

Trade-off between soluble protein production and nutritional storage in Bromeliaceae

Ana Z. Gonçalves, Helenice Mercier, Rafael S. Oliveira and Gustavo Q. Romero

Table S1. Analyses of variance (ANOVA) of the percentage of nitrogen in bromeliad leaves derived from *Dendropsophus nanus* feces, and nested ANOVA (bromeliad species nested within subfamilies) summarizing the effects of treatments (feces and control) on the total nitrogen concentration, total nitrogen incorporated, soluble protein, total amino acids and asparagine concentrations, relative growth rate of leaves and leaf mass per area of *Ananas bracteatus*, *Quesnelia arvensis*, *Aechmea blanchetiana*, *Neoregelia cruenta* (Bromelioideae) and *Vriesea gigantea*, *Vriesea bituminosa*, *Tillandsia cyanea* (Tillandsioideae)

| <i>Source of variation</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>P</i> |
|----------------------------------|-----------|-----------|----------|------------------|
| %N from feces | | | | |
| Treatments | 6 | 36.16 | 10.07 | <0.001 |
| Residuals | 35 | 3.59 | | |
| Total | 41 | | | |
| Total N concentration | | | | |
| Subfamilies | 1 | 743.4 | 12.13 | <0.001 |
| Treatments | 1 | 86.9 | 1.42 | 0.237 |
| Species (subfamilies) | 5 | 287.5 | 4.69 | <0.001 |
| Subfamilies:treatments | 1 | 43.7 | 0.71 | 0.401 |
| Species (subfamilies):treatments | 5 | 34.6 | 0.56 | 0.726 |
| Residuals | 70 | 61.2 | | |
| Total N incorporated | | | | |
| Subfamilies | 1 | 4481042 | 147.83 | <0.001 |
| Treatments | 1 | 63620 | 2.09 | 0.151 |
| Species (subfamilies) | 5 | 2398584 | 79.13 | <0.001 |
| Subfamilies:treatments | 1 | 115671 | 3.81 | 0.054 |
| Species (subfamilies):treatments | 5 | 33838 | 1.11 | 0.359 |
| Residuals | 70 | 30312 | | |
| Soluble protein | | | | |
| Subfamilies | 1 | 4140 | 9.20 | 0.003 |

| | | | | |
|----------------------------------|----|----------|--------|----------------|
| Treatments | 1 | 12245 | 27.22 | < 0.001 |
| Species (subfamilies) | 5 | 39762 | 88.38 | < 0.001 |
| Subfamilies:treatments | 1 | 14103 | 31.34 | < 0.001 |
| Species (subfamilies):treatments | 5 | 9656 | 21.46 | < 0.001 |
| Residuals | 70 | 450 | | |
| Amino acids | | | | |
| Subfamilies | 1 | 18335291 | 469.03 | < 0.001 |
| Treatments | 1 | 7464136 | 190.94 | < 0.001 |
| Species (subfamilies) | 5 | 586079 | 14.99 | < 0.001 |
| Subfamilies:treatments | 1 | 9340179 | 238.93 | < 0.001 |
| Species (subfamilies):treatments | 5 | 176911 | 4.52 | 0.001 |
| Residuals | 70 | 39092 | | |
| Asparagine | | | | |
| Subfamilies | 1 | 3853144 | 145.42 | < 0.001 |
| Treatments | 1 | 1710478 | 64.55 | < 0.001 |
| Species (subfamilies) | 5 | 53124 | 2.00 | 0.088 |
| Subfamilies:treatments | 1 | 2290403 | 86.44 | < 0.001 |
| Species (subfamilies):treatments | 5 | 14950 | 0.56 | 0.727 |
| Residuals | 70 | 26496 | | |
| Relative growth rate | | | | |
| Subfamilies | 1 | 0.0006 | 46.78 | < 0.001 |
| Treatments | 1 | 0.00008 | 6.87 | 0.010 |
| Species (subfamilies) | 5 | 0.0002 | 22.70 | < 0.001 |
| Subfamilies:treatments | 1 | 0.00003 | 2.61 | 0.110 |
| Species (subfamilies):treatments | 5 | 0.00 | 0.64 | 0.663 |
| Residuals | 70 | 0.00001 | | |
| Leaf mass per area | | | | |
| Subfamilies | 1 | 15228 | 20.77 | < 0.001 |
| Species (subfamilies) | 5 | 14569 | 19.87 | < 0.001 |
| Residuals | 28 | 733 | | |

Table S2. Analyses of variance (ANOVA) of the percentage of nitrogen in bromeliad leaves derived from *Dendropsophus nanus* feces, and nested ANOVA (bromeliad species nested within ecophysiological types) summarizing the effects of treatments (feces and control) on the total nitrogen concentration, total nitrogen incorporated, soluble protein, total amino acids and asparagine concentrations, relative growth rate of leaves and leaf mass per area of *Ananas bracteatus* (ecological type II), *Quesnelia arvensis* (type III), *Aechmea blanchetiana* (type III), *Neoregelia cruenta* (type III) and *Vriesea gigantea* (type IV), *Vriesea bituminosa* (type IV), *Tillandsia cyanea* (type V)

| <i>Source of variation</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>P</i> |
|------------------------------|-----------|-----------|----------|----------------|
| %N from feces | | | | |
| Treatments | 3 | 45.88 | 8.64 | < 0.001 |
| Residuals | 20 | 5.31 | | |
| Total | 23 | | | |
| Total N concentration | | | | |
| Types | 3 | 270.2 | 4.41 | 0.006 |
| Treatments | 1 | 86.9 | 1.42 | 0.237 |
| Species (types) | 3 | 456.8 | 7.46 | < 0.001 |
| Types:treatments | 3 | 34.4 | 0.56 | 0.641 |
| Species (types):treatments | 3 | 37.8 | 0.61 | 0.606 |
| Residuals | 70 | 61.2 | | |
| Total N incorporated | | | | |
| Types | 3 | 4321567 | 119.88 | < 0.001 |
| Treatments | 1 | 86858 | 2.41 | 0.126 |
| Species (types) | 3 | 171102 | 4.74 | 0.005 |
| Types:treatments | 3 | 79404 | 2.20 | 0.097 |
| Species (types):treatments | 3 | 30337 | 0.84 | 0.476 |
| Residuals | 56 | 36049 | | |
| Soluble protein | | | | |
| Types | 3 | 51865 | 116.03 | < 0.001 |
| Treatments | 1 | 13092 | 29.29 | < 0.001 |
| Species (types) | 3 | 14117 | 31.58 | < 0.001 |
| Types:treatments | 3 | 22208 | 49.68 | < 0.001 |
| Species (types):treatments | 3 | 129 | 0.28 | 0.833 |
| Residuals | 70 | 447 | | |
| Amino acids | | | | |

| | | | | |
|-----------------------------|----|---------|--------|----------------|
| Types | 3 | 6710829 | 171.67 | < 0.001 |
| Treatments | 1 | 7464137 | 190.94 | < 0.001 |
| Species (types) | 3 | 377734 | 9.66 | < 0.001 |
| Types:treatments | 3 | 3391981 | 86.77 | < 0.001 |
| Species (types):treatments | 3 | 16264 | 0.41 | 0.742 |
| Residuals | 70 | 39092 | | |
| Asparagine | | | | |
| Types | 3 | 1329804 | 50.19 | < 0.001 |
| Treatments | 1 | 1710467 | 64.55 | < 0.001 |
| Species (types) | 3 | 43121 | 1.62 | 0.191 |
| Types:treatments | 3 | 766291 | 28.92 | < 0.001 |
| Species (types):treatments | 3 | 22093 | 0.83 | 0.480 |
| Residuals | 70 | 26496 | | |
| Relative growth rate | | | | |
| Types | 3 | 0.0006 | 46.41 | < 0.001 |
| Treatments | 1 | 0.00008 | 6.87 | 0.010 |
| Species (types) | 3 | 0.00009 | 7.01 | < 0.001 |
| Types:treatments | 3 | 0.00001 | 0.96 | 0.414 |
| Species (types):treatments | 3 | 0.00001 | 0.99 | 0.402 |
| Residuals | 70 | 0.00001 | | |
| Leaf mass per area | | | | |
| Types | 3 | 28392 | 38.72 | < 0.001 |
| Species (types) | 3 | 966 | 1.31 | 0.288 |
| Residuals | 28 | 733 | | |
