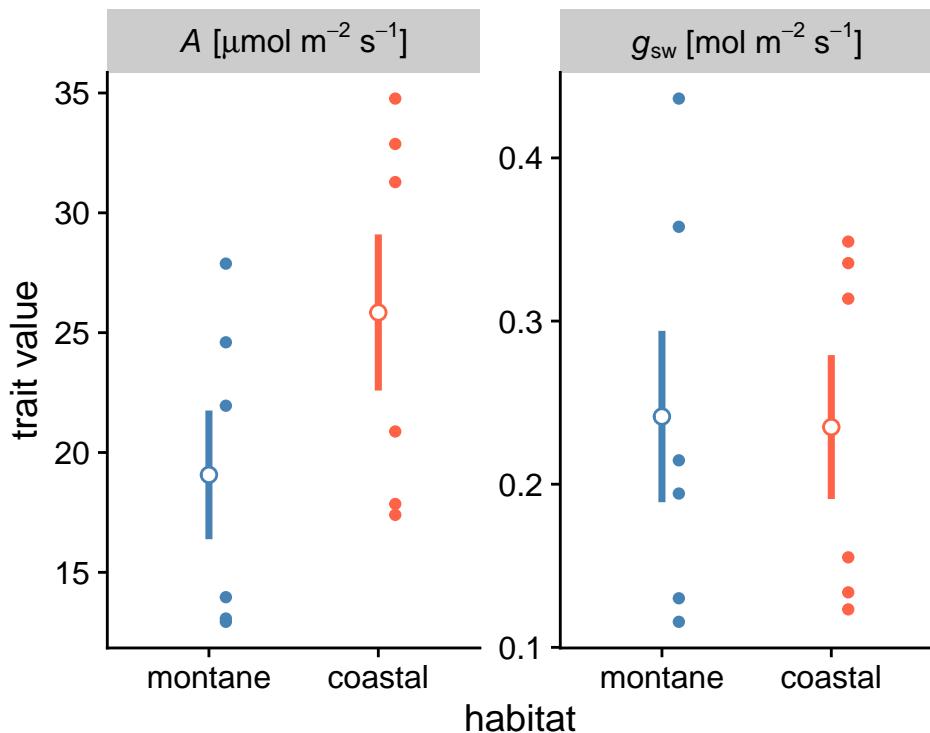


Figure S3: The photosynthetic rate (left facet) and stomatal conductance to water vapor (right facet) of montane (blue) and coastal (orange) ‘ilima leaves. Each point-interval is the median posterior estimate plus 95% confidence interval of trait value for that habitat. Smaller points next to each point-interval are the $g_{smax,ratio}$ of individual plants, one per site. Symbols: A , photosynthetic rate in $\mu\text{mol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$; g_{sw} , stomatal conductance to water vapor in $\text{mol m}^{-2} \text{ s}^{-1}$.

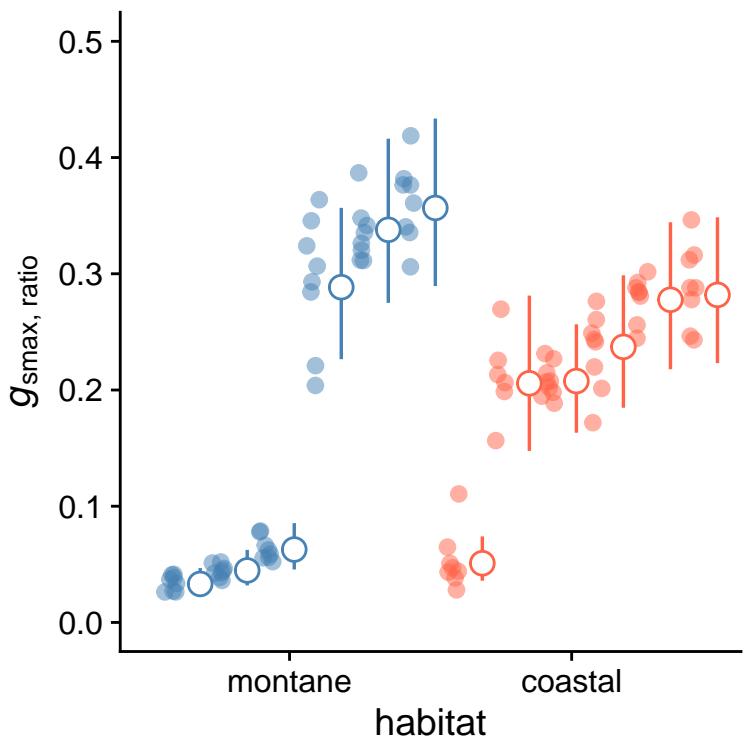


Figure S4: The $g_{\text{smax},\text{ratio}}$ (y -axis) of montane (blue) and coastal (orange) 'ilima leaves. Each point-interval is the median posterior estimate plus 95% confidence interval of $g_{\text{smax},\text{ratio}}$ for that site. Sites are arranged by habitat and ascending $g_{\text{smax},\text{ratio}}$ within habitat. Smaller, transparent points next to each point-interval are the $g_{\text{smax},\text{ratio}}$ of individual plants. Symbols: $g_{\text{smax},\text{ratio}}$, the ratio of anatomical maximum stomatal conductance to water vapor on the the adaxial surface over the total.