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## THE IMPORTANCE OF PALMS TO LATIN AMERICA; PEJIBAYE A NOTABLE EXAMPLE

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THE STORY concerning the importance of palms to primitive and civilized man is still incomplete. Palms, though next to grasses and legumes in economic importance, never have received their proper share of comprehensive investigation and research. They make up the most conspicuous family of plants which may be said to characterize the tropical and subtropical floras, being confined in their distribution to these regions. Their strict limitation in world distribution and lack of "prolific" species, as compared to grasses and legumes, in no way detracts from the potential value of palms to man. They have been and still are the most important group of plants to many peoples of the world.

Three important factors contribute to our sparse knowledge of many palms: 1)—Their tropical and subtropical distribution has caused palms to be of more importance to tropical than to temperate zone populations. Since the great scientific research centers of the world have been located outside the tropical regions, research on this group of plants has lagged. 2)—Palms are very difficult to collect. The collection of ample and proper material, of one species alone, including sketches and photographs, often takes an entire day. Neither the commercial collector nor the average traveling botanist has time or patience for more than the "snatch and glance" type of collection. Palms can only be collected properly by the specialist, with them as his prime objective. 3)—Many palms grow in regions isolated from ready means of transportation, drastically limiting the number of such collections that

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can be brought out at any one time. Species often change rapidly within comparatively short distances, with the result that spotty collecting within large geographical areas fails to net representative collections.

My opportunities for observing palms in their native habitats in Central and South America led me to suspect at first and later to use many palms as index plants to soil types. There appears to be working evidence from our *Hevea* studies and the necessity for choosing planting sites throughout Latin America that many palm genera and species are extremely sensitive with regard to their natural habitats. Changes in geological formations, changes in altitude, rainfall, and soils, including texture and moisture within any area, are always accompanied by conspicuous changes in the palm flora. Few observations confirming this are available from botanical or palm literature, chiefly because Latin American palm taxonomy is sketchy and has lagged in relation to the potential economic value of palms.

Within Latin America, Indian tribes which have lived and are now living between sea level and 1200 meters elevation have found their simple economy dependent upon the palm family. Houses are floored and walled with palm wood split and flattened into boards. Roofs are thatched with palm leaves. Bows and spear shafts are made of palm wood, as are many arrow points. In some places, blowgun darts are made of palm. In much of the Amazon valley, cord made from palm leaf fiber (*Astrocaryum spp.* and *Mauritia spp.*) goes into making fish nets, hammocks, fish lines, and other cordage. Palm hearts and fruits are usually of much more importance to their daily diet than is realized. Palm spines have been important as needles, not to mention that their strategic placement around camps prevents intrusion from trespassers. Oils, resins, and waxes as well as baskets, hats, and mats are other necessities which are obtained from or made of palms.

Indian civilizations have risen and fallen where palms have played a prime role in the daily life of the natives. Ethnologists make frequent use of the word "palm" when speaking of these peoples. Yet, it is seldom that one is able to correlate a native palm name with a palm-derived article. It is indeed rare to associate these with a valid scientific name.



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*Guilielma utilis*

Many palms, as other economic plants, have gone through a long and complicated history of domestication. The date palm is no doubt the classical example within the family. Its extreme importance as a staple food in the "Cradle of Civilization" and its later place in world economy have led to its development as an agricultural crop throughout various parts of the world. Another classical example is the coconut palm, now of even wider distribution than the date palm. The present world shortage of vegetable oils is causing another palm, the African oil palm, to take an important place in the agricultural development of the tropics. This plant, too, was originally an indigenous plant (of Africa) which for centuries was important only to those who lived within its native habitat. This striking example is a modern counterpart of wild plant domestication, a continuation of plant distribution and domestication similar to that taking place since the beginnings of agriculture but stepped up to a modern pace.

