**Supplementary material**

**Tables**

**Table S1.** Averages (± SE) of the values of bulk density and soil texture (sand, clay and silt) at the two sites sampled in French Guiana at the two topographic levels (N = 80).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Site | Topographic level | Bulk Density (g/cm³) | Tex Sand % | Tex Clay % | Tex Silt % |
| Nouragues | Bottom | 1,23 ± 0,01 | 60,27 ± 0,62 | 19,82 ± 0,29 | 19,91 ± 0,37 |
|  | Top | 0,84 ± 0,01 | 21,77 ± 0,93 | 42,01 ± 0,48 | 36,22 ± 0,54 |
| Paracou | Bottom | 1,34 ± 0,02 | 76,16 ± 0,42 | 9,85 ± 0,27 | 13,99 ± 0,22 |
|  | Top | 1,07 ± 0,03 | 80,24 ± 1,38 | 33,46 ± 4,39 | 37,05 ± 4,16 |

**Table S2.**Averages (± SE) of the values of N, C, P (determined by the Olsen method), P (determined by Bray method) and pH (determined by KCl method) at the two sites sampled in French Guiana at the two topographic levels (N = 80).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Site | Topographic level | N (%) | C (%) | Olsen P (ppm) | Bray P (ppm) | Soil pH |
| Nouragues | Bottom | 0,16 ± 0,01 | 2,04 ± 0,13 | 1,66 ± 0,1 | 1,32 ± 0,1 | 3,98 ± 0,02 |
|  | Top | 0,24 ± 0,01 | 3,36 ± 0,14 | 1,61 ± 0,09 | 0,73 ± 0,06 | 3,97 ± 0,02 |
| Paracou | Bottom | 0,11 ± 0,01 | 1,51 ± 0,09 | 1,79 ± 0,11 | 2,13 ± 0,15 | 4,2 ± 0,02 |
|  | Top | 0,1 ± 0,01 | 1,39 ± 0,08 | 1,05 ± 0,08 | 0,79 ± 0,06 | 4,11 ± 0,02 |

**Table S3.** Averages (± SE) of the values of N, C, P (determined by the Olsen method), P (determined by Bray method) and pH (determined by KCl method) at the two sites sampled in French Guiana at the two topographic levels and averaged for each plot (N = 20). C: control; N: addition of nitrogen; P: addition of phosphorous; NP: addition of nitrogen + phosphorous.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | Topographic level | Plot | N (%) | C (%) | Olsen P (ppm) | Bray P (ppm) | Soil pH |
| Nouragues | Bottom | N | 0,19 ± 0,02 | 2,49 ± 0,35 | 1,52 ± 0,24 | 1,22 ± 0,2 | 4,01 ± 0,03 |
|  |  | NP | 0,17 ± 0,01 | 2,18 ± 0,23 | 1,74 ± 0,15 | 1,2 ± 0,18 | 3,93 ± 0,03 |
|  |  | P | 0,13 ± 0,01 | 1,63 ± 0,2 | 2,04 ± 0,22 | 1,58 ± 0,2 | 3,99 ± 0,03 |
|  |  | C | 0,14 ± 0,01 | 1,84 ± 0,19 | 1,33 ± 0,18 | 1,28 ± 0,2 | 3,96 ± 0,03 |
|  | Top | N | 0,25 ± 0,02 | 3,52 ± 0,32 | 1,8 ± 0,15 | 0,83 ± 0,11 | 3,98 ± 0,03 |
|  |  | NP | 0,26 ± 0,02 | 3,71 ± 0,27 | 1,59 ± 0,19 | 0,57 ± 0,07 | 4,04 ± 0,06 |
|  |  | P | 0,23 ± 0,02 | 3,27 ± 0,27 | 1,45 ± 0,19 | 0,46 ± 0,07 | 4 ± 0,03 |
|  |  | C | 0,22 ± 0,02 | 2,93 ± 0,24 | 1,6 ± 0,15 | 1,06 ± 0,14 | 3,87 ± 0,03 |
| Paracou | Bottom | N | 0,12 ± 0,02 | 1,59 ± 0,23 | 2,05 ± 0,25 | 2,44 ± 0,29 | 4,25 ± 0,04 |
