A Study of Germination and Use in Twelve Palms of Northeastern Peru

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While working in the Peruvian Amazon in 1966–67 as a member of the United States Peace Corps, I had an opportunity to conduct some experiments on the germination of seeds of 12 species of palms that are common to this region, and in addition to note some of their local uses. The collection of seeds and information for this experiment took place within a 20-mile radius of the town of Iquitos, last seaport on the Amazon River. The actual germination of the seeds and care for the seedlings was conducted in an area called Puerto Almendras which is located nine miles to the west of Iquitos on the Nanay River. Some of the seedlings produced by this study have now been planted in this area and it is hoped that continued observation will provide information on growth-rates and age for the species involved, information that is not available today. The facilities and man hours used in this study were donated by the Escuela de Peritos Forestales and the United States Peace Corps. The forestry school mentioned is jointly operated by the United Nations (FAO) and La Universidad National de la Amazonia Peruviana and is located in Iquitos.

Germination

The methods of collection and germination of the palm seeds used in this study were the same for all species involved. The seeds were harvested at the time that they had begun to fall from the trees to insure full development and best possible germination results. Immediately after collection, the seeds were stripped of their fruit coats, washed in water, and allowed to dry in the sun for two hours. This was done to prevent fungal growth that might have hampered germination. After washing, one and sometimes two groups of 100 seeds were sown for each species. The seeds were placed in boxes of sand at a depth of approximately one-half inch. The boxes were then transferred underneath a sideless, 10-foot-high structure which was roofed with green translucent corrugated plastic. To provide drainage and to aid in control of fungal growth, the boxes were elevated to a height of three feet. All groups of seeds were then watered twice a day until such time as it was noted that no more seeds in the group were capable of germinating. The watering times varied from as much as 250 days for *chambira* (*Astrocaryum Chambira*) to as little as 65 days for *cashapona* (*Socratea Orbigniana*). (See Table 1.) Representations of the seeds and their seedlings are shown in the drawings included in this report as Figs. 1–12. These sketches were done by Jim Garcia of Iquitos under the supervision of the author. Note that the ages given for the seedlings represented are only the total days after emergence and do not include the days that development took place under the surface of the sand medium.

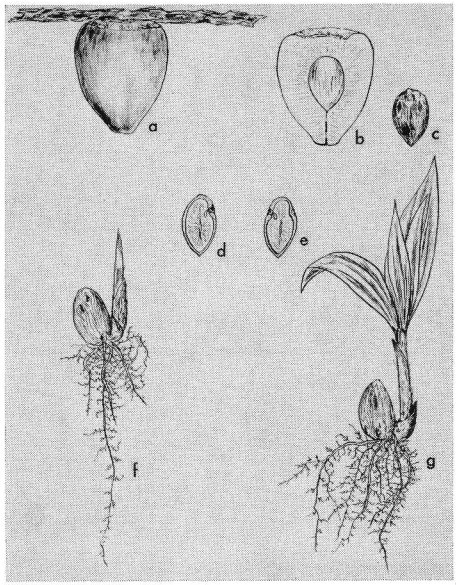
Table 1 names the palms used in this experiment, shows the percent germina-

TABLE 1. *The weights, percent germination, and time required for germination of 12 Peruvian palm species.*

Name	Germination in percentage of 100 seeds	Days allowed to germinate	Weight of 100 cleaned seeds in kilograms
Bactris Gasipaes	76	78	.330
Bactris Gasipaes	99	80	.285
Oenocarpus multicaulis	97	67	.294
Oenocarpus multicaulis	88	74	.290
Mauritia vinifera	7	100	1.750
Mauritia vinifera	8	125	2.370
Mauritiella sp.	4	94	.635
Mauritiella sp.	10	105	.632
Euterpe precatoria	93	89	.167
Euterpe precatoria	95	83	.250
Jessenia polycarpa	99	83	.910
Jessenia polycarpa	80	79	.886
Iriartea ventricosa	79	154	.340
Iriartea ventricosa	18	144	.363
Socratea Orbigniana	79	70	.268
Socratea Orbigniana	79	65	.240
Maximiliana stenocarpa	80	150	.620
Maximiliana stenocarpa	82	148	.660
Astrocaryum Chambira	3	250	4.400
Phytelephas macrocarpa	12	240	4.540
Scheelea sp.	61	146	4.060

tion for these species based on 100 seeds, gives the number of days required for the germination success noted, and records the weight per 100 cleaned seeds. It is evident from a study of this table that to procure good germination from palms such as *Mauritia vinifera*, *Mauritiella* sp., *Astrocaryum Chambira*, and *Phytelephas macrocarpa*, another method of sowing must be found.