The most widely distributed of all palms is the coconut, but except in favored regions it is limited to the vicinity of sea coasts. Its pantropic distribution is so tied up with man's domestication of the plant, plus nature's complication of sea current distribution, that there is doubt as to its original home. The coconut appears not to have been planted far from the sea to any extent by the Indians, such as within the Amazon valley after its introduction from the Old World. Perhaps this was due to its bulk, since they had not the means of carrying anything so large. They no doubt preferred to distribute plants with smaller seeds which could serve their purpose as well. It is known that the coconut will thrive and produce fruit far from the sea. This is exemplified at the inland town of San Martín, Peru, fully 320 kilometers from the nearest sea coast and on the eastern slopes of the Andes at an elevation of about 1200 meters. The coconut is said to have been established there by Spanish priests during colonial times. The inhabitants of San Martín consider it necessary to add small amounts of salt to the soil to induce proper fruiting. If this is a fact, or even a customary belief, it might explain why the Indians never established the coconut in the Amazon valley, since salt, sufficient even for their

own diet, is lacking within most of that great area.<sup>2</sup> Certainly no salt is used on excellently fruiting coconuts in the inland areas of Central America and I have noted one young tree in Madre de Dios, Peru near the Brazil-Bolivia border which was fruiting without the addition of salt to the soil.

It is interesting to note that in the above cases cited, as well as in many others observed where the coconut is far distant from the sea, the introduction of the coconut traces back to post-Columbian times, usually to introduction by the colonial priests, or later.

There is, however, a palm in Latin America with a much more varied distribution within America than the coconut. This palm, *Guilielma*, appears in spotted distribution from Nicaragua south to Bolivia and Brazil as well as in Trinidad and is said to occur in certain others of the West Indian islands. In areas where it grows it usually occurs in abundance. It is found on both sides of the Andean Cordillera wherever Indian civilizations have existed, where moisture is sufficiently high to support good forest, and where the elevation does not exceed 1200 meters. Its distribution, in part, follows closely much of the so-called Carib civilization influence. I have observed *Guilielma* growing in Costa Rica, Panama, the Atrato valley of Colombia, and throughout the upper Amazon valley of Peru and northern Bolivia. In all of these places, at least, its distribution is such as to suggest its dissemination by man. At present, it is still cultivated by the Indians and appears around their camps. When found in the forest it is always very spotty in distribution, being found only in places that could once have served as ideal camp or village sites. It may be found on well-drained knolls close to streams suitable for canoe navigation. It will be found growing as an isolated colony of plants within a type of forest that suggests a previously disturbed vegetation.

Taxonomic treatments of *Guilielma* state inconclusively that it is perhaps native to the Andean slopes of Colombia

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<sup>2</sup> Dr. Louis O. Williams, in correspondence, reports having seen the coconut in Minas Gerais and Goiaz as much 1000 kilometers from the sea in both the São Francisco and Amazon drainage at an elevation of more or less 500 meters. There he has found beautiful fruit production apparently without the use of salt.

and Ecuador. This in part may be true. It does, however, occur in undoubted native habitats on the extremely steep slopes of the Huallaga valley around the mouth of the Rio Chinchao, above Tingo María, Peru. Here it occurs in typical rain forest areas. The forest in this locality has the appearance of being undisturbed and virgin. Furthermore, the slopes are entirely too steep to have been of any previous primitive agricultural use. It seems safe to assume that here, at least, *Guilielma* is native. The same may well be true of other eastern Andean valleys throughout northern Bolivia, Peru, and Colombia.

The present accepted name for the palm in question is *Guilielma Gasipaes* (HBK.) L. H. Bailey, though in various regions it goes under such names as *G. speciosa* and *G. utilis*. In addition, certain variations have been named. Whether these variations are specific, varietal, or merely horticultural strains such as might be expected in any widely cultivated plant will remain for future study to determine.

Typical variations are found in the plant itself, the fruit, and even in the native names. The spines of the plant vary in length and there are some spineless forms. The fruit varies greatly in size as well as in number of fruits per cluster. Color variations from red through orange to yellows and tans are common. Certain individual trees mature fruit without seed. These seedless fruits, though smaller than normal, are highly prized in Costa Rica where they are referred to as "pejibaye macho." These same variations may be encountered whether one be in Costa Rica or Peru.