|  |  | NP | 0,13 ± 0,01 | 1,72 ± 0,19 | 1,43 ± 0,22 | 1,47 ± 0,19 | 4,16 ± 0,03 |
|  |  | P | 0,09 ± 0,01 | 1,25 ± 0,14 | 1,6 ± 0,2 | 2,79 ± 0,4 | 4,14 ± 0,04 |
|  |  | C | 0,1 ± 0,01 | 1,48 ± 0,19 | 2,07 ± 0,23 | 1,81 ± 0,25 | 4,24 ± 0,05 |
|  | Top | N | 0,1 ± 0,01 | 1,41 ± 0,12 | 1,03 ± 0,17 | 0,69 ± 0,1 | 4,16 ± 0,03 |
|  |  | NP | 0,1 ± 0,01 | 1,34 ± 0,18 | 1,27 ± 0,19 | 0,91 ± 0,15 | 4,1 ± 0,04 |
|  |  | P | 0,11 ± 0,01 | 1,5 ± 0,16 | 1,01 ± 0,14 | 0,81 ± 0,12 | 4,08 ± 0,04 |
|  |  | C | 0,09 ± 0,01 | 1,32 ± 0,17 | 0,9 ± 0,16 | 0,75 ± 0,12 | 4,1 ± 0,04 |

**Table S4.** Correlation data of the soil temperature (Soil T, in ºC), the soil water content (Soil WC, in %) and soil acid phosphatase activity (AcP act., in µmole of pNP or pNA g−1 soil / litter DW h-1, average soil and litter) with the terpene exchanges (Total terpenes: TT, Total monoterpenes: TMT, and Total sesquiterpenes: TSQT, in g m-2 h-1), differentiating the two climatic seasons and the two elevations.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Season |  | Dry |  |  |  |  |  |  |  | Wet |  |  |  |  |  |  |  |
| Topografic level |  | Bottom |  |  |  | Top |  |  |  | Bottom |  |  |  | Top |  |  |  |
|  |  | Mean | Std.Dv. | r(X,Y) | *P* | Mean | Std.Dv. | r(X,Y) | *P* | Mean | Std.Dv. | r(X,Y) | *P* | Mean | Std.Dv. | r(X,Y) | *P* |
| Soil WC | Soil T | 14,6 | 3 | **-0,82** | **0,001** | 20,4 | 10,7 | **-0,95** | **0,001** | 33,6 | 3,4 | 0,18 | 0,12 | 35,8 | 4,7 | **-0,58** | **0,001** |
|  | Soil AcP act. |  |  | **-0,38** | **0,001** |  |  | **-0,29** | **0,01** |  |  | **0,29** | **0,01** |  |  | 0,1 | 0,39 |
|  | TT |  |  | **0,42** | **0,001** |  |  | 0,04 | 0,71 |  |  | **-0,29** | **0,01** |  |  | **-0,37** | **0,001** |
|  | TMT |  |  | **0,66** | **0,001** |  |  | 0,02 | 0,86 |  |  | -0,05 | 0,69 |  |  | **-0,41** | **0,001** |
|  | TSQT |  |  | -0,11 | 0,33 |  |  | 0,09 | 0,43 |  |  | **-0,44** | **0,001** |  |  | -0,2 | 0,08 |
| Soil T | Soil WC | 25,2 | 0,5 | **-0,82** | **0,001** | 25,3 | 0,6 | **-0,95** | **0,001** | 25 | 0,2 | 0,18 | 0,12 | 25,1 | 0,3 | **-0,58** | **0,001** |
|  | Soil AcP act. |  |  | **0,45** | **0,001** |  |  | **0,23** | **0,05** |  |  | 0,2 | 0,07 |  |  | -0,02 | 0,83 |
|  | TT |  |  | -0,02 | 0,86 |  |  | -0,11 | 0,33 |  |  | **0,27** | **0,01** |  |  | **-0,24** | **0,05** |
|  | TMT |  |  | **-0,42** | **0,001** |  |  | -0,09 | 0,41 |  |  | 0,19 | 0,10 |  |  | **-0,32** | **0,01** |
|  | TSQT |  |  | **0,49** | **0,001** |  |  | -0,13 | 0,23 |  |  | **0,26** | **0,01** |  |  | -0,1 | 0,39 |
