

The Ecology of Paraguayan Palms

MIGUEL MICHALOWSKI

Botanist of the USOM to Paraguay (STICA), Professor of the University of Asunción

A traveler in South America might be surprised to find that palms are abundant in Paraguay. There he would find 40 to 50 species, among them about 20 known nowhere else. Farther to the south, in Uruguay and Argentina, neither the number of species nor the number of individuals is as large and the 35th parallel is considered the southern limit of palms in Latin America.

The Paraguayan palms are still awaiting detailed study. This short essay does not pretend to be such a study. It does, however, present a general ecological classification which may prove useful for future students. Two principal ecological groups of palms are evident in Paraguay: solitary palms which grow as scattered individuals, never forming communities, such as the *pindo* (*Arecatum Romanzoffianum*) and the *palmito* or *yeyi* (*Euterpe edulis*) also called *assai* in Brazil; and social or gregarious palms which form communities called *palmares* in Paraguay.

These communities formed by palms are included within the phytosociological order which I call palmetalia and are of two distinct types: the palmetion silvarum composed of palm forests known in the vernacular as *monte palmar* formed principally by a species of *Copernicia* (known locally as *caranday*) and the palmetion camporum composed of palms scattered in the grass plains never forming forests and known in the vernacular as *campo palmar*. The most typical representative of the last alliance is the *mbocayá* (*Acrocomia Totai*). Therefore the *campo palmar* form-

ed by the *mbocayá* is known in Paraguay as *mbocayaty* —*ty* meaning "a great quantity" in the Guaraní language. Many localities in Paraguay bear this name attesting to the importance of the community.

Several parallel series can be found in each type of palmetion. Among the erect palms, we meet with three series:

- I —relatively pure communities of tall palms such as the copernicias which sometimes reach a height of 25-30 meters and for which the term macropalmetum may be used.
- II —communities of palms such as *Acrocomia Totai* and the copernicias with an average height of 8-15 meters, the mesopalmetum.
- III—communities of dwarf palms belonging to the genera *Acanthococos*, *Attalea*, *Diplothemium*, and *Syagrus*, the micropalmetum.

The climbing palms, of which *Desmoncus rudentum*, known locally as *urubamba*, is the most typical representative, form a fourth series which may be designated the palmetum scandens.

The introduction of the term micropalmetum requires explanation. Communities of woody plants in Paraguay take three forms: a) the forests, known locally as *monte alto* or technically as the arboretum; b) communities of tall shrubs, the *monte bajo* (*matorral*) or macrofruticetum; c) communities of dwarf shrubs, the microfruticetum, with species of *Campomanesia*, *Myrcia*, and other genera of Myrtaceae, *Calliandra brevicaulis*, *Jacaranda decurrens*, and

others, most of them with large subterranean trunks showing only the leaves above the surface of the soil. All the palms of the micropalmetum possess the same peculiar characteristic of subterranean trunks with aerial rosettes of leaves. They deserve especial attention as plants to be grown as ornamentals in pots or tubs.

Within each of the groups of palms mentioned, there are some well defined ecological types in two major categories, the shade-loving or umbrophytic palms, and the sun-loving or heliophytic palms. These types are summarized in the accompanying chart and are amplified in following paragraphs.

Shade-loving or Umbrophytic Palms

Shade-loving palms may be placed in three categories, the first of which is not given an ecological name.

1. A group of tall solitary species (12-20 meters high) which cannot be considered as elements of the macropalmetum since they never form communities. Here belong *Arecastrum Romanzoffianum* and *Euterpe edulis*, both with mesophytic characteristics, preferring red soils and a pH between 5.5 and 6.5.

2. The mesopalmetum—palms with a height of 2 to 4 meters, all possessing hygrophytic or even hydrophytic tendencies, the species of *Bactris* often growing in water. These palms frequently form dense communities in the river gallery forest (*sotos*), their pH range being rather wide. The following species predominate: *Bactris Anisitsii*, the *mbocayá mi* or *caranda*; *Bactris bidentula*, *maraja do Igapo*; *B. inundata* or *tucum*; *Geonoma Schottiana* or *guarica*.

