Relationships between plant species richness and soil pH at the level of biome and ecoregion in Brazil

Soil pH has been used to indicate how changes in soil acidity can influence species loss. The correlation between soil pH and plant species richness has mainly been studied in North America and Europe, while there is a lack of studies exploring Tropical floras. Here, our aim was therefore to investigate the relationships between terrestrial plant species richness and soil pH for the large Brazilian flora, with spatial differentiation into biomes and ecoregions. Data of plant species occurrences and soil pH in Brazil were compiled from public databases into a geo-referenced inventory of 29,712 terrestrial plants species with a harmonized nomenclature. Based on the pH range, over which each species had been observed, the species richness for each unit of soil pH was determined and plotted as a function of pH for the 6 biomes and 47 ecoregions of Brazil. Lognormal distributions were found for entire Brazil (R² = 0.999), the six biomes (R² > 0.955) and for 40 out of 45 ecoregions, for which a sufficient number of observations was available (R² of 0.830–1.000). Similar distribution patterns were observed when limiting the study scope to range-restricted species, i.e. species only occurring in a single ecoregion in Brazil. Species richness is an indicator of plant biodiversity and we recommend a combined use of species richness for all species and for range-restricted species to address the overall status of the terrestrial plant ecosystem as well as the potential loss of unique species within it, including endemic species. We additionally propose that the developed inventory and the observed sensitivity distributions serve as basis for life cycle impact assessment of terrestrial acidification.

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