

1 Supplementary materials

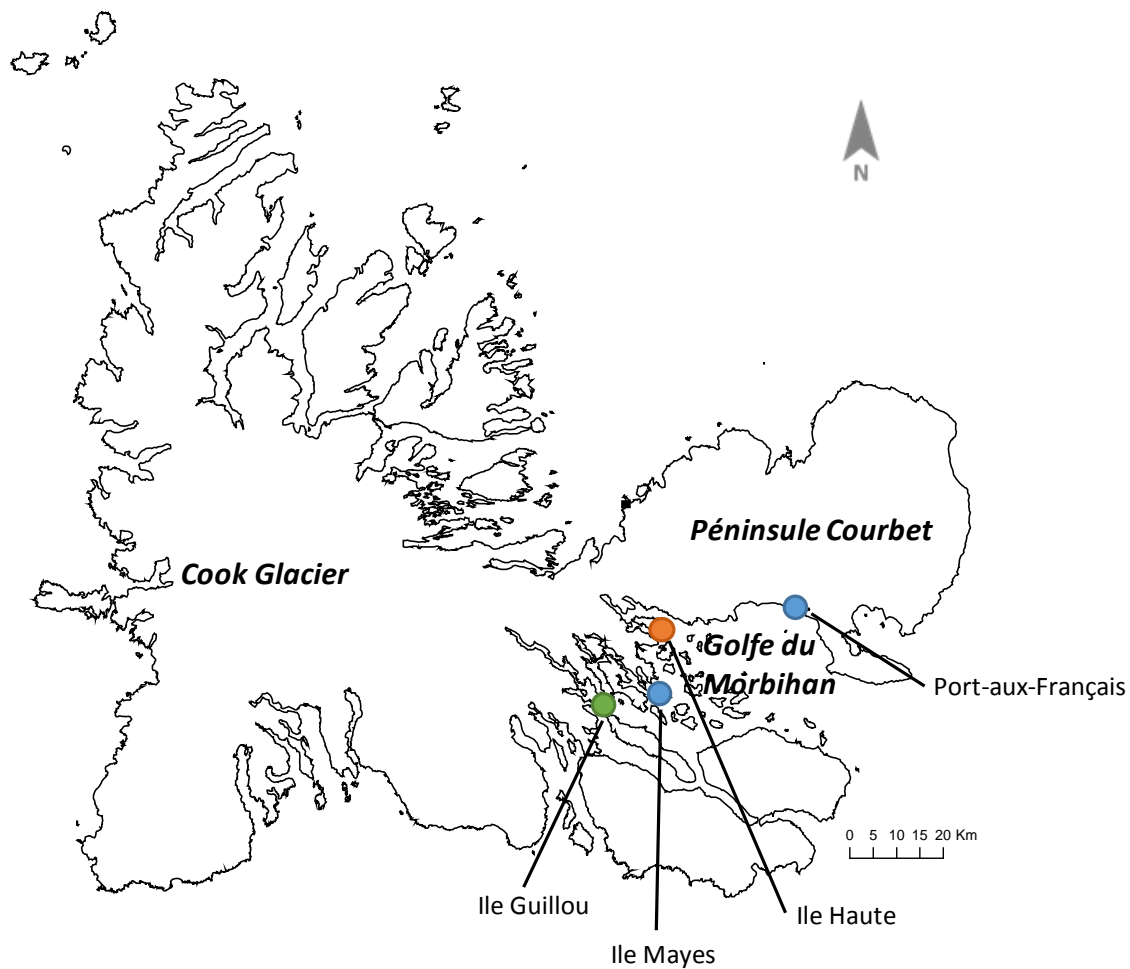
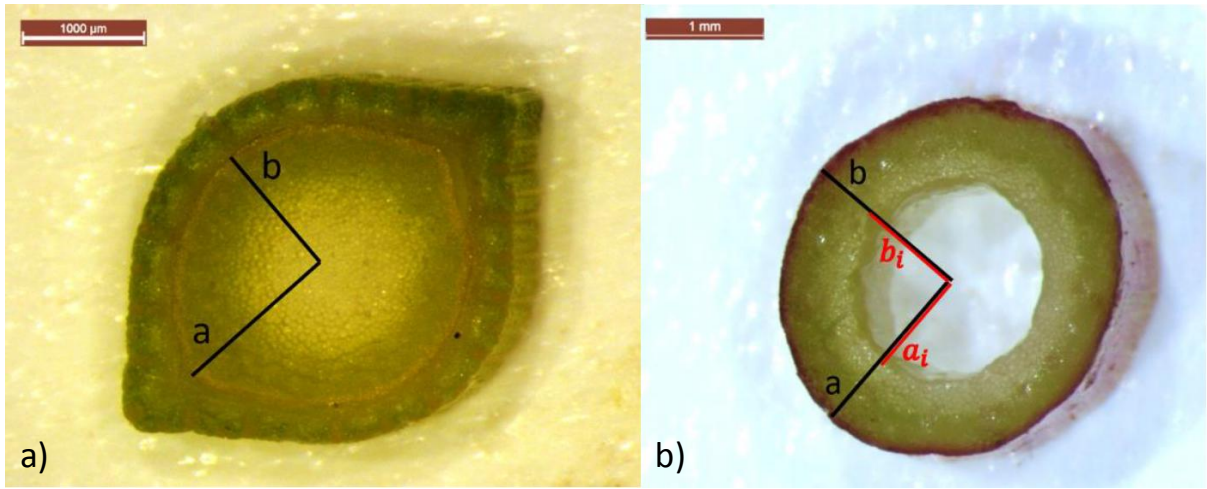