3. The micropalmetum—dwarf palms with the same ecological requirements as the foregoing group. The typical representative is *Scheelea parviflora*

with subterranean trunks and leaves reaching a length of 2 to 4 meters.

Sun-loving or Heliophytic Palms

The sun-loving palms occur on virgin soils of saline and non-saline nature and on tilled soils as well. Those of the latter are considered first.

A. Palms of Tilled Soil.

The most typical representative of this group is *Acrocomia Totai*, which belongs to section *Sentocomia*. According to a popular expression "the *mbocayá* follows the plow," and for this reason the principal area of *Acrocomia Totai* coincides more or less with the central region of Paraguay, the region of farming. It is strange that this species, so abundant in the country and possessing a high economic value (the fruits are rich in oil, the leaves provide forage), is practically undescribed. The acrocomias of Paraguay are not uniform. Some of those ascribed to *A. Totai* above probably belong to *Acrocomia sclerocarpa* (also a *Sentocomia*) while others could be placed with *A. Mokayayba*, a species of section *Tectocomia* which replaces *A. Totai* in the north. A study of these species offers a fine field for future investigation.

B. Palms of Virgin Soils.

On saline soils, which could be classified as light brown solotized latozols with a pH reaching 7 and 8, we meet with the mesopalmetum and the macropalmetum. The mesopalmetum is composed of species of *Trithrinax* (*T. campestris*, *T. biflabellata*, and others) all called *caranda*. They often form extremely dense communities of shrubs (*matorrales*) together with the *algorrobos* (species of *Prosopis*, a leguminous tree), and are very abundant in the Chaco region of Paraguay. Some copernicias should also be placed in this group. The species appear either in the

Ecological requirements Types of growth	Heliophytic Palms			Umbrophytic Palms	
	Mesophytic	Halophytic	Xerophytic	Mesophytic	Hygrophytic to Hydrophytic
Solitary Palms	<i>Scheelea princeps</i>			<i>Arecastrum Romanzoffianum</i> <i>Euterpe edulis</i>	
Palmetum scandens					<i>Desmancus rudentum</i>
Macropalmetum	<i>Acrocomia Total</i> <i>A. Mckayayba</i> <i>A. sclerocarpa</i>	<i>Copernicia</i> sp.			
Social Palms	<i>Butia Yatey</i> * <i>B. Yatey</i> var. <i>paraguayensis</i> <i>B. capitata</i> * <i>Scheelea quadrisperma</i> <i>S. phalerata</i> <i>S. quadrisulcata</i> * <i>Syagrus Dyerana</i>	<i>Trithrinax campestris</i> <i>T. brasiliensis</i> * <i>T. bifiabelata</i>			<i>Bactris unaensis</i> * <i>B. Anisitsii</i> <i>B. bidentata</i> <i>B. glaucescens</i> <i>B. inundata</i> <i>Geonoma Schottiana</i>
Micropalmetum	<i>Syagrus aspida</i>		* <i>Attalea Guaranitica</i> * <i>Acanthococcol Hassleri</i> <i>Diplothemium leucocalyx</i> * <i>D. Anisitsii</i> <i>D. Hasslerianum</i> * <i>Syagrus campicola</i> * <i>S. lilliputiana</i> * <i>S. arenicola</i> * <i>S. amadelpa</i> * <i>S. campylospatha</i> * <i>S. spaeensis</i> * <i>S. Hassleriana</i> * <i>S. Wildemaniana</i>		<i>Pyrenoglyphis piscatorum</i> <i>Scheelea parviflora</i>

*Endemic species are marked with an asterisk

form of a *campo palmar* or in the form of a *monte palmar*, the latter being either a very dense one (as at Colonia

Risso) or composed of rather scattered individuals (at Puerto Rosario).