Three basic patterns of germination are known for palms (See Tomlinson,



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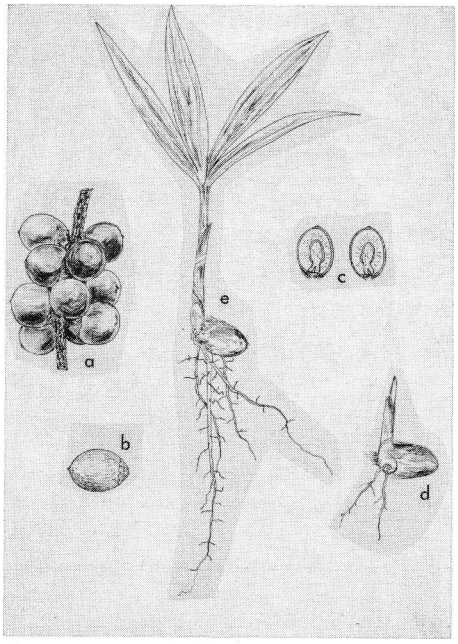
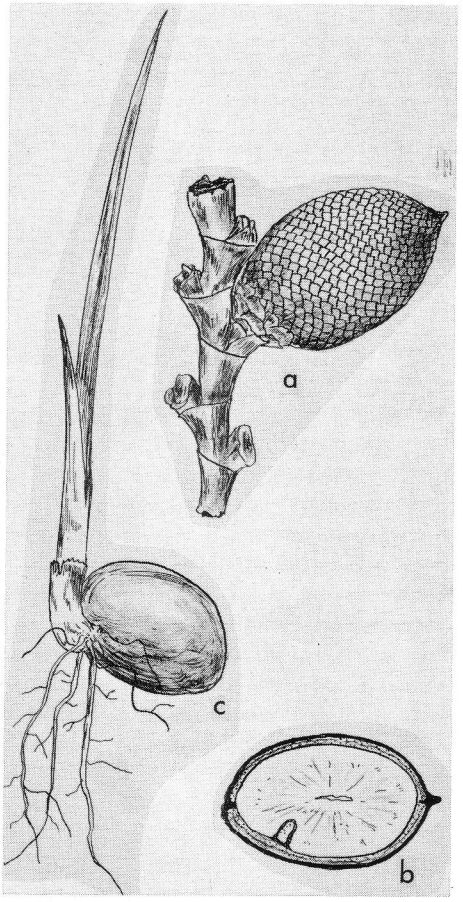
1. *Bactris Gasipaes* (*pijuayo*). a, fruit; b, fruit in vertical section to show endocarp; c, endocarp; d, e, endocarp in vertical section; f, seedling when visible leaves were two days old; g, seedling when visible leaves were 31 days old. All × ⅔.



2. *Oenocarpus multicaulis* (*sinami, sinamillo*). a, fruits on rachilla; b, fruit; c, fruit in vertical section; d, seedling when visible leaves were six days old; e, seedling when visible leaves were 63 days old. All ×5/7.