| Soil AcP act. | Soil WC | 88,3 | 92 | **-0,38** | **0,001** | 53,6 | 27 | **-0,29** | **0,01** | 287 | 317,4 | **0,29** | **0,01** | 285,5 | 251 | 0,1 | 0,39 |
|  | Soil T |  |  | **0,45** | **0,001** |  |  | **0,23** | **0,05** |  |  | 0,2 | 0,073 |  |  | -0,02 | 0,83 |
|  | TT |  |  | **-0,28** | **0,01** |  |  | **0,25** | **0,05** |  |  | -0,16 | 0,15 |  |  | -0,05 | 0,64 |
|  | TMT |  |  | **-0,33** | **0,01** |  |  | **0,22** | **0,05** |  |  | -0,18 | 0,11 |  |  | 0,15 | 0,19 |
|  | TSQT |  |  | -0,06 | 0,60 |  |  | **0,28** | **0,01** |  |  | -0,09 | 0,43 |  |  | -0,18 | 0,11 |
| TT | Soil WC | -7,1 | 12,9 | **0,42** | **0,001** | 3,9 | 5,9 | 0,04 | 0,71 | 19,5 | 41,2 | **-0,29** | **0,01** | 119,7 | 370,7 | **-0,37** | **0,001** |
|  | Soil T |  |  | -0,02 | 0,86 |  |  | -0,11 | 0,33 |  |  | **0,27** | **0,01** |  |  | **-0,24** | **0,05** |
|  | Soil AcP act. |  |  | **-0,28** | **0,01** |  |  | **0,25** | **0,05** |  |  | -0,16 | 0,15 |  |  | -0,05 | 0,64 |
|  | TMT |  |  | **0,81** | **0,001** |  |  | **0,98** | **0,001** |  |  | **0,83** | **0,001** |  |  | **0,69** | **0,001** |
|  | TSQT |  |  | **0,69** | **0,001** |  |  | **0,93** | **0,001** |  |  | **0,83** | **0,001** |  |  | **0,85** | **0,001** |
| TMT | Soil WC | -5,7 | 9,1 | **0,66** | **0,001** | 2,2 | 3,9 | 0,02 | 0,86 | 15,7 | 24,6 | -0,05 | 0,69 | 115,1 | 201 | **-0,41** | **0,001** |
|  | Soil T |  |  | **-0,42** | **0,001** |  |  | -0,09 | 0,41 |  |  | 0,19 | 0,10 |  |  | **-0,32** | **0,01** |
|  | AcP act. |  |  | **-0,33** | **0,01** |  |  | **0,22** | **0,05** |  |  | -0,18 | 0,11 |  |  | 0,15 | 0,19 |
|  | TT |  |  | **0,81** | **0,001** |  |  | **0,98** | **0,001** |  |  | **0,83** | **0,001** |  |  | **0,69** | **0,001** |
|  | TSQT |  |  | 0,14 | 0,22 |  |  | **0,85** | **0,001** |  |  | **0,38** | **0,001** |  |  | 0,2 | 0,07 |
| TSQT | Soil WC | -1,2 | 7,8 | -0,11 | 0,33 | 1,6 | 2 | 0,09 | 0,43 | 3,8 | 25 | **-0,44** | **0,001** | 4,6 | 273,4 | -0,2 | 0,08 |
|  | Soil T |  |  | **0,49** | **0,001** |  |  | -0,13 | 0,23 |  |  | **0,26** | **0,01** |  |  | -0,1 | 0,39 |
|  | AcP act. |  |  | -0,06 | 0,60 |  |  | **0,28** | **0,01** |  |  | -0,09 | 0,43 |  |  | -0,18 | 0,114 |
|  | TT |  |  | **0,69** | **0,001** |  |  | **0,93** | **0,001** |  |  | **0,83** | **0,001** |  |  | **0,85** | **0,001** |
|  | TMT |  |  | 0,14 | 0,22 |  |  | **0,85** | **0,001** |  |  | **0,38** | **0,001** |  |  | 0,2 | 0,07 |