The macropalmetum is composed of

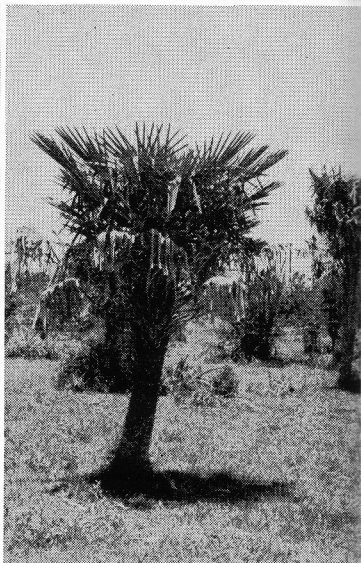
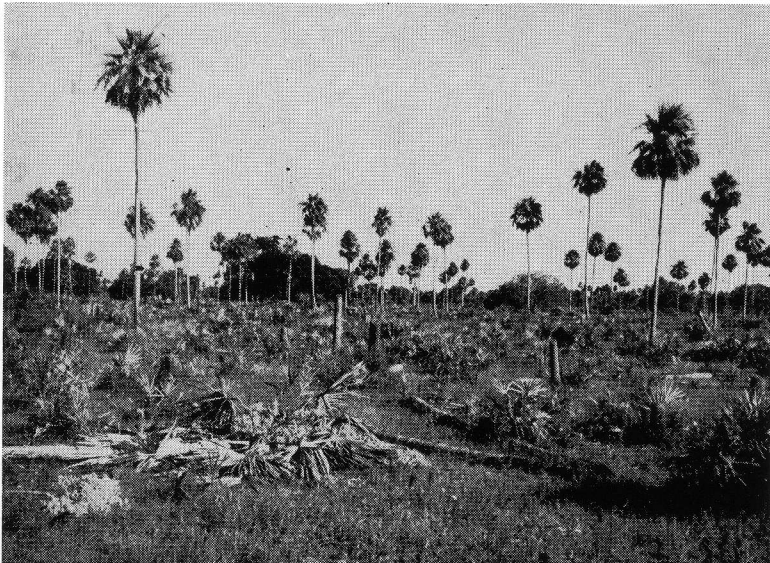
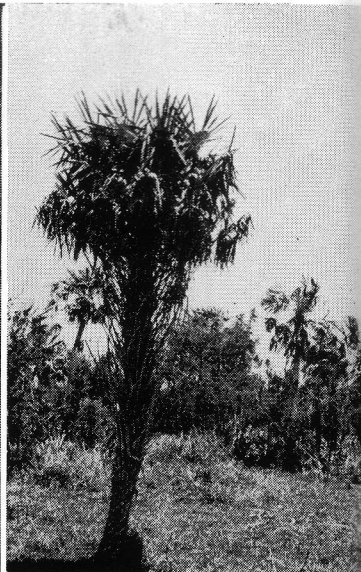
various species of *Copernicia* which are still awaiting correct identification. After several trips made in Brazil and Paraguay, I was able to establish the following geographical distribution of *Copernicia* species. *Copernicias* are common in the Brazilian state of Matto Grosso but appear also in the northern regions of Paraguay on the borders of the Paraguay River between Puerto Sastre and Fuerte Olimpo. Trees of this region reach a height of 25 to 30 meters, usually forming palm forests. Other *copernicias* form palm forests in the north between the rivers Aquidaban and Apa and extend through the Chaco toward Bolivia. Here the trees are only 15-20 meters tall. A palm that has been called *Copernicia australis* is the southernmost species, abundant in the central region and in the region of Pilar with trees reaching a height of 8 to 15 meters.

Three kinds of *Copernicia* or *caranday* palm are recognized by the people of Paraguay: the white palm, lowest of all with soft spongy wood, the red palm, and the black palm which is most appreciated of all. Whether the first two kinds could be distinguished as *Copernicia alba* and *Copernicia rubra* is a matter requiring further investigation. Argentinian writers (Cabrera and others) considered them as one species, preferring the name *Copernicia alba*. It seems to me, however, that we have to deal in this case with parallel ecological forms recorded in the literature as the three principal species mentioned above. According to Hassler, the black palms are the aged individuals while the white and red ones are the younger plants. The problem is not yet resolved and has some economic significance. Some years ago, the Paraguayan government granted a commercial firm a patent to extract the wax of the caranday. The

palm was mentioned in the patent as *Copernicia cerifera*. A rival firm objected, insisting that this species does not exist in the central region (working field of the first firm) being replaced there by *C. australis*. The government was obliged to declare the patent null and void until botanical agreement could be reached.

