**Table S1.** The PLFA biomarkers used to represent the different groups of soil micro-organisms (Frostegård *et al*.1996).

|  |  |
| --- | --- |
| Microbial group | Phospholipids fatty acid signatures |
| Bacteria in general | i15:0,a15:0,i16:0,i17:0a17:0,16:1ω7c, cy17:0,cy19:0 |
| Gram-positive bacteria (G+) | i15:0,a15:0,i16:0,i17:0 |
| Gram-negative bacteria (G-) | 16:1ω7c, cy17:0,cy19:0 |
| Actinomycetes | 10Me16:0,10Me18:0 |
| Fungi | 18:1ω9c,18:2ω6c |

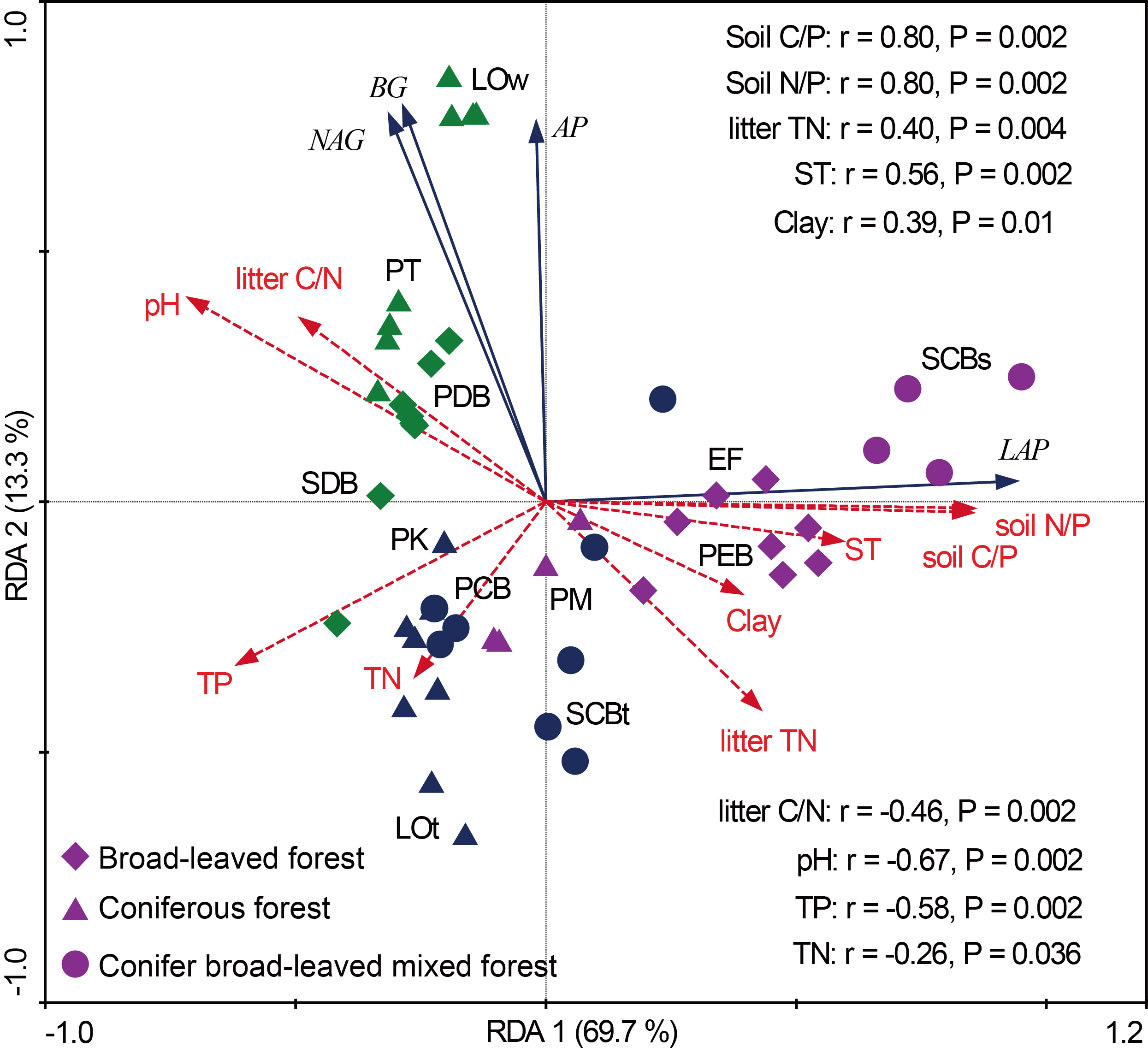
**Table S2.** Average values of soil enzyme activities and microbial PLFAs in the three different climatic zones and three different forest types, respectively.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Treatment** | | **Climate** | | | **Forest type** | | |
| **Temperate**  **(LS)** | **Warm temperate**  **(TY)** | **Subtropical**  **(DH)** | **Conifer broad-leaved mixed forest** | **Coniferous forest** | **Broad-leaved forest** |
| **Enzyme activities**  **(nmol g−1 h−1)\*** | BG | 134b | 299a | 86b | 155b | 214a | 133b |
| NAG | 40b | 176a | 28b | 49b | 114a | 64b |
| LAP | 67c | 359a | 242b | 143c | 223b | 256a |
| AP | 366b | 285b | 994a | 842a | 365c | 557b |
| **PLFAs**  **(nmolg−1)\*\*** | tPLFAs | 11.75a | 9.59b | 7.67c | 6.32a | 5.23a | 4.51b |
| Bacteria | 5.67a | 4.37b | 4.25b | 5.53a | 4.71b | 3.47c |
| Fungi | 0.25c | 0.41b | 0.84a | 0.46b | 0.25c | 0.82a |
| F/B | 0.04b | 0.11a | 0.21a | 0.08b | 0.05c | 0.26a |
| G+ | 3.17a | 2.26c | 2.80b | 3.35a | 2.73b | 2.23b |
| G− | 2.16a | 1.81b | 1.19b | 2.17a | 1.98a | 1.24b |
| G+/G− | 1.69b | 2.25b | 2.37a | 1.65a | 1.84a | 1.85a |
| Actinomycete | 0.31a | 0.23a | 0.26a | 0.33a | 0.27b | 0.22b |