**Table S5.** Averages (± SE) of acid phosphatase (AcP) activity in soil and litter in French Guiana in dry and wet seasons at bottom and top elevations respectively. C: control; N: addition of nitrogen; P: addition of phosphorous; NP: addition of nitrogen + phosphorous. Lowercase letters indicate differences between treatments and capital letters indicate differences between seasons (ANOVAs, *P* < 0.001, N = 10). No differences were seen between topographic levels.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **AcP activity** | Dry |  | Wet |  |
| Topographic level | Bottom | Top | Bottom | Top |
| Fertilization treatments | ***Soil*** |  |  |  |
| N | 39,55 ± 6,4aA | 63,13 ± 5,79aA | 44,17 ± 5,83aA | 90,74 ± 8,97aA |
| P | 30 ± 4,48aA | 51,06 ± 8aA | 38,92 ± 3,08aA | 90,5 ± 13,65aA |
| NP | 33,36 ± 3,73aA | 52,2 ± 9,48aA | 45,52 ± 4,56aA | 82,94 ± 14,45aA |
| C | 34,82 ± 4,86aA | 53,16 ± 4,31aA | 45,01 ± 4,9aA | 55,83 ± 2,13aA |
|  |  |  |  |  |
|  | ***Litter*** |  |  |  |
| N | 136,96 ± 32,93aB | 63,93 ± 11,09aB | 539,86 ± 71,31aA | 472,16 ± 71,18aA |
| P | 146,23 ± 31,26aB | 46,33 ± 7,78aB | 341,57 ± 63,67bA | 338,61 ± 35,77bA |
| NP | 134,87 ± 28,21aB | 42,08 ± 9,06aB | 612,69 ± 103,21aA | 532,23 ± 50,41acA |
| C | 150,66 ± 43,29aB | 56,64 ± 11,09aB | 628,32 ± 99,92aA | 620,63 ± 60,3cA |

**Table S6.** Mean ±SE wet and dry season soil terpenoid mono- and sesquiterpenes exchange rates μg m-2 h-1 and retention time prefix of rt; mins. C: control; N: addition of nitrogen; P: addition of phosphorous; NP: addition of nitrogen + phosphorous. Upper and lowercase letters in bold indicate within and between season fertilization treatment differences in compound exchange, respectively, at *P* < 0.05, N = 12.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***Dry season*** | | | | ***Wet season*** | | | |
|  | **C** | **N** | **P** | **NP** | **C** | **N** | **P** | **NP** |
| **Monoterpenes** |  | | | | | | | |
| rt8.1 | 0.003**±**0.003 | 0.000**±**0.000 | 0.000**±**0.000 | 0.003**±**0.003**B** | -0.063**±**0.042**a** | 0.166**±**0.121**ab** | -0.021**±**0.017**ab** | 0.972**±**0.852**bA** |
| Bornylene | 0.000**±**0.000 | 0.064**±**0.051 | 0.000**±**0.000 | 0.030**±**0.030 | 0.087**±**0.037**b** | 0.511**±**0.301**a** | -0.178**±**0.182**b** | 0.174**±**0.083**b** |
| 1S--Pinene | -0.279**±**0.134 | 1.224**±**0.846 | -0.107**±**0.046 | -0.125**±**0.046 | 10.919**±**7.411**b** | 0.899**±**0.484**b** | -12.564**±**4.900**a** | 12.664**±**11.246**b** |
| rt9 | 0.035**±**0.192 | 0.238**±**0.247**B** | 0.194**±**0.135 | 0.575**±**0.645 | 0.740**±**0.452**b** | 24.174**±**14.617**aA** | 6.818**±**2.724**b** | 0.613**±**0.320b |
| rt9.1 | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 | 2.078**±**2.327 | 9.727**±**8.937 | 0.238**±**0.265 | 9.109**±**8.811 |
| rt9.2 | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000**B** | 0.617**±**0.490**a** | 0.980**±**0.983**ab** | 0.297**±**0.577**a** | 3.035**±**1.663**bA** |
| rt9.5 | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 | 0.376**±**0.147 | 1.143**±**0.905 | 0.895**±**0.867 | 1.196**±**0.955 |
| Camphene | 0.169**±**0.174 | 0.070**±**0.074**B** | -0.051**±**0.046 | 0.058**±**0.042 | 1.236**±**0.456**bc** | 5.620**±**2.789**aA** | 2.205**±**1.448**ac** | -1.863**±**1.992**b** |
| Verbenene | 0.009**±**0.006 | 0.011**±**0.007**B** | 0.002**±**0.002 | 0.153**±**0.096 | 0.921**±**0.529**a** | 75.828**±**61.001**bA** | -5.219**±**2.264**a** | 1.945**±**1.371**a** |
| -Pinene | -0.069**±**0.123 | -0.078**±**0.106**B** | -0.188**±**0.129 | 0.037**±**0.052 | 1.026**±**0.431**a** | 7.673**±**4.787**bA** | 0.687**±**0.389**a** | 1.914**±**1.543**a** |
| t-Ocimene | -0.024**±**0.009**b** | 0.100**±**0.051**aB** | 0.013**±**0.011**b** | -0.003**±**0.034**b** | 0.000**±**0.000 | 0.000**±**0.000**A** | 0.000**±**0.000 | 0.000**±**0.000 |
| -Phellandrene | -0.039**±**0.034 | 0.562**±**0.503**B** | -0.118**±**0.049 | 0.010**±**0.009 | 0.334**±**0.410**b** | 4.061**±**2.086**aA** | 1.065**±**0.435**b** | 0.259**±**0.188**b** |
| rt10.5 | 0.000**±**0.000 | 0.000**±**0.000**B** | 0.000**±**0.000 | 0.000**±**0.000 | 1.487**±**0.722**a** | 23.810**±**13.255**bA** | 2.342**±**1.716**a** | 1.985**±**0.902**a** |
| d-Limonene | -0.716**±**0.272**ab** | 0.532**±**0.389**a** | -4.148**±**1.665**bB** | 0.032**±**0.036**a** | 1.054**±**0.681**a** | 5.026**±**2.826**b** | 2.850**±**2.013**abA** | 1.152**±**0.952**ab** |
| rt10.6 | 0.011**±**0.007**b** | -1.832**±**0.678**aB** | -0.235**±**0.106**b** | -0.063**±**0.051**b** | 0.000**±**0.000 | 0.000**±**0.000**A** | 0.000**±**0.000 | 0.000**±**0.000 |
| p-Cymene | -0.351**±**0.137 | 0.170**±**0.067 | 0.107**±**0.067**B** | -0.044**±**0.016 | 0.288**±**0.324**a** | 6.162**±**2.485**c** | -3.361**±**1.913**bA** | 0.325**±**0.239**a** |
| -Terpinene | 0.000**±**0.000 | 0.039**±**0.029**B** | -0.042**±**0.017 | 0.048**±**0.038 | 1.055**±**0.441**b** | 34.791**±**16.947**aA** | 0.881**±**0.580**b** | 0.649**±**0.462**b** |
| Terpinolene | -0.187**±**0.070 | 0.213**±**0.173**B** | 0.002**±**0.028 | 0.513**±**0.444 | 0.495**±**0.172**a** | 2.164**±**0.962**bA** | -0.376**±**0.305**a** | 0.164**±**0.094**a** |
| p-Cymenene | 0.113**±**0.083 | -0.219**±**0.148**B** | -0.232**±**0.112 | -0.107**±**0.044 | 0.450**±**0.182**a** | 3.286**±**1.254**bA** | 1.156**±**0.840**a** | 0.025**±**0.055**a** |
| rt11.18 | 0.000**±**0.010**a** | 0.032**±**0.027**a** | -0.119**±**0.051**bB** | -0.102**±**0.042**bB** | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000**A** | 0.000**±**0.000**A** |
| rt12 | -0.405**±**0.151**aB** | 0.019**±**0.019**b** | -0.062**±**0.033**b** | 0.000**±**0.000**b** | 0.000**±**0.000**A** | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 |
| rt12.2 | -0.002**±**0.001**b** | 0.001**±**0.001**b** | -0.034**±**0.025**aA** | 0.000**±**0.000**b** | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000**B** | 0.000**±**0.000 |
| rt12.5 | -0.077**±**0.049**b** | 0.000**±**0.000**b** | -0.155**±**0.075**a** | -0.002**±**0.001**b** | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 |
| Camphor | -0.201**±**0.087 | -0.220**±**0.107 | -0.400**±**0.160 | 0.064**±**0.048 | 0.191**±**0.082 | 0.148**±**0.467 | 0.005**±**0.004 | 0.126**±**0.123 |
| rt13 | -0.176**±**0.070**aB** | 0.022**±**0.020**b** | -0.258**±**0.106**aB** | 0.002**±**0.002**b** | 0.000**±**0.000**A** | 0.000**±**0.000 | 0.000**±**0.000**A** | 0.000**±**0.000 |
| rt13.2 | -0.269**±**0.123**ac** | 0.048**±**0.058**aB** | -0.589**±**0.236**bcB** | 0.019**±**0.015**a** | 0.087**±**0.058**a** | -0.917**±**0.241**bA** | 0.102**±**0.136**aA** | -0.025**±**0.117**a** |
| **Sesquiterpenes** |  | | | | | | | |
| rt13.4 | 0.011**±**0.009**b** | -0.161**±**0.059**aB** | 0.001**±**0.002**b** | -0.004**±**0.001**b** | 0.000**±**0.000 | 0.000**±**0.000**A** | 0.000**±**0.000 | 0.000**±**0.000 |
| -Elemene/  Endobornyl acetate | -0.228**±**0.104 | 0.091**±**0.068 | -0.157**±**0.062 | -0.017**±**0.018 | 0.058**±**0.057 | 0.155**±**0.480 | 0.003**±**0.003 | 0.339**±**0.354 |
| rt14.5 | 0.131**±**0.084 | 0.761**±**0.733**aB** | 0.010**±**0.005**b** | -0.016**±**0.011**b** | 0.000**±**0.000 | 0.000**±**0.000**A** | 0.000**±**0.000 | 0.000**±**0.000 |
| -Copaene | -2.841**±**1.044**a** | 0.239**±**0.095**b** | 0.480**±**0.399**bcB** | 0.009**±**0.040**bc** | -3.063**±**1.159**c** | 0.737**±**0.693**ad** | 2.756**±**1.323**abA** | 0.144**±**0.200**d** |
| rt14.9 | -0.252**±**0.094**aB** | -0.001**±**0.016**bd** | 0.023**±**0.012**cb** | -0.093**±**0.048**d** | 0.000**±**0.000**A** | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 |
| -Elemene | 0.075**±**0.067**B** | 0.070**±**0.051 | 0.002**±**0.002**B** | -0.095**±**0.039 | -11.725**±**4.340**cA** | 2.947**±**2.430**ad** | 16.208**±**5.992**bA** | 0.841**±**0.989**d** |
| -Cubebene/Cyperene | 0.586**±**0.315**B** | 0.112**±**0.034 | 0.141**±**0.099 | 0.012**±**0.042 | -6.767**±**2.823**aA** | 0.425**±**0.159**b** | 1.564**±**2.359**b** | 0.668**±**0.234**b** |
| rt15.5 | 0.525**±**0.360**aB** | 0.011**±**0.005**b** | 0.000**±**0.000**b** | 0.000**±**0.000**b** | 0.000**±**0.000**A** | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 |