Figure S1. Sampling sites localizations on the Kerguelen archipelago. For each site, individuals were sampled from windy and sheltered microhabitats. Blue dots indicate sites where the three species were sampled. Orange and green dots respectively indicate where one (*D. glomerata*) or two (*P. pratensis*, *T. officinale*) species were sampled.

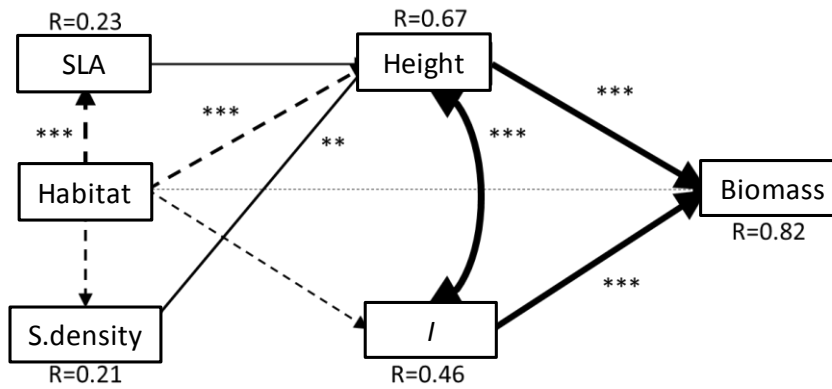


$$I = \frac{\pi}{4} * (b^3 * a)$$

$$I = \frac{\pi}{4} * (b^3 * a - b_i^3 * a_i)$$

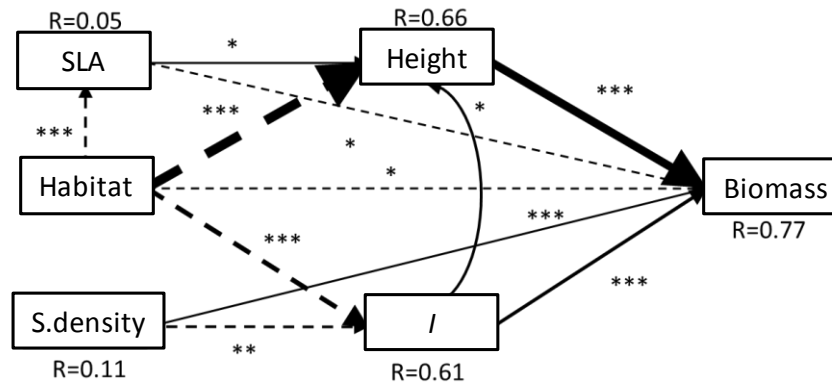
Figure S2. Calculation of the second moment of area I depending on the stem section morphology: a) full section in *Dactylis glomerata*, b) hollow section in *Taraxacum officinale*.