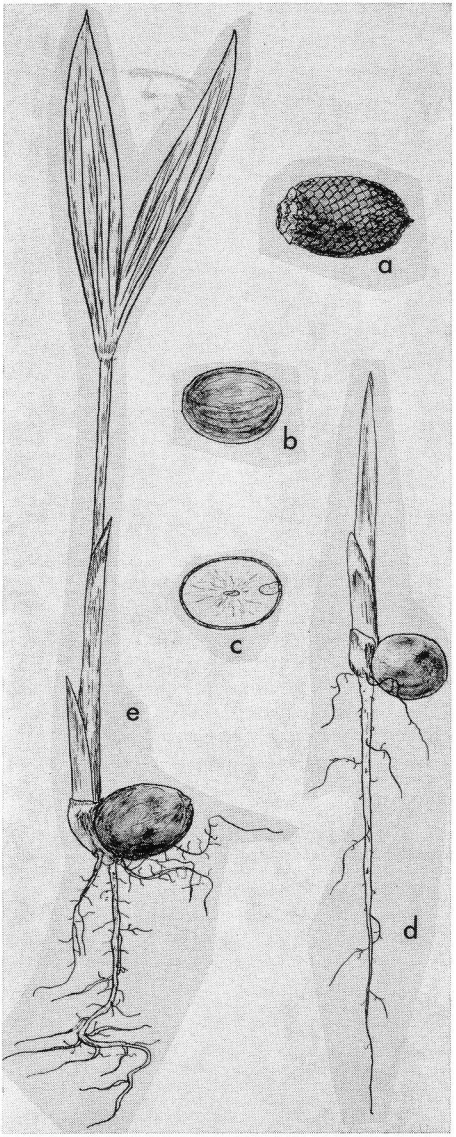
3. *Mauritia vinifera* (*aguaje*). a, fruit on rachilla; b, fruit in vertical section; c, seedling when visible leaves were 43 days old. All ×1/2.

Principes 4:58–59. 1960). The germination type of several of these Peruvian species studied appears not to have been noted previously. All but three have the type of germination characteristic of *Archontophoenix* and many arecoid palms. *Maximiliana* and *Scheelea*, however, appear to germinate like *Phoenix*, while *Phytelephas* germinates like *Washingtonia*. In one fruit of *Maximiliana* all three seeds germinated (Fig. 9).

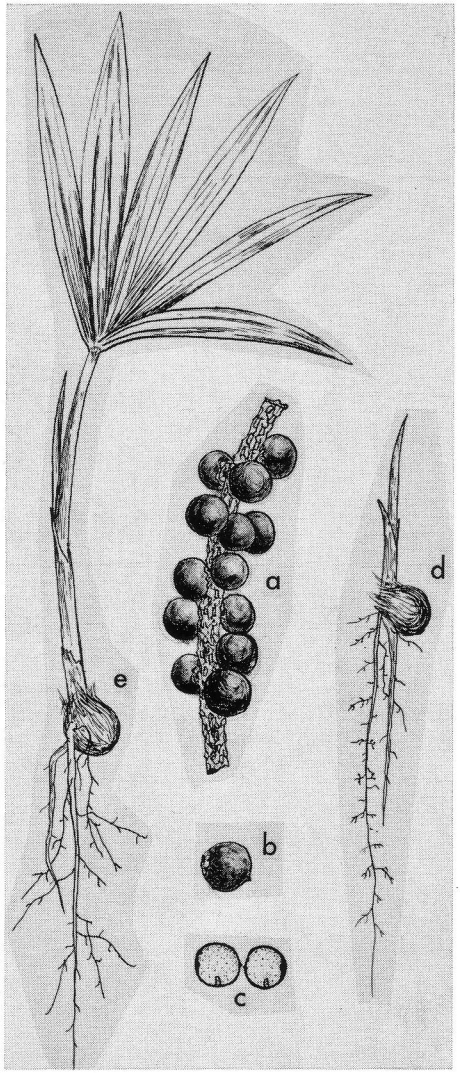
Local Uses

The fruit of *pijuayo* (*Bactris Gasipaes*) is illustrated in Fig. 1. It is boiled and eaten by the native populace. When covered with butter and sprinkled with salt, this dish also becomes a favorite of many tourists. The tree is also useful for its trunk which, when dry, can be split, flattened, and made into flooring, walls, etc. *Pijuayo* can be found with or without spines protruding from its trunk. The native population seems to seek out the spineless variety because of the ease with which they can climb it to harvest the fruit and for the smooth flooring which can be made from it.