On non-saline soils we find both the mesopalmetum and the micropalmetum. The first is formed by *Butia Yatay*, which requires a pH of 4-5.5 and grows on red soils in the north (Concepción) and in the south (Misiones) where it forms *campos palmares* called *yatay-ty* in Guaraní. It should be emphasized here that terminological confusion results due to the liberal use of the vernacular name *yatay*. The Paraguayans distinguish the following types: the true *yatay* (*Butia Yatay* in the strict sense reaching 5-6 meters in height, although the Uruguayan-Argentinian species *B. capitata* reaching 6-8 meters is likely to be found in the south); the *yatay-mi* (small *yatay*, *mi* being Guaraní for small) which is only 1-2 meters in height and is probably *B. Yatay* var. *paraguayensis*. Other palms having nothing in common with *Butia* are also called *yatay*. They are *yatay pony*, *Diplothemium Anitsitsii*, a prostrate palm (*pony* being Guaraní for prostrate), and *yatay guasú* (*guasú*—big), *Scheelea quadrisperma*.

The communities of the micropalmetum, abundant in Paraguay and composed of xerophytic species confined to weathered rocky soils with a pH of 5-6.5, are very interesting. Species listed below occur in pure stands or mixed with representatives of other families (Myrtaceae, Annonaceae, Bromeliaceae). The classical locality for this association is the meseta of the Sierra de Amambay in the northeast, although



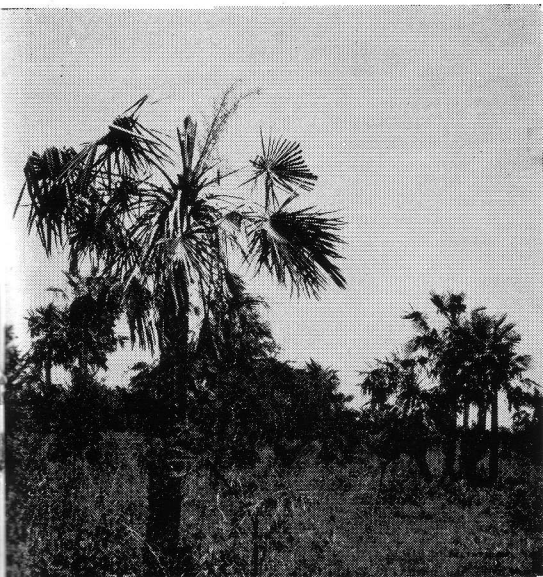


Fig. 32, top left:

A pure stand of *caranday* (*Copernicia*) at Puerta Casada, Paraguay, seen from the air.

Fig. 33, center left:

The black type of *Copernicia* probably representative of older specimens nearing the senescent stage.

Fig. 34, bottom left:

Typical handsome specimens of mature *caranday* of the red type found in abundance in the Gran Chaco.

Fig. 35, top center:

The white type of *Copernicia* is apparently a juvenile stage of *caranday* distinguished at this age by persistent petioles which later fall completely leaving the trunk clean. This and other photographs of white types are from the Río Salado region of Paraguay.

Fig. 36, center:

A flat-topped *caranday* of the white type which results from the harvesting of terminal leaves before they expand fully. These soft, yellow, chlorophyll-deficient leaves are excellent materials for weaving baskets and hats.

Fig. 37, bottom center:

A white type which has started to recover from the flat-topped condition.

Fig. 38, top right:

A white type *caranday* that has very recently been denuded of most of its useful leaves for purposes of weaving.