a) *Dactylis glomerata*, Windy



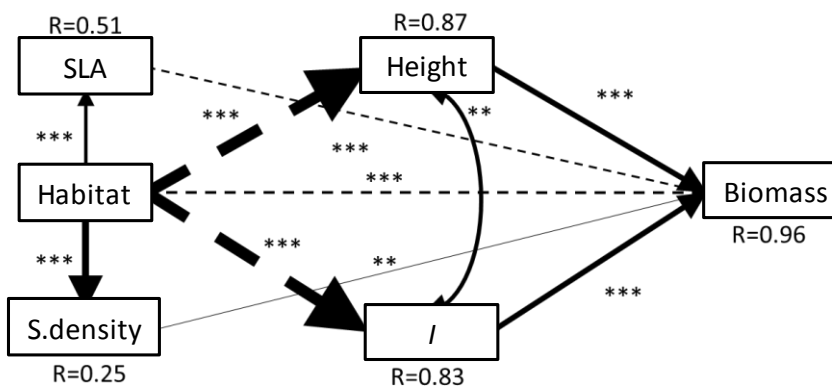
C-score=2.419, P-value=0.298, Df=2

b) *Poa pratensis*, Windy



C-score=0.932, P-value=0.628, Df=2

c) *Taraxacum officinale*, Windy



C-score=4.636, P-value=0.098, Df=2

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15 **Figure S3.** Confirmatory Path Analysis for the effect of wind and traits on individual
16 performances in a) *Dactylis glomerata*, b) *Poa pratensis* and c) *Taraxacum officinale*.

Numbers adjacent to arrows are standardized path coefficients (analogous to relative regression weights) and indicative of the effect of the relationship. Continuous arrows show positive and dashed arrows negative relationships, with arrow thicknesses proportional to the strength of the relationship. The proportion of variance explained (R^2) is shown besides each response variable in the model. Goodness-of-fit statistics are shown in below the plot as the Fischer's C value, the P-value, and the degrees of freedom (DF) for each model. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. Non-significant arrows are removed to simplify model interpretation. Marginally significant arrows do not show any symbol. Absolute standardized effects are the same as in Figure 4. *I*: second moment of area; S.density: stem density.

Table S1. Mean (\pm SD) wind speeds under the sampling conditions (in m.s^{-1}). These mean values were obtained by calculating the mean of five mean values of wind speed, each measured during 30s at 30cm from the soil surface (corresponding to the vegetation height), on different days. For each species, we performed an ANOVA test, based on a linear model procedure (with wind speed as response variable, and Site \times Microhabitat as explanatory variables), to demonstrate that the microhabitat ('windy', 'sheltered') significantly influenced wind speeds (and thus the magnitude of the mechanical stress on plants). Additional Tukey post-hoc tests indicated that for all species in all sites, there was a significant difference in wind speed between sheltered and windy microhabitats.