Oenocarpus multicaulis (Fig. 2) has two common names in the Iquitos region, *sinami* and *sinamillo*. Although this palm can be split and used for flooring as *pijuayo*, it is seldom sought because it does not reach a sufficient diameter



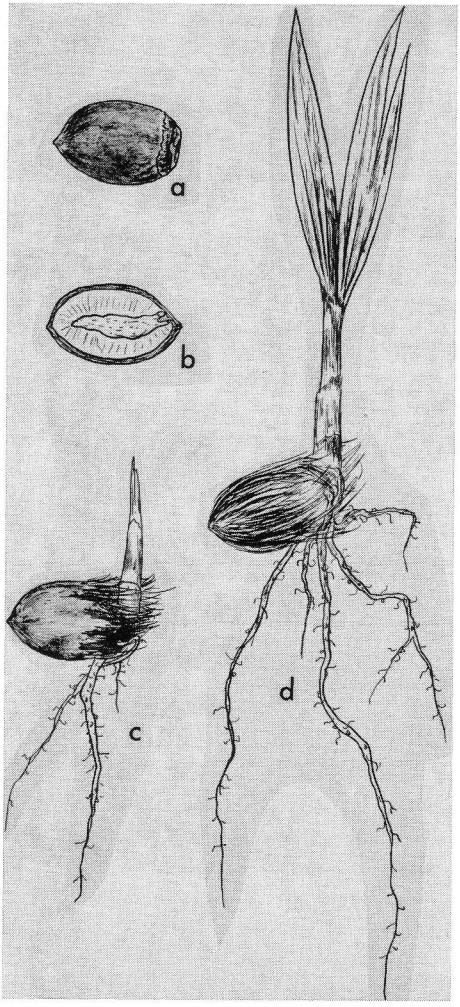
4. *Mauritiella* sp. (*aguajillo*). a, fruit; b, seed; c, seed in vertical section; d, seedling when visible leaves were 10 days old; e, seedling when visible leaves were 35 days old. All × ½.



5. *Euterpe precatoria* (*huasaí*). a, fruits on rachilla; b, fruit; c, seed in vertical section; d, seedling when visible leaves were eight days old; e, seedling when visible leaves were 30 days old. All × ½.

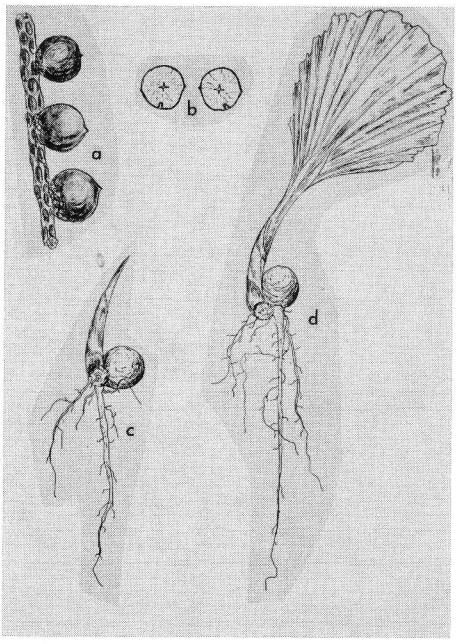
to make flooring of adequate width. The thin fruit coating around the seed can be dissolved in water to make a pleasant tasting drink.

Mauritia vinifera or *aguaje* is probably the most important palm economically that Peru has to offer. The thick layer underneath the scalelike outer covering of the fruit is very tasty and is used as a flavoring or eaten as is. Each fruit

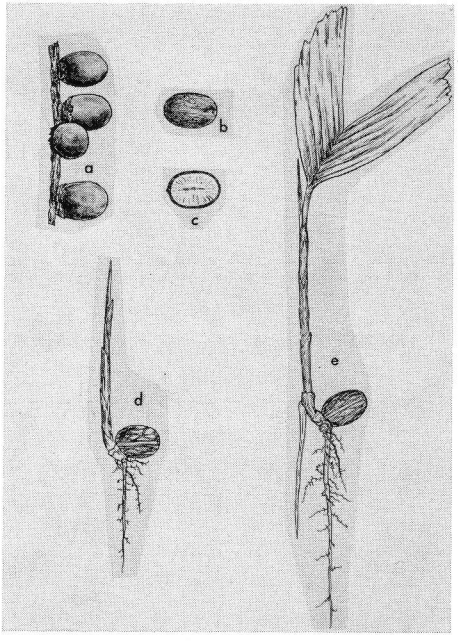


6. *Jessenia polycarpa* (*ungurahui*). a, fruit; b, fruit in vertical section; c, seedling when visible leaves were six days old; d, seedling when visible leaves were 70 days old. All × ½.

(Fig. 3) usually will sell for one to two cents in Iquitos' open air market. The overall sales of this fruit possibly exceed those of bananas in the region.



7. *Iriartea ventricosa* (*huacrapona*). a, fruits on rachilla; b, seed in vertical section; c, seedling when visible leaves were eight days old; d, seedling when visible leaves were 123 days old. All × 5/7.



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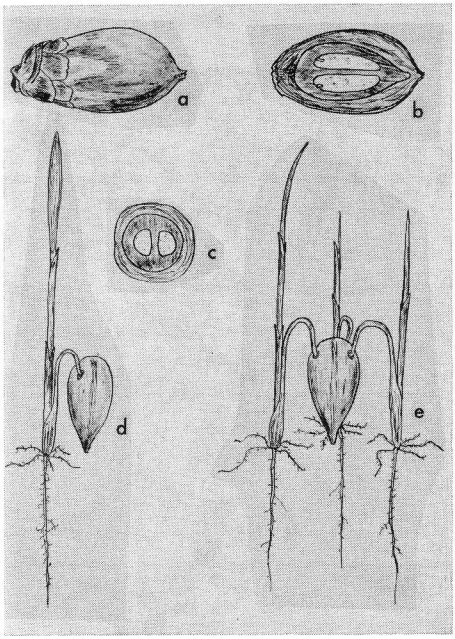
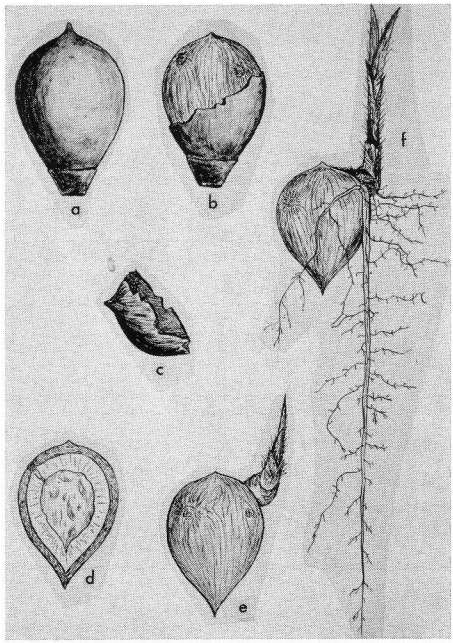
8. *Socratea Orbigniana* (*cashapona*). a, fruits on rachilla; b, seed; c, seed in vertical section; d, seedling when visible leaves were six days old; e, seedling when visible leaves were 67 days old. All × 5/8.



9. *Maximiliana stenocarpa* (*inayuca*). a, fruit; b, fruit in vertical section; c, fruit in cross-section; d, e, seedlings when visible leaves were 30 days old, note germination of three seeds from a single fruit in e. All × 4/5.



10. *Astrocaryum Chambira* (*chambira*). a, fruit; b, fruit with portion of pericarp removed; c, portion of pericarp; d, endocarp in vertical section; e, seedling when visible leaves were 35 days old; f, seedling when visible leaves were 68 days old. All × 2/3.

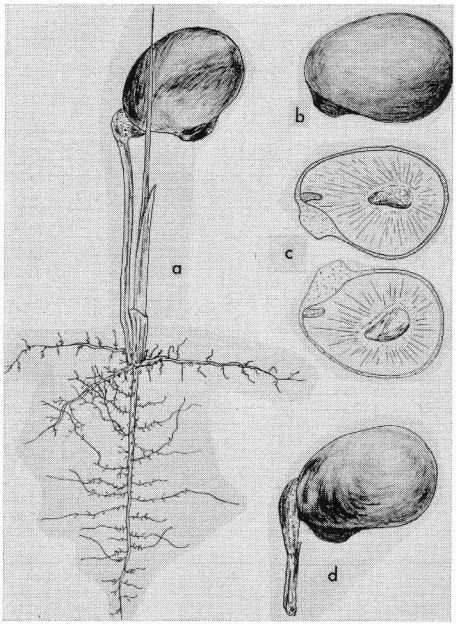
Mauritiella sp. or *aguajillo* (Fig. 4) is similar to *aguaje* but is smaller and has clustered trunks. Very little use is made of either its fruit or trunk by the native population.