| t-Caryophyllene | 0.428**±**0.772 | 0.387**±**0.153 | -0.324**±**0.186**B** | -0.194**±**0.154 | 1.463**±**0.761**a** | 4.646**±**1.798**ac** | 7.614**±**4.540**bcA** | 0.006**±**0.698**a** |
| rt16 | 0.000**±**0.000**a** | 0.029**±**0.015**a** | 0.006**±**0.005**a** | 0.058**±**0.049**bB** | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000**A** |
| rt16.6 | 0.005**±**0.005**B** | 0.010**±**0.007 | 0.001**±**0.000**B** | 0.007**±**0.004 | -21.006**±**8.650**bA** | 5.793**±**5.325**c** | 28.917**±**17.297**aA** | 1.189**±**2.250**dc** |
| rt16.7 | 0.623**±**0.482 | 0.272**±**0.117 | 0.055**±**0.038**B** | -0.087**±**0.148 | 0.064**±**0.037**b** | 0.436**±**0.299**b** | 2.734**±**1.942**aA** | 0.012**±**0.055**b** |
| rt16.9 | 0.000**±**0.000**ac** | 0.143**±**0.065**bB** | 0.113**±**0.095**ab** | -0.070**±**0.041**c** | 0.000**±**0.000 | 0.000**±**0.000**A** | 0.000**±**0.000 | 0.000**±**0.000 |
| -Muurolene | -0.003**±**0.003**a** | 0.025**±**0.022**bB** | 0.000**±**0.000**a** | 0.002**±**0.007**a** | 0.000**±**0.000 | 0.000**±**0.000**A** | 0.000**±**0.000 | 0.000**±**0.000 |
| -Selinene | 0.405**±**0.366**B** | 0.529**±**0.204 | 0.119**±**0.067 | -0.322**±**0.136 | -64.524**±**23.771**aA** | 3.692**±**4.360**bd** | 28.450**±**16.570**b** | -0.971**±**2.727**cd** |
| rt18.1 | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 | -0.001**±**0.000**B** | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000**A** |
| rt18.4 | 0.327**±**0.327**B** | 0.059**±**0.031 | 0.024**±**0.020**B** | 0.006**±**0.005 | -29.880**±**11.627**aA** | 12.880**±**5.063**bc** | 23.097**±**14.388**bA** | -1.721**±**1.966**c** |
| rt18.8 | 0.000**±**0.000 | 0.003**±**0.002 | 0.012**±**0.011 | 0.020**±**0.020 | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 | 0.000**±**0.000 |
| rt19.7 | -0.379**±**0.645**B** | 0.301**±**0.209 | -1.635**±**0.681**B** | -0.111**±**0.553 | 3.723**±**1.345**aA** | 0.895**±**0.947**b** | 4.269**±**1.636**aA** | 0.480**±**0.619**b** |

**Table S7.** Effects of fertilization on soil terpene exchange rates ((μg m-2 h-1, averages ± SE) in wet and dry seasons at upper and lower elevations (top and bottom) of the hills. Upper and lowercase letters indicate within and between elevation differences in exchange rates at *P* < 0.001; fertilized, N = 60; control, N = 20.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Dry season** | | | | **Wet season** | | | |
|  | **Lower elevation-bottom** | | **Upper elevation-top** | | **Lower elevation-bottom** | | **Upper elevation-top** | |