| | | <i>T. officinale</i> | <i>P. pratensis</i> | <i>D. glomerata</i> |
|-------------------|-----------|----------------------|---------------------|---------------------|
| Port-aux-Français | Sheltered | 0.72 (\pm 0.29) | 0.72 (\pm 0.29) | 0.68 (\pm 0.22) |
| | Windy | 1.86 (\pm 0.66) | 1.86 (\pm 0.66) | 1.86 (\pm 0.66) |
| Ile Mayes | Sheltered | 0.63 (\pm 0.30) | 0.63 (\pm 0.30) | 0.63 (\pm 0.30) |
| | Windy | 1.98 (\pm 0.70) | 1.98 (\pm 0.70) | 1.98 (\pm 0.70) |
| Ile Guillou | Sheltered | 0.54 (\pm 0.58) | 0.54 (\pm 0.58) | - |
| | Windy | 1.76 (\pm 0.44) | 1.76 (\pm 0.44) | - |
| Ile Haute | Sheltered | - | - | 0.12 (\pm 0.12) |
| | Windy | - | - | 1.20 (\pm 0.66) |

Table S2. Pair correlations between the four traits measured in the three plant species. *I*: second moment of area. Tables show Pearson coefficient of correlation (*r*). Results are showed for each species individually and for all species together.

| | | Height | SLA | <i>I</i> | Stem density |
|-----------------------------|--------------|--------|-------|----------|--------------|
| <i>Dactylis glomerata</i> | Height | 1 | 0.02 | 0.71 | 0.46 |
| | SLA | 0.02 | 1 | -0.18 | -0.08 |
| | <i>I</i> | 0.71 | -0.18 | 1 | 0.26 |
| | Stem density | 0.46 | -0.08 | 0.26 | 1 |
| <i>Poa pratensis</i> | Height | 1 | 0.26 | 0.53 | 0.04 |
| | SLA | 0.26 | 1 | 0.08 | -0.01 |
| | <i>I</i> | 0.53 | 0.08 | 1 | 0.26 |
| | Stem density | 0.04 | -0.01 | 0.26 | 1 |
| <i>Taraxacum officinale</i> | Height | 1 | -0.43 | 0.79 | -0.46 |
| | SLA | -0.43 | 1 | -0.4 | 0.26 |
| | <i>I</i> | 0.79 | -0.4 | 1 | -0.49 |
| | Stem density | -0.46 | 0.26 | -0.49 | 1 |
| All species | Height | 1 | 0.05 | 0.32 | 0.34 |
| | SLA | 0.05 | 1 | -0.36 | 0.26 |
| | <i>I</i> | 0.32 | -0.36 | 1 | -0.5 |
| | Stem density | 0.34 | 0.26 | -0.5 | 1 |

Table S3. Tukey tests for multiple comparisons for the differences in traits between species.
I: second moment of area. Dglo: *Dactylis glomerata*; Pprat: *Poa pratensis*; Toff: *Taraxacum officinale*. All p-values have been corrected using Bonferroni method.

| | | Estimate | Standard error | z-value | p-value |
|--------------|--------------|----------|----------------|---------|-----------|
| Height | Dglo – Pprat | -0.1852 | 0.1174 | -1.577 | 0.344 ns |
| | Dglo – Toff | 0.5188 | 0.1172 | 4.427 | <0.001*** |
| | Pprat – Toff | 0.704 | 0.1073 | 6.563 | <0.001*** |
| SLA | Dglo – Pprat | -0.1171 | 0.1637 | -0.716 | 1 ns |
| | Dglo – Toff | 0.2869 | 0.1633 | 1.757 | 0.237 |
| | Pprat – Toff | 0.4041 | 0.1507 | 2.682 | 0.022* |
| <i>I</i> | Dglo – Pprat | 0.4065 | 0.1059 | 3.838 | <0.001*** |
| | Dglo – Toff | -0.9949 | 0.1057 | 9.41 | <0.001*** |
| | Pprat – Toff | -1.4041 | 0.0968 | -14.477 | <0.001*** |
| Stem density | Dglo – Pprat | -1.1776 | 0.1149 | -10.254 | <0.001*** |
| | Dglo – Toff | 0.7233 | 0.1146 | 6.311 | <0.001*** |
| | Pprat – Toff | 1.9009 | 0.1065 | 17.842 | <0.001*** |

Note: Asterisks indicate significant difference, *i.e.*, ns = not significant; * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.