Huasaí or *Euterpe precatoria* (Fig. 5) is a slender and beautiful palm and people are beginning to use it for beautifying roadways in the Iquitos region. The cabbage or palm hearts are extracted and eaten by the natives at Easter time. These hearts are also sold in the market place and are a favorite salad of tourists. Although the palm hearts can be taken from most of the palms mentioned in this study, they remain in short supply because the best and the easiest harvested are those that are taken from the not-too-plentiful *huasaí*.

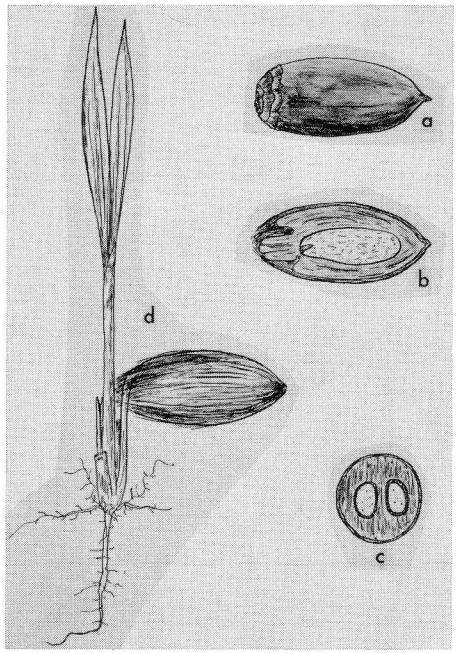
Ungurahui (*Jessenia polycarpa*) is much sought after by the native population because, like *sinami*, the thin fruit coating around the seed (Fig. 6) can be dissolved in water to make a refreshing drink. The water solution of this palm is usually mixed with dry granulated *yuca* to make a drink that is both tasty and filling.

Huacrapona or *Iriartea ventricosa* (Fig. 7) is a tall and robust palm that is an excellent source of flooring. It can be split easily and folded out into boards that are often three feet in width. It is so sought after in the Iquitos region that very few of the larger palms are left around populous centers.

Cashapona (*Socratea Orbigniana*), see Fig. 8, is used in much the same way as *huacrapona*. However, this palm is much smaller and, therefore, is less sought after by the natives.



11. *Phytelephas macrocarpa* (*yarina*). a, seedling when visible leaves were 10 days old; b, endocarp; c, endocarp and seed in vertical section showing equal halves; d, endocarp with seed beginning to germinate. All × 5/7.



12. *Scheelea* sp. (*shapajilla*). a, fruit; b, fruit in vertical section; c, fruit in cross-section; d, seedling when visible leaves were 38 days old. All × 4/5.

Inayuca or *Maximiliana stenocarpa* (Fig. 9) is used very little by the native population. It has been known, however, to be used by the Indians of the Amazon region to make darts for blow guns and wadding for shotguns. The darts are made by splintering the wood near the base of the tree, and the wadding is formed by shavings from this same area.

Chambira (*Astrocaryum Chambira*). This palm is used by the natives for its edible fruits (Fig. 10) and for the fibers that it produces. The fruits are like small coconuts and can be eaten when still green. The fibers are extracted from the new leaves and are used for making twine that is woven into many useful items.

Yarina (*Phytelephas macrocarpa*) was formerly an important palm economically. The green seed has a gelatinous center which is eaten by some natives. When the seed is ripe, the gelatinous center is hard (Fig. 11) and can be carved into buttons, needles, and many useful household tools.

Shapajilla or *Scheelea* sp. (Fig. 12) is fairly common around the Iquitos region, but the native population has developed no uses for it.