ternational Palm Year would be brought into being. A tentative date for the initiation of this project would be July 1st, 1963. More details would appear in the next issue of PRINCIPES (April). These would consist largely of detailed descriptions of the simple procedures to be employed in making measurements, together with examples of how additional information which will be needed (largely facts about the age and the condition of the palms under observation) is to be recorded, as well as the observations on leaf production in the palms themselves.

Mr. R. W. Read, Botanist at Fairchild Garden, has been kind enough to offer his services as taxonomic consultant in instances where the identity of a palm under observation is in doubt.

I began by emphasizing how scientific theory is frequently based on masses of facts gained by international co-operative efforts involving many individuals. In the physical sciences these people are usually trained scientists and need quite elaborate apparatus. But it is not so in biology. In the history and development of biological science the keen, intelligent amateur is a prominent and important figure. In keeping with this tradition the untrained but enthusiastic and careful observer participating in an International Palm Year can assemble valuable information without the need of special equipment. These facts about growth rates in palms are a fundamental necessity and cannot be assembled in any other way.

The directors of The Palm Society have cast their blessing on my proposal. It is to be hoped that enthusiastic individuals will now be forthcoming in sufficient numbers that this idea of an International Palm Year will become a reality. It would offer a chance which so rarely presents itself in this era of elaborate and costly technology, a chance for the non-specialist to make a significant contribution to scientic research.

Growth Rates of Certain Palms

DENT SMITH

In this article the observations on the growth rate of a few palms, largely supported by photographic illustrations, are of course quite distinct from the scientific studies planned by Dr. P. B. Tomlinson for the proposed International Palm Year. His studies would be based at least in part, nevertheless, on the records and observations of non-technicians, who are any of us engaged in growing palms for pleasure or profit. This article, though but fragmentary, would conform with the objective if it proves to contain even a very minor fraction of the collective information to be sought.

Studies leading to fuller knowledge of the growth rate of palms must be of some importance to botanical science, as otherwise it is unlikely that Dr. Tomlinson would undertake them. How important they would be to gardening more nearly concerns all of us who garden, and most of us do. Greater knowledge of the growth rate of palms would be of the very first importance to anyone attempting to grow them. This may be readily seen from the fact that the placement of them is so often wrong in the sense that the misplaced plant shoots up years sooner than expected or the reverse, remaining almost stationary though rapid growth had been envisioned. Frightful mistakes in planting palms are not due only to lack of feeling for landscape design; they are

1. *Coccothrinax crinita.* (left), a specimen about nine years old which has grown much faster than usual for the species under cultivation; 1a (right), another plant of same age which has grown at the slow rate generally considered normal for the species.

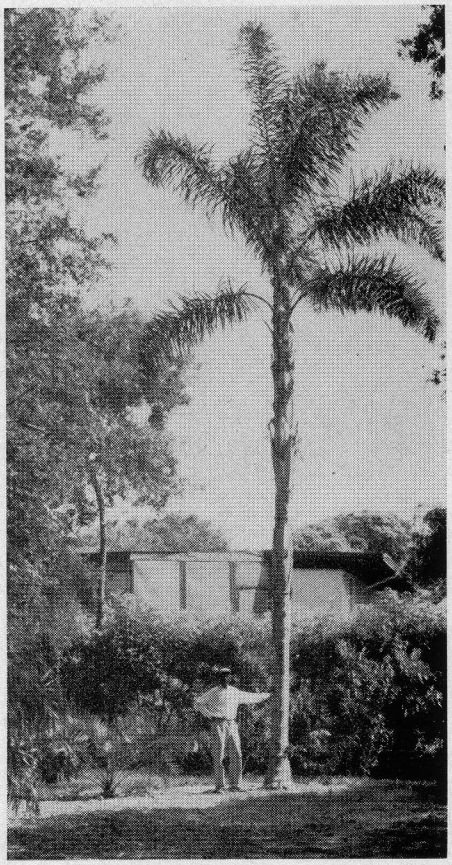
often due to ignorance of the growth to be expected, resulting in monstrosities up in the power lines and ridiculous little palmets pastured out where the monsters should have been.

One dimension a given palm may ultimately reach is probably known more often than not, for at least that one — height — usually is included in published descriptions. But palms grow in three dimensions, not just one, and both above and below ground; new roots, and any enlargement of the root system and of subterranean trunks, as in *Sabal minor* and *S. Etonia,* also must be included in the term "growth." Because of space limitations, attention here will be chiefly focused on the vertical or upward growth rate of the few palms to be mentioned.

Except for the more commonly cultivated kinds, seldom do we know how long it takes a palm to reach maturity and at what rate it grows at various stages between birth and death. For a palm does not have a growth rate, but rates. Certain species make their most rapid growth in the next few years after passing the seedling stage, while any increase in the size of others during this same period is barely perceptible from month to month, and in some cases even from year to year. Generally the growth rate is much reduced as maturity is approached, which may be readily seen by the narrower interspaces between the leaf scars, or in scarless stems by the congested appearance of the sheaths at the top of the shaft.

The relative terms "fast" and "slow" are inexact and sometimes misleading, for what one man calls fast another might call slow. Two rapid growers while young are the *Arecastrum Romanzoffianum* and the *Livistona decipiens,* but the former might easily make double the upward growth of the latter in the same length of time. