**Table 1.** Regression coefficients for linear mixed effects model with ln *N*area as the dependent variable and soil treatment variables, climate, leaf traits, and species characteristics as fixed effects.\*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **df** | **Slope** | ***p*** | **Relative Importance** |
| Soil N | 1 | - | **< 0.001** | 0.98% |
| Soil P | 1 | - | 0.728 | 0.14% |
| Soil K+µ | 1 | - | 0.483 | 0.14% |
| *T*g | 1 | -0.040 ± 0.006 | **< 0.001** | 7.37% |
| ln *I*g | 1 | 0.020 ± 0.143 | 0.889 | 20.26% |
| ln *M*area | 1 | 0.937 ± 0.008 | **< 0.001** | 53.55% |
| χ | 1 | -0.295 ± 0.120 | **0.014** | 6.08% |
| N fixer | 1 | - | **< 0.001** | 5.42% |
| Photosynthetic pathway (C3/C4) | 1 | - | **< 0.001** | 3.69% |
| Soil N x Soil P | 1 | - | **0.003** | 0.14% |
| Soil N x Soil K+µ | 1 | - | 0.582 | 0.15% |
| Soil P x Soil K+µ | 1 | - | 0.766 | 0.06% |
| Soil N x Soil P x Soil K+µ | 1 | - | 0.891 | 0.07% |

\* P-values < 0.05 are bolded and < 0.1 are italicized. Sample size is 1,812. Key: χ = ratio of intercellular to extracellular CO2 concentration, *I*g = photosynthetically active radiation, *M*area = leaf mass per leaf area, *T*g = temperature.

**Table 2.** Regression coefficients for linear mixed effects model with *N*area as the dependent variable and soil treatment variables, predicted nitrogen components, and species characteristics as fixed effects.\*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **df** | **Slope** | ***p*** | **Relative Importance** |
| ln *N*photo | 1 | 0.520 ± 0.091 | **< 0.001** | 23.25% |
| ln *N*structure | 1 | 0.952 ± 0.009 | **< 0.001** | 37.10% |
| Soil N | 1 | - | **< 0.001** | 5.23% |
| Soil P | 1 | - | 0.719 | 3.82% |
| Soil K+µ | 1 | - | 0.506 | 3.53% |
| N fixer | 1 | - | **< 0.001** | 4.42% |
| Photosynthetic pathway (C3/C4) | 1 | - | **< 0.001** | 8.93% |
| Soil N x Soil P | 1 | - | **0.003** | 1.28% |
| Soil N x Soil K+µ | 1 | - | 0.596 | 1.19% |
| Soil P x Soil K+µ | 1 | - | 0.803 | 1.11% |
| Soil N x Soil P x Soil K+µ | 1 | - | 0.981 | 0.60% |

\* P-values < 0.05 are bolded and < 0.1 are italicized. Sample size is 1,812. Key: *N*photo = leaf N used for photosynthesis, *N*structure = leaf N in structural tissue.

**Table 3.** Results for linear mixed effects model with aboveground biomass (AGB; g) as the dependent variable and soil treatment variables as independent categorical variables.\*

|  |  |  |  |
| --- | --- | --- | --- |
|  | **df** | **χ2** | ***p*** |
| Soil N | 1 | 49.657 | **< 0.001** |
| Soil P | 1 | 37.955 | **< 0.001** |
| Soil K+µ | 1 | 2.739 | *0.098* |
| Soil N x Soil P | 1 | 0.010 | 0.919 |
| Soil N x Soil K | 1 | 5.532 | **0.019** |
| Soil P x Soil K | 1 | 0.378 | 0.538 |
| Soil N x Soil P x Soil K | 1 | 0.087 | 0.767 |

\* P-values < 0.05 are bolded and < 0.1 are italicized. Sample size is 763. Key: df = degrees of freedom.

**Table 4.** LAI

|  |  |  |  |
| --- | --- | --- | --- |
|  | **df** | **χ2** | ***p*** |
| Soil N | 1 | 49.148 | **< 0.001** |
| Soil P | 1 | 8.287 | **0.004** |
| Soil K+µ | 1 | 0.747 | 0.388 |
| Soil N x Soil P | 1 | 5.086 | **0.024** |
| Soil N x Soil K | 1 | 1.758 | 0.185 |
| Soil P x Soil K | 1 | 0.446 | 0.504 |
| Soil N x Soil P x Soil K | 1 | 0.279 | 0.597 |

\* P-values < 0.05 are bolded and < 0.1 are italicized. Sample size is 551. Key: df = degrees of freedom.

**Table 5.** Anova results for the linear mixed effects model with ∆*N*area as the dependent variable and ∆AGB, ∆χ, and ∆*M*area as independent variables.\*

|  |  |  |  |
| --- | --- | --- | --- |
|  | **df** | **χ2** | ***p*** |
| ∆AGB | 1 | 1.900 | 0.168 |
| Soil P | 1 | 7.957 | 0.005 |
| Soil K+µ | 1 | 0.191 | 0.662 |
| C3/C4 | 1 | 0.175 | 0.676 |
| N fixer | 1 | 2.036 | 0.154 |
| ∆LMA | 1 | 92.327 | **< 0.001** |
| ∆χ | 1 | 0.572 | 0.450 |
| Soil P x Soil K+µ | 1 | 0.515 | 0.473 |
| ∆AGB x ∆LMA | 1 | 4.423 | 0.035 |
| ∆AGB x ∆χ | 1 | 0.094 | 0.759 |
| ∆LMA x ∆χ | 1 | 1.196 | 0.274 |
| ∆AGB x ∆LMA x ∆χ | 1 | 2.539 | 0.111 |

\* P-values < 0.05 are bolded and < 0.1 are italicized. Sample size is 310. Key: χ = ratio of intercellular to extracellular CO2 concentration, *M*area = leaf mass per leaf area.

**Table 6.** Results from Tukey’s HSD test for comparisons of means and slopes of the ∆*N*arealinear mixed effects model.\*

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Slope** | **Intercept** | ***p*** |
| ∆*M*area = -25 | 0.003 ± 0.023 | -5.5 ± 6.02 | 0.913 |
| ∆*M*area = 0 | -0.027 ± 0.016 | 17.2 ± 5.69 | *0.091* |
| ∆*M*area = 25 | -0.056 ± 0.028 | 39.9 ± 6.29 | **0.048** |

\* P-values < 0.05 are bolded and < 0.1 are italicized.