

Supplementary Material

Table S1. Initial nutrient stocks of each considered *E. grandis* and *P. taeda* litter layer

| Variable | <i>E. grandis</i> | | | <i>P. taeda</i> | | |
|---------------------------|-------------------|---------------------|-------------------|-------------------|-------------------|---------------------|
| | C1 | C2 | C3 | C1 | C2 | C3 |
| N (kg ha ⁻¹) | 20.23 (0.95) | 28.71 (1.69) | 18.56 (1.53) | 17.65 (0.37) | 21.90 (1.73) | 35.99 (2.16) |
| P (kg ha ⁻¹) | 0.60 (0.04) | 1.15 (0.08) | 0.86 (0.08) | 0.91 (0.16) | 1.29 (0.05) | 2.51 (0.35) |
| K (kg ha ⁻¹) | 3.86 (0.26) | 10.08 (0.76) | 5.68 (0.65) | 2.18 (0.23) | 4.00 (0.13) | 7.77 (0.87) |
| Ca (kg ha ⁻¹) | 16.23 (0.41) | 30.45 (1.00) | 22.74 (0.53) | 8.63 (0.33) | 10.25 (0.53) | 16.88 (0.54) |
| Mg (kg ha ⁻¹) | 2.72 (0.25) | 6.39 (0.18) | 5.08 (0.22) | 1.62 (0.05) | 2.25 (0.06) | 4.63 (0.17) |
| Fe (g ha ⁻¹) | 270.06 (35.52) | 268.07 (9.90) | 163.73 (8.17) | 175.38 (29.70) | 132.68 (1.73) | 221.60 (20.42) |
| Mn (g ha ⁻¹) | 586.04 (32.17) | 1747.42 (147.59) | 995.21 (48.87) | 590.78 (14.71) | 793.75 (51.32) | 1513.82 (190.56) |
| Cu (g ha ⁻¹) | 7.64 (0.39) | 22.60 (0.59) | 16.16 (1.36) | 4.40 (0.18) | 10.27 (1.56) | 16.98 (3.30) |
| Zn (g ha ⁻¹) | 24.22 (2.33) | 41.43 (1.08) | 30.66 (5.90) | 42.12 (3.48) | 49.60 (5.13) | 91.56 (8.14) |

¹Data from Baietto et al., 2021. C1: winter layer, year 1; C2: spring layer, year 1; C3: summer layer, year 1. The value in parentheses indicates the standard error of the mean ($n = 3$).

Table S2. Generalized linear mixed models adjusted for data of both forest species for the remaining nutrient concentration (C1 layer).

| Nutrient | | Coefficient ¹ | t-value | R _p ² |
|----------|----------------|--------------------------|---------------------|-----------------------------|
| N | Intercept | 0.054 (0.045) | 1.18 ^{ns} | 0.33 |
| | Time | 0.010 (0.003) | 3.42 ^{**} | |
| | Species | 0.080 (0.064) | 1.25 ^{ns} | |
| | Species × Time | −0.004 (0.004) | −0.91 ^{ns} | |
| K | Intercept | −0.082 (0.131) | −0.62 ^{ns} | 0.60 |
| | Time | −0.065 (0.009) | −7.15 ^{**} | |
| | Species | 0.173 (0.185) | 0.93 ^{ns} | |
| | Species × Time | −0.010 (0.013) | −0.75 ^{ns} | |
| Fe | Intercept | 0.446 (0.100) | 4.43 ^{**} | 0.46 |
| | Time | 0.039 (0.007) | 5.57 ^{**} | |
| | Species | −0.122 (0.142) | −0.86 ^{ns} | |
| | Species × Time | 0.012 (0.010) | 1.24 ^{ns} | |

^{ns}: no significant; ^{**}: $p < 0.05$; R_p²: conditional pseudo-R squared. ¹ The values in parentheses indicate the standard error.

Table S3. Generalized linear mixed models adjusted for data of both forest species for the remaining nutrient concentration (C2 layer).

| Nutrient | | Coefficient ¹ | t-value | R _p ² |
|----------|----------------|--------------------------|---------------------|-----------------------------|
| N | Intercept | 0.013 (0.032) | 0.41 ^{ns} | 0.69 |
| | Time | 0.024 (0.003) | 8.54 ^{**} | |
| | Species | 0.076 (0.045) | 1.69 ^{ns} | |
| | Species × Time | −0.013 (0.004) | −3.30 ^{**} | |
| K | Intercept | −0.309 (0.125) | −2.48 ^{**} | 0.59 |
| | Time | −0.074 (0.011) | −6.78 ^{**} | |
| | Species | 0.138 (0.176) | 0.78 ^{ns} | |
| | Species × Time | −0.030 (0.015) | −1.97 ^{**} | |
| Fe | Intercept | 0.054 (0.068) | 0.79 ^{ns} | 0.81 |
| | Time | 0.072 (0.006) | 12.57 ^{**} | |
| | Species | 0.088 (0.096) | 0.92 ^{ns} | |
| | Species × Time | −0.023 (0.008) | −2.83 ^{**} | |
| Cu | Intercept | −0.057 (0.044) | −1.28 ^{ns} | 0.30 |
| | Time | −0.001 (0.004) | −0.24 ^{ns} | |
| | Species | 0.127 (0.063) | 2.02 ^{**} | |
| | Species × Time | −0.021 (0.006) | −3.68 ^{**} | |
| Zn | Intercept | 0.147 (0.080) | 1.84 ^{ns} | 0.64 |
| | Time | 0.043 (0.006) | 6.86 ^{**} | |
| | Species | −0.038 (0.113) | −0.33 ^{ns} | |
| | Species × Time | −0.018 (0.009) | −1.99 ^{**} | |

