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Notes on the Biology, Ecology, and Use of a Small Amazonian Palm: Lepidocaryum tessmannii

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Lepidocaryum tessmannii Burret is a small palm which is abundant in the understory of some tropical rain forests in the Peruvian Amazonia (Fig. 1). This species is locally known as "irapay." It is a clustering palm with slender stems, not more than 3–4 cm in diameter and 6 m in height. The leaves are palmate, like those of its giant relative, *Mauritia flexuosa* L.f., but they have only 4 segments inserted at the end of a 1.2 m long petiole. Each axis bears 4 to 7 contemporaneous leaves. All the species of the genus are dioecious. The "irapay" is distributed throughout Peruvian Amazonia; eastwards, it does not reach central Amazonia.

This small palm is remarkable for its highly unusual growth pattern with vegetative propagation, its density in the understory of the forests surveyed, its topographic distribution which is affected by soil drainage, and its use for thatching house roofs.

Our observations were made in forests near the village of Jenaro Herrera on the Ucayali River (4°55′18″ Lat S; 73°40′36″ Long W), about 200 km southwest of Iquitos. The height above sea level is 125 m. The climate belongs to the tropical humid type with about 2.9 m annual rainfall and an average temperature of 26° C.

Growth Dynamics

The clumps of *Lepidocaryum tessmannii* are formed from basal branching, which corresponds to the growth pattern defined as Tomlinson's model by Hallé et al. (1978): "This architecture results from the repeated development of equivalent orthotropic modules in the form of basal branches which are initially restricted to the epicotyledonary region of the seedling axis (the first module), and the basal nodes in subsequent axes." In the case of the "irapay," inflorescences are lateral.

Numerous Amazonian palms develop such a growth pattern. The unusual feature of the "irapay" is its production of creeping, stolonlike rhizomes.[1] Each axis produces several rhizomes from its base, with a diameter of 0.5 to 1 cm, running generally in the first 5 cm of the soil or sometimes on the surface, and attaining up to 2 m in length. During the horizontal expansion phase before the apex grows vertically and elaborates a new stem with a larger diameter, scale leaves are formed and roots are emitted from the lower side of the rhizome throughout its length.

Amazonian palms rarely produce such stolonlike rhizomes. Another New World case is provided by *Iriartella setigera* (Mart.) H. A. Wendl. (Kahn, 1983). Sev-

[1] We use "rhizome" in its broadest sense: "Rhizome is a useful general name, readily qualified as fleshy, stoloniferous, aerial, descending, scale bearing, leafly, etc. Semantic obstacles arise only when the term is too rigidly defined" (Bell and Tomlinson 1980).

1. High density of *Lepidocaryum tessmannii* as shown by the abundance of palmate leaves with 4 leaflets.

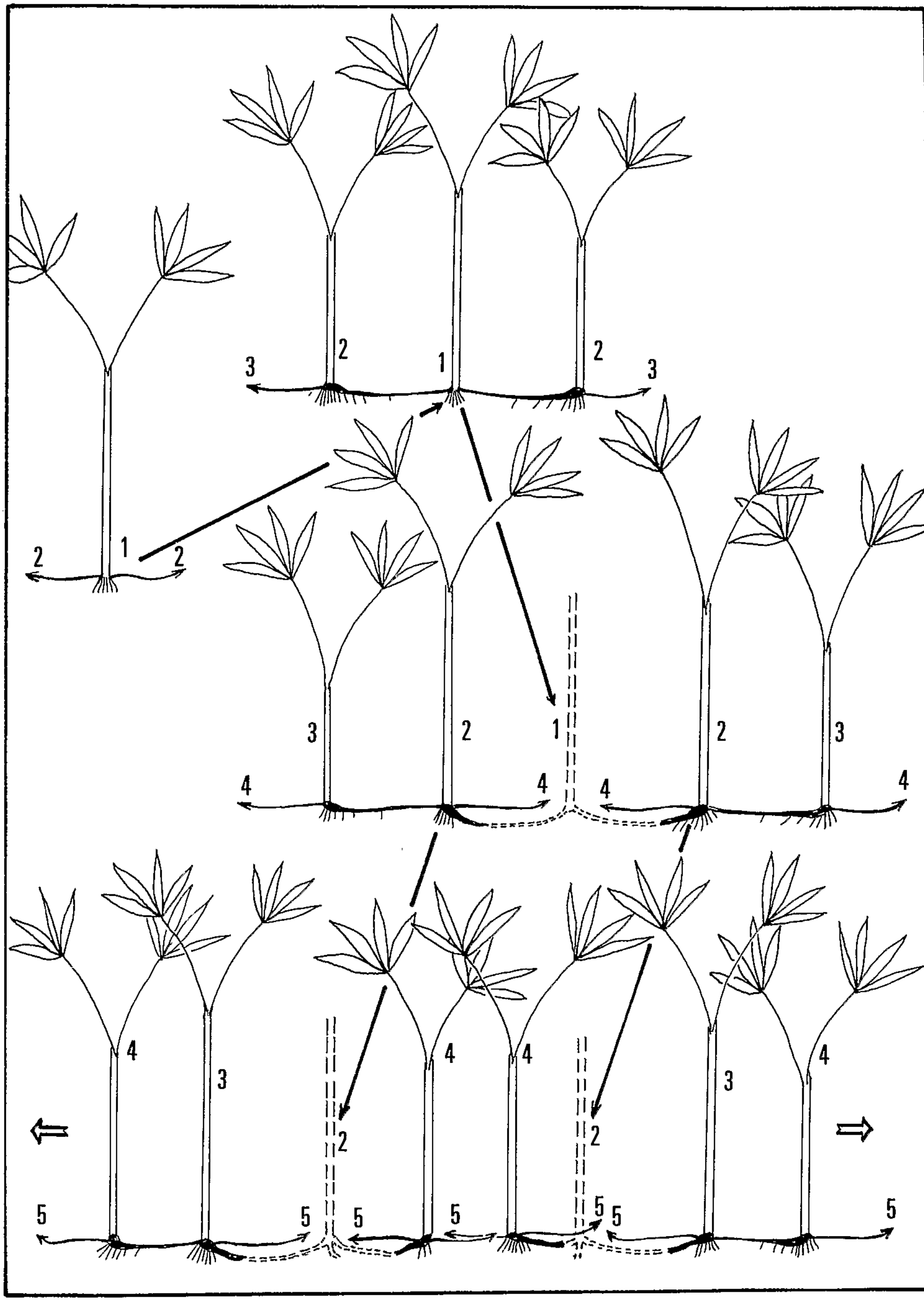
eral palms in the Old World have been described with such rhizomes: *Podococcus barteri* G. Mann. et Wendl. (Bullock 1980) in Africa, *Salacca* (Corner 1966), *Arenga, Calamus,* and other rattans in Asia, the rhizomes of which realize diverse forms as described by Dransfield (1978).

Density of *Lepidocaryum tessmannii*

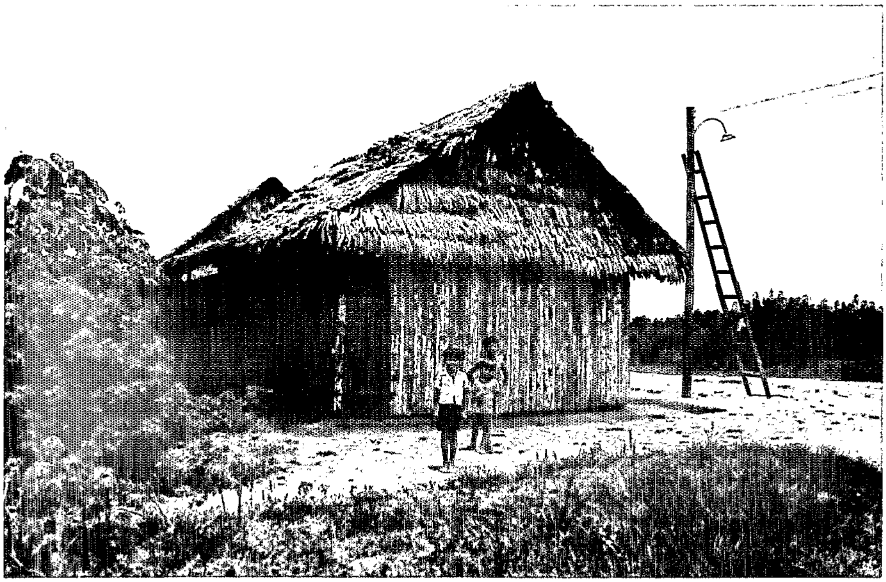
The density of the "irapay" was estimated from two plots, each of 0.2 ha. One is located on well-drained, yellow ferralitic soil, in an upland forest described by Marmillod (1982). *Lecythidaceae, Sapotaceae* and *Caesalpiniaceae* are particularly abundant in the forest canopy, reaching up to 40 m in height and 1.5 m in DBH. The other is on poorly drained, gleyic soil, in a seasonal swamp forest dominated by arborescent palms (*Mauritia flexuosa, Jessenia bataua* (Mart.) Burret, *Euterpe precatoria* Mart.), with a lower density of dicotyledonous trees. Both forests cover vast areas in the region. All axes of *Lepidocaryum tessmannii* above 1 m in height were counted in each plot.

On well-drained soil, 508 axes (2,540/ha) were counted. This number is smaller than that found by Marmillod (1982) who calculated 3,500 axes per ha from 0.7 ha surveyed. The difference between these two studies would not surprise those who know the particular forest; the density of the palm varies considerably from place to place and is apparently related to forest dynamics.