Native names applied to *Guilielma* show a wide variation, yet a certain similarity exists between those of South and Central America. The most common name in Central America is "pejibaye" or "pejivalle," as well as "pejibay" and "pixbae." These or the same with slight variations in spelling are used in Honduras, Nicaragua, Costa Rica, and parts of Panama at least. In Trinidad it is "peachnut," "pewa" or "pupunha." In British Guiana the Arawak name is said to be "paripi." The Venezuelan name is "macanilla." Common names in Brazil include "pupunha" and "pirijão." Both in Colombia and Ecuador "chontaduro" is the name applied, while in Peru it is known as "chonta" along the eastern Andean foothills around Tingo María and Satipo. Farther east in

Peru at Iquitos, Pucallpa, Pampa del Sacramento, and Madre de Dios it is known as "pejijuayo" or "pifuayo." Within the Peruvian *montaña* east of the Andes there are several widely separated settlements known as "Pijuayal," named presumably from this palm growing in the vicinity. Could not the Central American name "pejibaye" be a corruption of the Peruvian name "pejijuayo" for the same plant?

This palm, perhaps above all other plants, has been the one most necessary for the simple needs of the Amazonian Indian. With few exceptions bows and spear shafts are made from its wood, as are many of the arrow points. The fruit and young growing point or "heart" are among his staple foods, both nutritious and of good flavor. The leaves he uses for thatch and the spines were formerly used as needles. The value of the plant, together with the fact that dissemination was easy, as the seeds remain viable for a long time, made it an ideal plant for domestication throughout the Amazon valley by the Indians inhabiting that region in the past.

Henry W. Bates in *The Naturalist on the River Amazonas*, p. 290, Dent & Dutton edition, had the following interesting comments: "The celebrated "Peach palm," Pupunha of the Tupi nations (*Guilielma speciosa*), is a common tree at Ega. The name, I suppose, is in allusion to the color of the fruit, and not to its flavour, for it is dry and mealy, and in taste may be compared to mixture of chestnuts and cheese. Vultures devour it eagerly, and come in quarrelsome flocks to the trees when it is ripe. Dogs will also eat it: I do not recollect seeing cats do the same, although they go voluntarily to the woods to eat Tucumá, another kind of palm fruit. The tree, as it grows in clusters beside the palm-thatched huts, is a noble ornament, being, when full grown, from fifty to sixty feet in height and often as straight as a scaffold-pole. A bunch of fruits when ripe is a load for a strong man, and each tree bears several of them. The Pupunha grows wild nowhere on the Amazons. It is one of those few vegetable productions (including three kinds of mandioca and the American species of banana) which the Indians have cultivated from time immemorial, and brought with them in their original migration to Brazil. It is only, however, the more advanced tribes who have kept up the cultivation. The superiority of the fruit on the Solimoens to that grown on the

Lower Amazons and in the neighbourhood of Pará is very striking. At Ega it is generally as large as a full-sized peach, and when boiled almost as mealy as a potato; whilst at Pará it is no bigger than a walnut, and the pulp is fibrous. Bunches of sterile or seedless fruits sometimes occur in both districts. It is one of the principal articles of food at Ega when in season, and is boiled and eaten with treacle or salt. A dozen of the seedless fruits makes a good nourishing meal for a grown-up person. It is the general belief that there is more nutriment in Pupunha than in fish or *Vacca marina*."

In connection with its interesting probable history in the Amazon valley and adjacent Andean foothills, *Guilielma* is today of exceptional importance to distinct areas of other Latin American countries. Some of the more striking examples are northwestern Ecuador centering around the Río Cayapas, the Atrato valley of Colombia, and eastern Costa Rica, notably the Reventazón valley.

The Atrato river, though flooding much of the surrounding country, has natural, rather high silted levee banks which are well drained. On these natural levees, from near the mouth on up to its water-way connection with the San Juan river and down the San Juan, *Guilielma* is exceedingly common. Within this area this palm, known there as "chontaduro," is a very important item of food.

The most publicized and best known area in which *Guilielma* serves as a food plant is the Reventazón valley and adjoining regions of Costa Rica, where it is in fruit from June to December.

In Costa Rica the "pejibaye" may be seen from the train window of the Northern Railroad where both the trees and vendors of the fruit are abundant. The market in San José abounds with it and an airplane trip to one of the outlying Costa Rican towns will usually find several passengers carrying bunches of its fruit to friends or relatives. It is esteemed by Costa Ricans and may be found on the meager table of the laborer as well as on the silver hors d'oeuvre tray of a state banquet.

As in the Amazon valley, the Talamanca Indian of Costa Rica makes his bows and arrow points from the wood of *Guilielma*. There appears to be no place in Costa Rica where the tree can be demonstrated to be native. It no doubt repre-