
Do endemic trees flora make endemic forests? Insights from New Caledonian forests

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Abstract

New Caledonia homes a rich and highly original flora with a species endemic rate > 75% and fascinating representation of relict taxa (gymnosperms and basal angiosperms). As a result, previous studies on the island flora have mostly focused on the taxonomy and biogeographical origins of this exceptional flora while few studies have attempted to understand the spatial distribution of species and the structure and diversity of species assemblages. Here, we present new insights into the diversity, structure, and ecology of trees communities derived from the New Caledonian Plant Inventory and Permanent Plot Network (NC-PIPPN). NC-PIPPN consists of standardized forest inventories scattered throughout the New Caledonian main island. This network groups together ca. 450 plots including more than 70 000 occurrences of woody plants (trees, shrubs, lianas, tree ferns, and palms) belonging to more than 950 mostly endemics species. Most species are distributed along wide environmental ranges (ca. 900 m of elevation and 2200 mm of mean annual rainfall) and contrasted substrates (volcano-sedimentary, ultramafics and calcareous). Wide environmental ranges, however, do not significantly correlate with large spatial distribution or high local abundance. As in other places in the tropics, the diversity of the forests is support by a highly uneven species abundance distribution. Less than 20% of tree species account for > 50% of all known occurrences, while half of the tree species contribute to < 16% of occurrences. Local abundance is also independant to spatial distribution: some rare species at the island scale are locally abundant while some frequent species at the island scale are locally rare. The

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spatial distribution of species results in highly heterogeneous forests (high beta diversity) that contrasts with a relatively homogeneous structure of communities. Despite a highly original flora and a pattern of aggregative species distribution, New Caledonian forests are not so distinguishable from other forests in the South Pacific region. Our results suggest that the New Caledonian rainforests are mostly constrained by geographical features (area and isolation of the archipelago) and climatic features (e.g. cyclonic frequency) while the flora uniqueness poorly contribute to the forest structure.

Keywords: New Caledonia, diversity, communities, trees