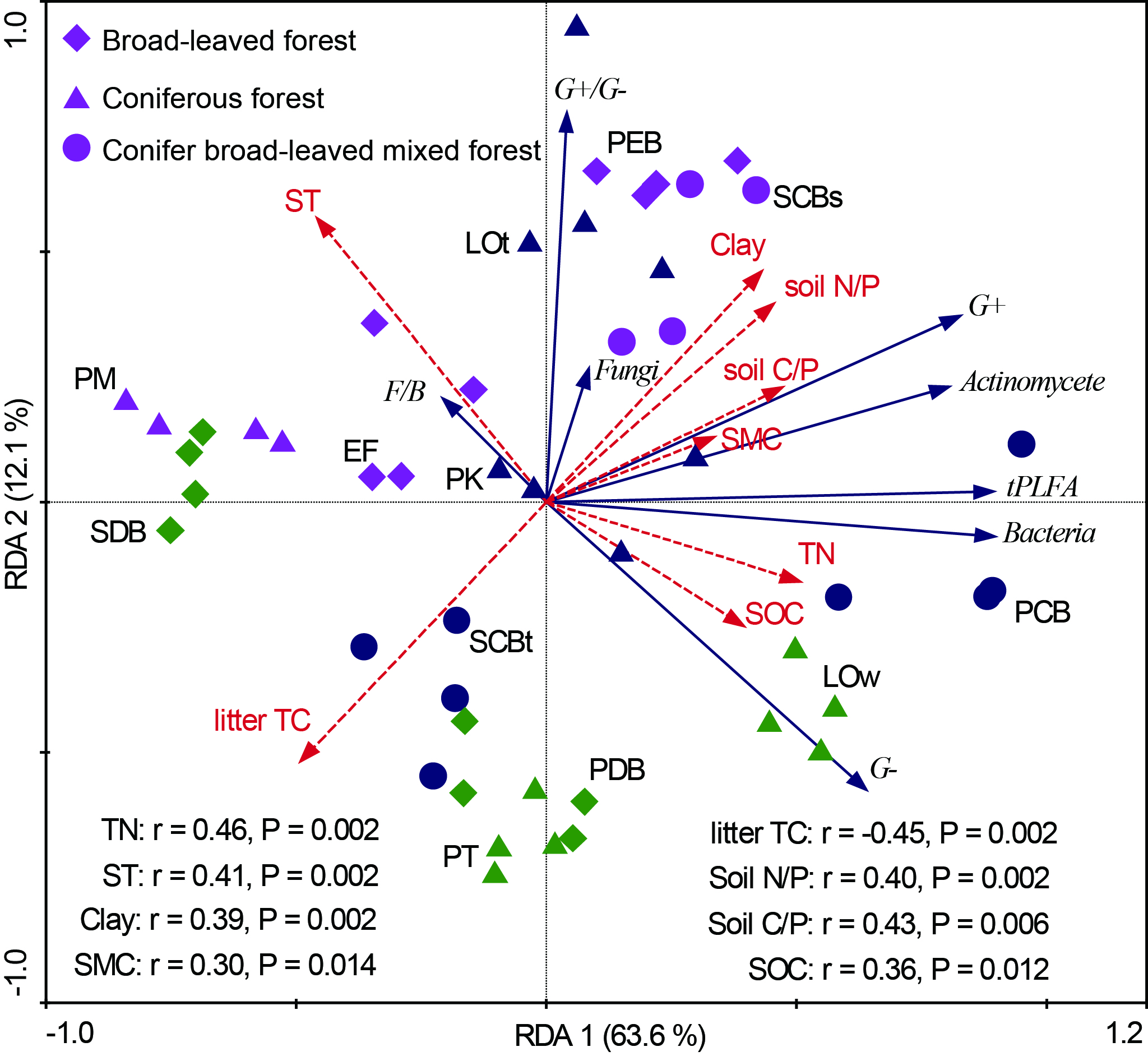
\*: β-glucosidase (BG), N-acetylglucosaminidase (NAG), leucine aminopeptidase (LAP) and acid phosphatase (AP)

