

Palm communities as a key to forest types and soils on ultramafic rocks in southern New Caledonia

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Introduction

The rain forest on ultramafic slopes in the Southern Massif of New Caledonia develops under various soil conditions : eroded oxisol, colluvial oxisol, indured oxisol, all on peridotites, and hypermagnesian soil from serpentinites.

These soils types frequently occur as a mosaic in the rain forest and some distinctive structural and floristic characters are associated with each one. Furthermore, primary and secondary forest types can be recognised.

Palms are abundant in the understorey of these forests with up to 6 species and 3500 individuals of all ages per hectare (Pintaud, 1994). As most of the species have a narrow and well defined ecological range, they may be very good indicators of the above-mentioned variations within the rain forest. Such a use of the palm communities previously proved to be efficient in tropical America (Kahn & de Granville 1992).

Methods

Study plots of 1200 m² (30 x 40 m) were established in 3 survey areas which cover 6 forest

types giving a total of 12 plots.

Within each plot, all palm seedlings, juveniles and adults were surveyed and 8 ecological characters were reported on 25 m² sub-plots. They include : litter cover, depth and composition, abundance of dead trunks and rocks, topography, composition and cover of the understorey and canopy strata.

Correlations between the structure of the palm community and the ecological conditions were studied using the Spearman rank-order correlation coefficient.

Results

In 1,2 ha surveyed, 7 species of palms in 7 different genera were encountered. The distribution of these species was strongly related to soils and disturbance of the forest (Table 1).

There are 3 palm species each restricted to one of the 3 main soil types : *Cyphokentia macrostachya* on colluvial oxisol only, *Campecarpus fulcitus* on eroded oxisol, *Burretiokentia* sp. nov. on slightly alkaline soil derived from serpentinites. These 3 species occur only in primary rain forest with other associated palm species with a broader ecological range. In secondary forest, only 3 species

Table 1 Mean number of adult palms on each forest type per 1200 m².

Palm species	Mixed I	Mixed I	Mixed I	Mixed II	Monod. II	Monod. II
	Col. Per.	Erod. Per.	Erod. Ser.	Col. Per.	Col. Per. N	Hardpan A
<i>Actinokentia</i>	2	20	1	8	2	0
<i>Basselina</i>	17	15	0	15	27	30
<i>Brongniartikentia</i>	1	1	0	0	0	15
<i>Burretiokentia</i>	0	0	22	0	0	0
<i>Campecarpus</i>	2	28	0	0	0	0
<i>Chambeyronia</i>	0	0	4	0	0	0
<i>Cyphokentia</i>	31	5	0	0	0	0

Mixed I or II = mixed primary or secondary rain forest, Monod. = monodominant canopy forest

Col. = colluvion, Erod. = eroded, Per. = peridotites, Ser. = serpentinite

N : dominated by *Nothofagus aequilateralis* ; A : dominated by *Arillastrum gummiferum*.

develop : *Basselinia pancheri*, *Brongniartientia vaginata* and *Actinokentia divaricata*.

Discussion

Structures of palm communities are characteristic of the different lowland rain forest types on ultramafic rocks. Palms are indicators of both soil types and states of disturbance. However, if mixed secondary forest is clearly recognizable by the dominance of several pioneer tree species such as *Myodocarpus fraxinifolius*, *Codia arboorea* and *Alphitonia neocaledonica*, the status of monodominant canopy forests is disputed. Our study supports the hypothesis that monodominant forests are secondary types because the structure of the low diversity palm community is very similar to that of typical mixed secondary forest and contrasts strongly with the high diversity community of primary forest types.

References

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