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DESCRIPTION OF A *PTEROCARPUS OFFICINALIS* (LEGUMINOSAE) MONOCULTURE IN CORCOVADO NATIONAL PARK, COSTA RICA

by Daniel H. Janzen

Department of Biology University of Pennsylvania Philadelphia, Pennsylvania 19104

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ABSTRACT

A monoculture forest of *Pterocarpus officinalis* is described in the Corcovado National Park, Costa Rica. An area of 999 m^2 contained 66 living large saplings and adults of *P. officinalis;* seedling density can be as high as 71.9/m^2.

In discussing lowland tropical forests, the intellectual interest of population biologists has been largely focused on habitats containing many species of trees. However, forests with extremely low species richness of large trees do exist: *Shorea albida* Sym. ex A. V. Thom. peat swamp forests in Sarawak (Anderson 1961, 1964); *Mora excelsa* Benth. forests in Trinidad (Beard 1946); *Ocotea, Mora* and *Eperua* forests in Suriname (Richards 1952); *Gilbertiodendron dewevrei* (DeWild.) J. Leon. forests in west Africa (Gerard 1960); mangrove forests around the world (Watson 1928); *Raphia taedigera* Mart., *Prioria copaifera* Griseb., and *Parkinsonia aculeata* L. swamp forests in Costa Rica; bamboo forests around the world (Janzen 1976); etc. The study of the ecology and population biology of these forests (e.g., Janzen 1974) should be of extreme interest to foresters and others wishing to establish pure stands of valuable perennials in tropical habitats. Here, I very briefly describe a monoculture forest of the large papilionaceous legume tree *Pterocarpus officinalis* Jacq. in order to draw attention to its existence and establish a base-point for a long term study of its demography.

The newly established Corcovado National Park on the Pacific side of the Osa Peninsula in southwestern Costa Rica contains a number of monoculture swamp forests: mangrove spp., *Raphia taedigera* (Palmae), *Mora oleifera* (Tr.) Docke (Leguminosae), and *Pterocarpus officinalis.* The *Pterocarpus officinalis* forest is located between the ranger station at La Llorona (Arco de Piedra) and the Río Llorona (at the north end of the Park). In brief, its western-most edge is about 500 m from the open ocean, and it lies as the last band of monoculture forest in the series mangrove spp. *Mora oleifera* — *Pterocarpus officinalis* — mixed-species-rich

forest. The terrain is flat alluvium that rises abruptly at the intersection of the *P. officinalis* forest with the mixed forest. Proceeding eastward and parallel to the Río Llorona, the *P. officinalis* forest blurs into the intergradation of *Mora* forest and mangrove forest with the species-rich riparian forest above tidal influence.

There is nothing known of the history of the site, except that there has obviously been no logging of the *P. officinalis* forest; it appears that about 10—20 years ago, however, many of the large nearby mangrove trees were cut to collect their tannin-rich bark. Whether the monoculture nature of the *P. officinalis* stand is the result of a unique seeding in of a site left bare by a peculiar circumstance, or whether it represents a seral stage that was previously occupied by *Mora* and mangroves cannot be determined. The absence of large dead stumps of any species of tree within the *P. officinalis* monoculture makes me suspect the former to be the case.

The Forest

To document the detailed composition of the *P. officinalis* monoculture, a primary survey plot was marked out in the area between the intergradation of *Pterocarpus-Mora*-mangrove stands and the beginnings of the mixed forest. It was 37 m long and 27 m wide (999 m^2), with the long axis parallel to the river and running approximately east-west. This area contained 66 living large saplings and trees of *P. officinalis* (Table 1); there were no small saplings or seedlings of any species of tree that appeared to be more than 1 m tall (Fig. 1). The *P. officinalis* DBH was taken with a diameter tape and the buttressing was included; any tree over 0.50 feet (15 cm) DBH is a member of the canopy (about 30 m above ground). There were no other tree species present in this area as large individuals, though there may have been some small seedlings of species from the mixed forest.

Between the primary survey plot and the mangroves was an area 37 m long and 33 m wide (1221 m^2) of which I counted by eye 49 *P. officinalis* and 19 *Mora oleifera* trees of the same size class as those in the primary study area; the thousands of *Mora* seedlings and saplings less than 4 years old in this area were not included in this census.

The forest floor under the *P. officinalis* forest contains large monoculture patches of *Crinum erubescens* Sol. swamp lilies (as does the *Mora* monoculture forest at Río Sirena in the southern part of the Park). There is one such patch of *Crinum* in the primary survey plot; an area of 217 m^2 contained 589 individual plants.

While much of the forest floor below *P. officinalis* forest is either bare mud (with fallen leaves of various ages) or *Crinum* vegetation, there are small patches of 1-year-old *P. officinalis* seedlings (there are a very few widely scattered individuals that are large enought to be 2 years old) derived from the enormous number of

seeds that fell shortly before 10 December 1976. On 20 March 1977, an area of 11.9 m^2 was marked out in one of these patches at the southwest corner of the primary survey plot; this area is directly below a gap in the canopy made by the very recent fall of a large adult *P. officinalis.* There were 855 seedlings in this area (71.9/m^2); their average height was 28.35 cm (s.d. = 9.50) and they had an average of 3.05 leaves per plant (s.d. = 1.18); these measurements were based on a subsample of 171 plants chosen by measuring all the plants in an arbitrary fraction of the small plot.

The dynamics of *P. officinalis* germination are not clear. In early December 1976 all seed had fallen and apparently germinated immediately to produce these seedlings; however, the ground between the butresses of the adult trees was liberally sprinkled with moist and apparently living seeds with rotting fruit coats.

Table 1. DBH (in feet) for the 66 *P. officinalis* trees in the primary study plot.

0.15	0.60	3.00
0.16	0.61	3.07
0.19	0.67	3.13
0.20	0.68	3.20
0.23	0.69	3.26
0.24	0.69	3.61
0.25	0.70	3.74
0.27	0.76	4.05
0.27	0.86	4.28
0.29	0.88	4.48
0.31	0.91	4.58
0.35	1.05	4.66
0.38	1.12	4.80
0.39	1.14	4.92
0.39	1.20	4.93
0.40	1.25	4.99
0.49	1.29	5.13
0.49	1.29	5.22
0.50	1.82	5.59
0.50	2.12	7.07
0.51	2.34	10.28
0.53	2.71	
0.55	2.94	

Discussion

I suspect that as accumulation of soil occurs the *P. officinalis* forest is moving into the *Mora* forest (at present represented by only an occasional large tree) which is in turn moving into the mangrove forest. This can be determined only by following the system for many years, which is planned.

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Resumen

Se describe un bosque de una sola especie de *Pterocarpus officinalis* Jacq. (Leguminosae) del Parque Nacional Corcovado, Puntarenas, Costa Rica. Una área de 999 m^2 conviene 66 árboles vivos de esta especie y la densidad de plántulas puede ser tan alta como 71.9/m^2.

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Fig. 1. Looking west through the *Pterocarpus officinalis* forest. All trees in this photograph are *P. officinalis* and the understory herb is *Hymenocallis* (March 1977, La Llorona, Parque Nacional Corcovado, Costa Rica).