Table 3. Contrasting adaptive strategies of *B. ermanii* and *P. jezoensis* along the elevational gradient.

	B. ermanii (Treeline species)	*P. jezoensis* (Non-treeline species)
Resource strategy	Acquisitive	Conservative
Trait variation	Lower overall variation; highest in photosynthetic traits	Higher variation; especially in photosynthetic and nutrient traits
Trait integration	High coordination (tight network)	Low coordination (modular network)
Water strategy	Radical (high gs, low WUE)	Conservative (high $\delta^{13}C$, low gs)
Plasticity	Functionally integrated, less flexible	More flexible, but less integrated
Implication	Potential for rapid response under warming	Greater persistence in shaded/stable environments
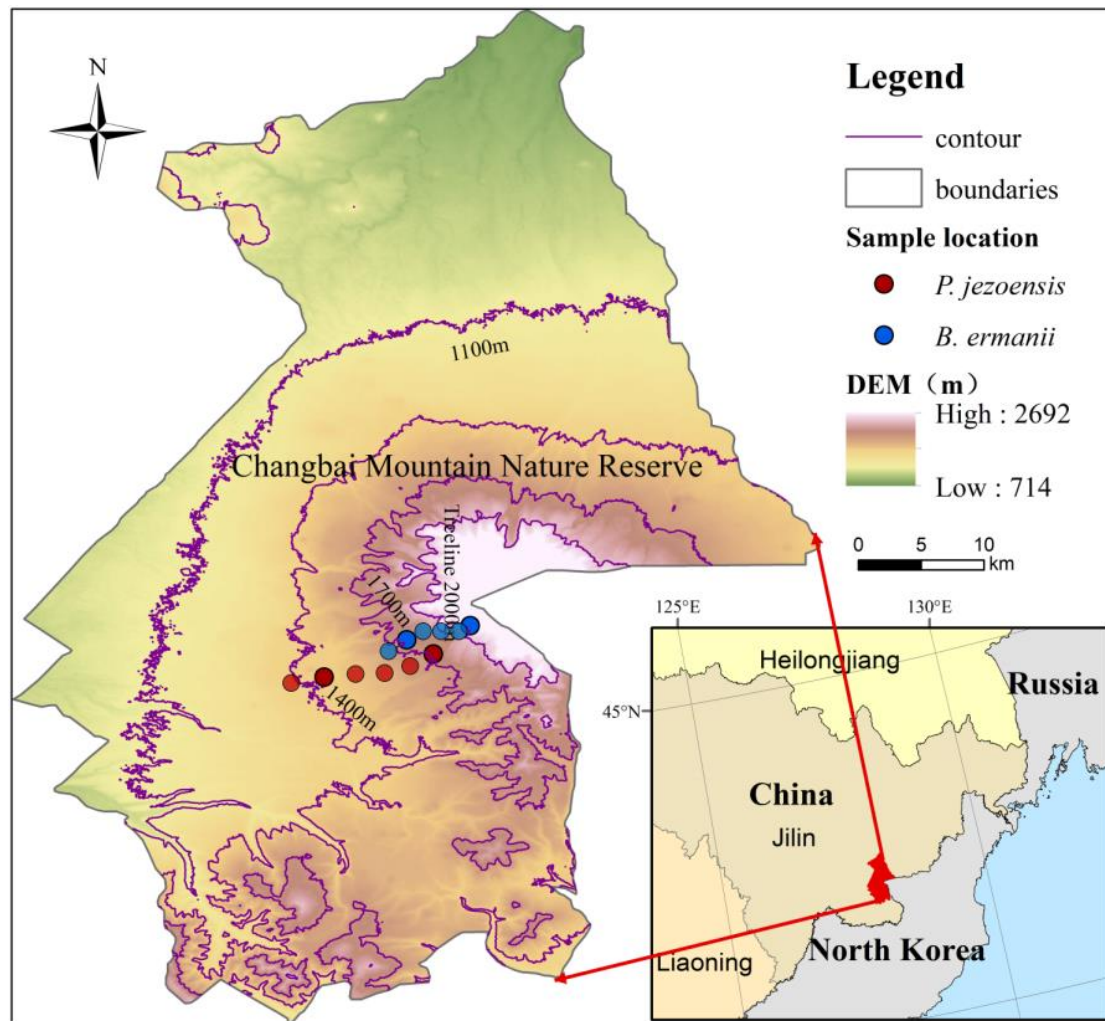
Figure 1. Map of the study area on Changbai Mt showing the main distribution zones of *B. ermanii* and *P. jezoensis*, along with the locations of sampling plots and their corresponding elevations.