^{ns}: no significant; ^{**}: $p < 0.05$; R_p²: conditional pseudo-R squared. ¹ The values in parentheses indicate the standard error.

Table S4. Generalized linear mixed models adjusted for data of both forest species for the remaining nutrient concentration (C3 layer).

| Nutrient | | Coefficient ¹ | t-value | R _p ² |
|----------|----------------|--------------------------|---------------------|-----------------------------|
| N | Intercept | 0.061 (0.049) | 1.24 ^{ns} | 0.72 |
| | Time | 0.044 (0.005) | 8.90 ^{**} | |
| | Species | 0.026 (0.069) | 0.38 ^{ns} | |
| | Species × Time | −0.013 (0.007) | −1.88 ^{ns} | |
| P | Intercept | −0.025 (0.053) | −0.48 ^{ns} | 0.56 |
| | Time | 0.005 (0.005) | 0.92 ^{ns} | |
| | Species | 0.046 (0.074) | 0.62 ^{ns} | |
| | Species × Time | −0.028 (0.007) | −3.98 ^{**} | |
| K | Intercept | −0.372 (0.128) | −2.91 ^{**} | 0.47 |
| | Time | −0.064 (0.014) | −4.57 ^{**} | |
| | Species | 0.040 (0.181) | 0.22 ^{ns} | |
| | Species × Time | −0.034 (0.020) | −1.72 ^{ns} | |
| Ca | Intercept | −0.009 (0.050) | −0.18 ^{ns} | 0.52 |
| | Time | 0.026 (0.005) | 5.44 ^{**} | |
| | Species | 0.024 (0.071) | 0.34 ^{ns} | |
| | Species × Time | −0.006 (0.007) | −0.85 ^{ns} | |
| Fe | Intercept | 0.132 (0.103) | 1.28 ^{ns} | 0.78 |
| | Time | 0.094 (0.009) | 10.18 ^{**} | |
| | Species | −0.125 (0.145) | −0.86 ^{ns} | |
| | Species × Time | −0.010 (0.013) | −0.75 ^{ns} | |
| Mn | Intercept | −0.032 (0.064) | −0.50 ^{ns} | 0.42 |
| | Time | 0.020 (0.006) | 3.14 ^{**} | |
| | Species | 0.131 (0.091) | 1.44 ^{ns} | |
| | Species × Time | 0.002 (0.009) | 0.23 ^{ns} | |
| Zn | Intercept | 0.186 (0.082) | 2.26 ^{**} | 0.78 |
| | Time | 0.055 (0.007) | 8.18 ^{**} | |
| | Species | −0.126 (0.116) | −1.08 ^{ns} | |
| | Species × Time | −0.020 (0.010) | −2.13 ^{**} | |

^{ns}: no significant; ^{**}: $p < 0.05$; R_p²: conditional pseudo-R squared. ¹ The values in parentheses indicate the standard error.

Table S5. Generalized linear mixed models adjusted for data of both forest species for the remaining nutrient content (C1 layer).

| Nutrient | | Coefficient ¹ | t-value | R _p ² |
|----------|----------------|--------------------------|---------------------|-----------------------------|
| N | Intercept | 0.039 (0.059) | 0.66 ^{ns} | 0.44 |
| | Time | −0.026 (0.005) | −5.78 ** | |
| | Species | −0.068 (0.083) | −0.82 ^{ns} | |
| | Species × Time | 0.005 (0.006) | 0.69 ^{ns} | |
| P | Intercept | 0.087 (0.085) | 1.03 ^{ns} | 0.57 |
| | Time | −0.037 (0.006) | −6.40 ** | |
| | Species | −0.250 (0.120) | −2.08 ** | |
| | Species × Time | 0.006 (0.008) | 0.73 ^{ns} | |
| K | Intercept | −0.115 (0.154) | −0.75 ^{ns} | 0.65 |
| | Time | −0.097 (0.011) | −8.54 ** | |
| | Species | 0.035 (0.217) | 0.16 ^{ns} | |
| | Species × Time | −0.002 (0.016) | −0.12 ^{ns} | |
| Ca | Intercept | 0.048 (0.081) | 0.60 ^{ns} | 0.54 |
| | Time | −0.042 (0.006) | −6.83 ** | |
| | Species | 0.003 (0.114) | 0.03 ^{ns} | |
| | Species × Time | −0.011 (0.009) | −1.22 ^{ns} | |
| Mg | Intercept | −0.082 (0.072) | −1.14 ^{ns} | 0.56 |
| | Time | −0.038 (0.006) | −6.90 ** | |
| | Species | −0.046 (0.102) | −0.45 ^{ns} | |
| | Species × Time | −0.009 (0.008) | −1.17 ^{ns} | |
| Mn | Intercept | 0.118 (0.064) | 1.84 ^{ns} | 0.47 |
| | Time | −0.022 (0.004) | −4.96 ** | |
| | Species | −0.146 (0.090) | −1.61 ^{ns} | |
| | Species × Time | 0.018 (0.006) | 2.93 ** | |
| Cu | Intercept | 0.468 (0.104) | 4.50 ** | 0.42 |
| | Time | −0.044 (0.008) | −5.28 ** | |
| | Species | 0.185 (0.147) | 1.26 ^{ns} | |
| | Species × Time | −0.022 (0.112) | −1.91 ^{ns} | |