On poorly-drained soil, the density of the palm falls to 266 axes counted (1,330/ha), demonstrating its capacity to tolerate anaerobic conditions due to waterlogging. De Granville (1978) and Sist (1985) described analogous edaphic behavior in another understory species of the forests of French Guiana, *Astrocaryum paramaca* Mart., the populations of which are smaller on poorly-drained soil. However, such edaphic behaviour is not general in Amazonian forests; a clear-cut distribution



2. Vegetative propagation of *Lepidocaryum tessmannii* Burret by the production of stolonlike rhizomes. The palm can overrun the understory of the forest and become the most abundant species. Each axis can produce numerous rhizomes during its lifetime.



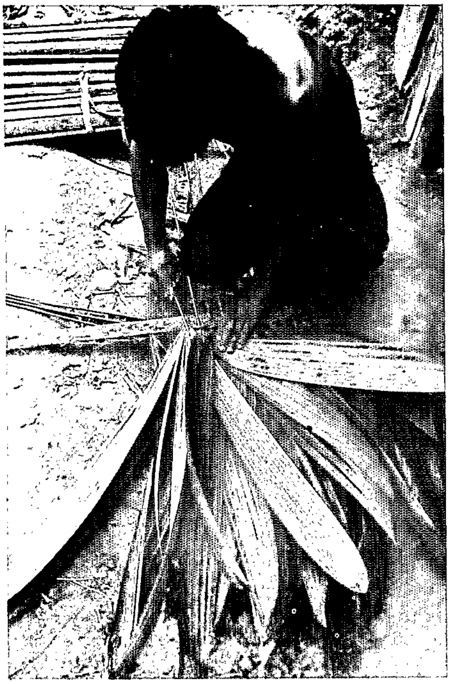
3. House thatched with leaves of "irapay" (village of Jenaro Herrera). The walls are made with split stems of *Euterpe precatoria*, and the door and the floor (inside) with split stems of *Iriartea ventricosa*.

of palms in relation to soil drainage as shown by Kahn and Castro (1985) in central Amazonia, is observed more frequently.

Vegetative Propagation

All the axes of the "irapay" were dug in a 50 m^2 area on well-drained soil. Only one seedling of this species was found in the area surveyed. Most of the axes were related to other living or dead individuals. Isolated axes clearly presented the remainder of a degenerated rhizome at their base. While propagation by vegetative means is well developed, fruiting palms are observed over a long period with peaks from March to April during the rainy season and from September to October during the drier period. Production of rhizomes from axes originating from seedlings is apparently precocious, making a comparative estimate of sexual and vegetative reproduction rates very difficult.

Such intense vegetative propagation appears to be infrequent in Amazonian palm species as we can judge from our own experience in Brazil, Peru, and French Guiana (Kahn and Castro 1985, Kahn 1985, 1986). Most examples of Tomlinson's growth form constitute isolated clumps of related stems, sometimes up to 25 together, as in *Euterpe oleracea* Mart. (Cavalvante 1974). In this case basal branching contributes more to maintain population sizes, stabilizing the number of fruiting axes in the long term, than in propagating the species (Hallé et al. 1978), as is found for "irapay." *Iriartella setigera* which also produces stolonlike rhizomes, behaves differently; only 1 or 2, rarely 3 new stems are built from the 4 to 8 rhizomes born of the first axis base, generally when the first axis is dying. *Lepidocaryum tessmannii* is the most abundant species in the understory of the Peruvian forests surveyed and this is due to its vegetative propagation by stoloniferous rhizomes (Fig. 2).



4. How leaves of "irapay" are attached on an axis made from the stem of *Wettinia augusta* for composing a cover unit.

Thatching with "irapay"

The leaves of the "irapay" are used to thatch houses (Fig. 3); this use is widespread in all areas of "terra firme" forests where the palm is abundant, and described by Mejia (1983).

The roof cover unit is composed of an axis, up to 3 m in length, made from the stem of another understory palm, *Wettinia augusta* Poepp. et Endl., to which 90 to 150 leaves of "irapay" are attached by their petioles. The 4 leaflets of one leaf are interwoven with those of the two neighbors as shown in Figure 4. The roof lifetime varies from 4 to 6 years depending on the leaf density in the cover unit as well as on the space left between the cover units. The longest lifetime of a 60° dihedral roof is obtained with cover units composed of 150 leaves with a spacing of about 10 cm.

A house with an area of 35 m^2 covered by a two-planed roof needs 160 cover units, 70 for each side and 10 for each gable. With an average of 130 leaves per cover unit, some 20,800 leaves are necessary for thatching such a house. If an average of 4 leaves are collected from each "irapay" axis, then collecting must be extended to 5,200 axes, i.e. about 2 hectares of these forests, each with a density of 2,500 to 3,500 axes (1 m in height).

Collection is made by cutting the long petiole at the middle. Leaves are packed in bundles of a thousand, which is about as much as a man can carry.

Acknowledgments

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