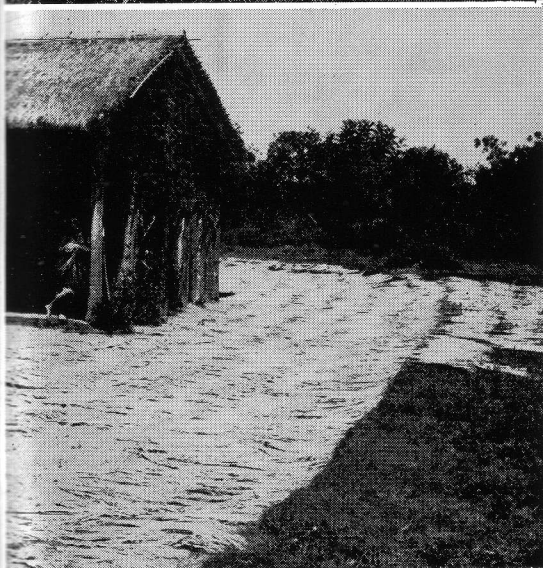
Fig. 39, center right:

Leaves from the terminal bud of *Copernicia* being sun-dried outside a hat-weaver's house, Río Salado region of Paraguay.

Fig. 40, bottom right:

Repairing a bridge over the Río Salado, a typical use of the black type of *caranday*. The hard, tough, woody, black trunks also serve as telephone poles, beams, and as timber in other manners.

Photographs by E. D. Kitzke



it appears also in the central cordilleras and in the south in the region of Itapua. *Syagrus sapida* is represented in the region of Misiones and appears also in the north.

The most important integrating species are *Acanthococos Hassleri*, *Attalea guaranitica*, *Diplothemium leucocalyx*, and *D. Hasslerianum*. The first, known as *ape hu* (*ape*, surface; *hu*, black), is a handsome species with leaves 0.5-0.8 meters long. It is recommended for use in pots. Recent investigations in Brazil show that the palm is probably the source of valuable vegetable oil. The second, *vuacuri* ór *coco de la cordillera*, is an intermediate species passing into the mesopalmetum. There are dwarf forms reaching a height of 6 to 8 meters. The fruits are edible. The third, *Diplothemium leucocalyx*, is a species typical of the central cordilleras with leaves 1-2 meters long. *D. Hasslerianum* or *apepu* (a large surface) with leaves 1-1.8 meters long occurs in the north-east.

In addition to the above, some ten species of dwarf palms included in the genus *Cocos* by Barbosa Rodrigues but placed in *Syagrus* by Beccari occur in the association. The most interesting of these is doubtless the lovely *Syagrus lilliputiana*, a palm only 10 centimeters in height with leaves 30-40 centimeters

long. Hochreutiner called this palm a "treasure of the Paraguayan flora." Its area is confined to the northeast in the region of the Capiibary River.

REFERENCES

- Bailey, L. H., "Acrocomia — Preliminary Paper," *Gentes Herbarum* 4: 420-476. 1941.
- Barboša Rodrigues, J., *Palmae Novae Paraguayenses*, Rio de Janeiro. 1899.
- , *Palmae Hasslerianae Novae*, Rio de Janeiro. 1900.
- , *Sertum Palmarum Brasiliensium*, Bruxelles. 1903.
- Chodat, R. & Hassler, E., *Plantae Hasslerianae* 2:111-113. Geneva. 1903.
- , *Aperçu de la géographie botanique du Paraguay*. Geneva. 1910.
- Fiebrig, C., "Ensayo fitogeografico sobre el Chaco Boreal." *Revista del Jardín Botánico de Asunción* 3. 1933.
- , "Los habitantes vegetales del continente Sur-Americano." *Revista del Jardín Botánico de Asunción* 4. 1935.
- Hochreutiner, B. P. G., "Die paraguayische Pflanzenwelt." Schuster, A. N., *Paraguay*, Stuttgart. 1929.
- Markley, K., "*La Palma 'Mbocaya'*." Asunción. 1953.
- Michalowski, M., *Plantas comestibles del Paraguay*, Asunción. 1954.
- , *Plantas industrializables del Paraguay*, Asunción. 1954.



Fig. 41. A typical *mbocaya-ty* of *Acrocomia Totai* in Paraguay. Photograph by M. Michalowski.