^{ns}: no significant; **: $p < 0.05$; R_p²: conditional pseudo-R squared. ¹ The values in parentheses indicate the standard error.

Table S6. Generalized linear mixed models adjusted for data of both forest species for the remaining nutrient content (C2 layer).

| Nutrient | | Coefficient ¹ | t-value | R _p ² |
|----------|----------------|--------------------------|----------------------|-----------------------------|
| P | Intercept | 0.042 (0.050) | 0.84 ^{ns} | 0.64 |
| | Time | −0.032 (0.004) | −7.53 ^{**} | |
| | Species | 0.071 (0.071) | 1.01 ^{ns} | |
| | Species × Time | −0.017 (0.006) | −2.80 ^{**} | |
| K | Intercept | −0.268 (0.118) | −2.27 ^{**} | 0.74 |
| | Time | −0.109 (0.011) | −10.12 ^{**} | |
| | Species | 0.219 (0.167) | 1.31 ^{ns} | |
| | Species × Time | −0.027 (0.015) | −1.75 ^{ns} | |
| Ca | Intercept | −0.003 (0.049) | −0.06 ^{ns} | 0.54 |
| | Time | −0.023 (0.004) | −5.95 ^{**} | |
| | Species | 0.044 (0.070) | 0.63 ^{ns} | |
| | Species × Time | −0.009 (0.005) | −1.61 ^{ns} | |
| Mg | Intercept | 0.021 (0.052) | 0.41 ^{ns} | 0.63 |
| | Time | −0.035 (0.005) | −7.87 ^{**} | |
| | Species | 0.125 (0.074) | 1.70 ^{ns} | |
| | Species × Time | −0.006 (0.006) | −1.01 ^{ns} | |
| Fe | Intercept | 0.094 (0.070) | 1.34 ^{ns} | 0.54 |
| | Time | 0.037 (0.006) | 6.13 ^{**} | |
| | Species | 0.164 (0.098) | 1.67 ^{ns} | |
| | Species × Time | −0.020 (0.008) | −2.38 ^{**} | |
| Mn | Intercept | −0.016 (0.062) | −0.26 ^{ns} | 0.73 |
| | Time | −0.032 (0.005) | −6.34 ^{**} | |
| | Species | 0.194 (0.087) | 2.23 ^{**} | |
| | Species × Time | 0.015 (0.007) | 2.08 ^{**} | |
| Cu | Intercept | −0.015 (0.065) | −0.23 ^{ns} | 0.59 |
| | Time | −0.035 (0.005) | −6.74 ^{**} | |
| | Species | 0.206 (0.092) | 2.25 ^{**} | |
| | Species × Time | −0.017 (0.007) | −2.35 ^{**} | |

^{ns}: no significant; ^{**}: $p < 0.05$; R_p²: conditional pseudo-R squared. ¹ The values in parentheses indicate the standard error.

Table S7. Generalized linear mixed models adjusted for data of both forest species for the remaining nutrient content (C3 layer).

| Nutrient | | Coefficient ¹ | t-value | R _p ² |
|----------|----------------|--------------------------|---------------------|-----------------------------|
| K | Intercept | −0.343 (0.118) | −2.91 ** | 0.71 |
| | Time | −0.107 (0.013) | −8.20 ** | |
| | Species | −0.006 (0.167) | −0.04 ^{ns} | |
| | Species × Time | −0.036 (0.018) | −1.98 ** | |
| Mg | Intercept | 0.002 (0.068) | 0.02 ^{ns} | 0.55 |
| | Time | −0.032 (0.006) | −5.34 ** | |
| | Species | 0.046 (0.096) | 0.48 ^{ns} | |
| | Species × Time | −0.013 (0.009) | −1.47 ^{ns} | |
| Fe | Intercept | 0.158 (0.094) | 1.69 ^{ns} | 0.70 |
| | Time | 0.052 (0.008) | 6.38 ** | |
| | Species | −0.211 (0.132) | −1.60 ^{ns} | |
| | Species × Time | −0.012 (0.012) | −1.00 ^{ns} | |

^{ns}: no significant; **: $p < 0.05$; R_p²: conditional pseudo-R squared. ¹ The values in parentheses indicate the standard error.