\*\*: tPLFAs, total PLFAs; F/B, fungi/bacteria; G+, Gram-positive bacteria; G−, Gram-negative bacteria; G+/G−,Gram-positive bacteria/Gram-negative bacteria.

The Data labeled with different letters indicated soil microbial PLFAs and enzyme activities among different climatic zones or forest types were significantly different at *P*< 0.05.



**Figure S1.** Redundancy analysis (RDA) ordination biplot of soil enzyme activities and environmental properties for the 12 forests. Blue color legend, Liangshui; Green color legend, Taiyue; Pink color legend, Dinghu. Only the environmental variables that were significantly correlated with RDA1 are shown. The dotted lines and solid lines represent the environmental variables and enzyme activities. The abbreviations of the sampling site and enzyme activities included in this figure are shown in Table 1 and Figure 2, respectively. The variables in this table were abbreviated as follows: litter TN = litter total nitrogen; litter C/N = litter total carbon/nitrogen; ST = soil temperature; Clay = soil clay content; TN = soil total nitrogen; TP = soil total phosphorus; C/P = soil carbon/phosphorus, and N/P = soil nitrogen/phosphorus.

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**Figure** **S2.** Redundancy analysis (RDA) ordination biplot of soil microbial community structure and environmental properties for the 12 forests. (Blue color legend, Liangshui; Green color legend, Taiyue; Pink color legend, Dinghu). Only the environmental variables that were significantly correlated with RDA1 are shown. The abbreviations of the sampling site and microbial groups included in this figure are shown in Table 1 and Figure 3, respectively. The variables in this table were abbreviated as follows: litter TC = litter total carbon; SMC = soil moisture content; ST = soil temperature; Clay = soil clay content; TN = soil total nitrogen; SOC = soil organic carbon; soil C/P = soil carbon/phosphorus, and soil N/P = soil nitrogen/phosphorus.