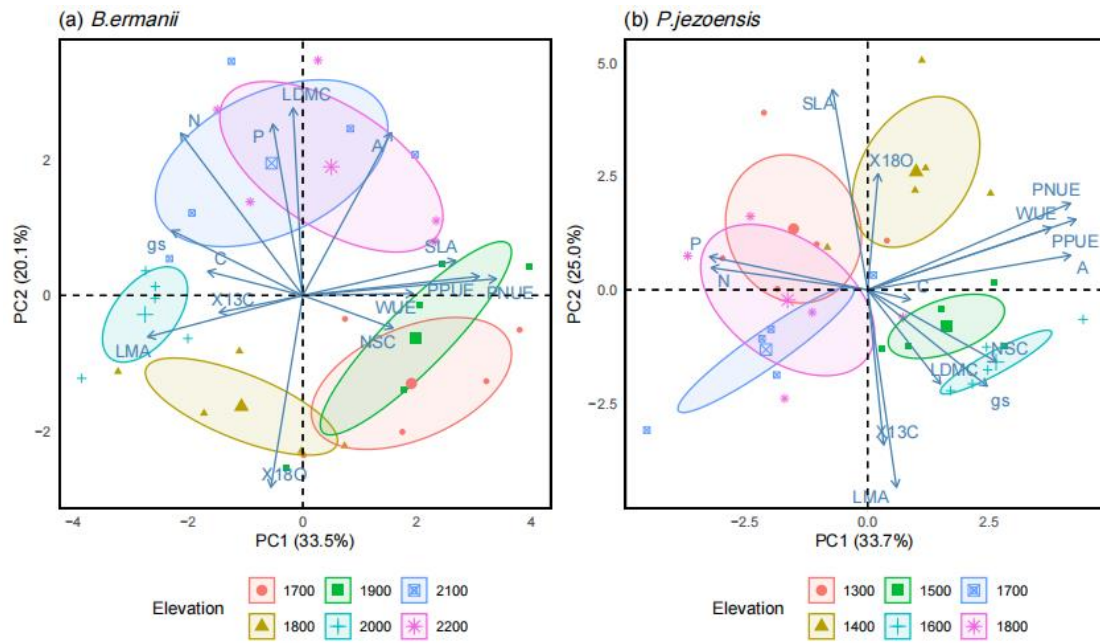
Figure 1. PCA analysis of 13 leaf functional traits of *B. ermanii* and *P. jezoensis*. The parameter descriptions are provided in Table 1.
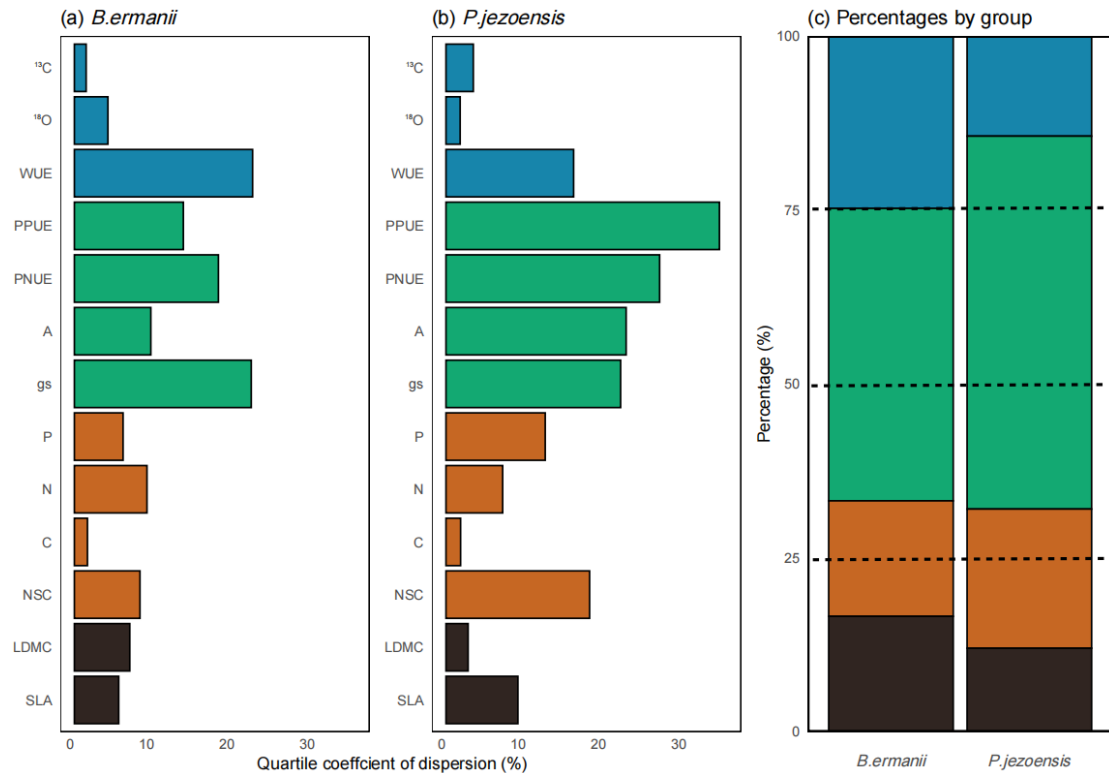
Figure 3. Intraspecific variation in leaf functional traits of *B. ermanii* (a) and *P. jezoensis* (b). (a-b) showed the QCD for 13 leaf traits in *B. ermanii* and P. jezoensis (b), respectively, grouping by functional category. Trait groupings are color-coded: structural (brown), nutrient (orange), photosynthetic (green), and hydraulic (blue) traits. (c) showed the relative contribution of each trait group to total intraspecific variation (%) for *B. ermanii* and *P. jezoensis*. For each species, we calculated the average QCD per group and then divided it by the summed average QCD across all four trait groups. This reflects the dominant sources of phenotypic variability in each species. See Table 1 for trait abbreviations.