| **Compound** | **Fertilized** | **Control** | **Fertilized** | **Control** | **Fertilized** | **Control** | **Fertilized** | **Control** |
| Monoterpenes | -5.72 ± 1.30**aA** | -5.57 ± 1.19**aA** | 2.72 ± 0.57**aA** | 0.68 ± 0.14**aA** | 7.25 ± 0.99**aA** | 41.13 ± 8.45**aA** | 151.64 ± 28.48**aB** | 5.46 ± 10**bA** |
| Sesquiterpenes | -1.04 ± 0.65**aA** | -1.83 ± 2.97**aA** | 1.77 ± 0.29**aA** | 1.1 ± 0.25**aA** | -1.03 ± 3.48**aA** | 18.37 ± 1.59**aA** | 99.94 ± 24.60**aB** | -281.51 ± 64.46**bB** |
| Total terpenes | -6.89 ± 1.73**aA** | -7.9 ± 2.57**aA** | 4.57 ± 0.85**aA** | 1.82 ± 0.41**aA** | 6.22 ± 4.1**aA** | 59.49 ± 9.21**aA** | 251.58 ± 37.98**aB** | -276.05 ± 64.33**bB** |

**Table S8.** Means (±SE) of diurnal total terpene, monoterpene, and sesquiterpenes exchange rates (g m-2 h-1) under contrasting fertilization treatments and elevations lower at bottom and upper at top of the hills in the dry and wet seasons. C: control; N: addition of nitrogen; P: addition of phosphorous; NP: addition of nitrogen + phosphorous. Lower and uppercase letters indicate within elevation differences and within plots in each season in exchange rates at *P* < 0.0001, N = 20.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Season | Fertilization treatment | Elevation level | Total terpenes | Total monoterpenes | Total sesquiterpenes |
| Dry | C | Lower | -7,9 ± 2,57**aA** | -5,57 ± 1,19**aA** | -1,83 ± 2,97**aA** |
|  |  | Upper | 1,82 ± 0,41**aA** | 0,68 ± 0,14**aA** | 1,1 ± 0,25**aA** |
|  | N | Lower | -2,13 ± 0,84**aA** | -4,09 ± 1,3**aA** | 2,03 ± 0,52**aA** |
|  |  | Upper | 9,89 ± 1,37**aA** | 5,75 ± 1,01**aA** | 3,88 ± 0,4**aA** |
|  | NP | Lower | -3,36 ± 0,92**aA** | -0,35 ± 0,06**aA** | -3,01 ± 0,91**aA** |
|  |  | Upper | 3,77 ± 1,44**aA** | 2,54 ± 1**aA** | 1,27 ± 0,47**aA** |
|  | P | Lower | -15,16 ± 4,58**aA** | -12,72 ± 3,14**aA** | -2,13 ± 1,42**aA** |
|  |  | Upper | 0,06 ± 0,37**aA** | -0,12 ± 0,3**aA** | 0,18 ± 0,09**aA** |
| Wet | C | Lower | 59,49 ± 9,21**aA** | 41,13 ± 8,45**aA** | 18,37 ± 1,59**aA** |
|  |  | Upper | -276,05 ± 64,33**bA** | 5,46 ± 1**aA** | -281,51 ± 64,46**bA** |
|  | N | Lower | -20,88 ± 4,97**aA** | 5,98 ± 0,76**aA** | -26,86 ± 5,02**aA** |
|  |  | Upper | 496,59 ± 51,73**bB** | 406,35 ± 45**bB** | 90,23 ± 9,57**bB** |
|  | NP | Lower | 6,73 ± 0,5**aA** | 4,59 ± 0,85**aA** | 2,14 ± 0,53**aA** |
|  |  | Upper | 64,08 ± 12,8**aC** | 64,29 ± 12,53**aC** | -0,21 ± 0,95**aB** |
|  | P | Lower | 32,8 ± 7,46**aA** | 11,17 ± 2,57**aA** | 21,63 ± 4,95**aA** |
|  |  | Upper | 194,07 ± 73,58**aC** | -15,73 ± 8,99**aC** | 209,8 ± 66,17**bC** |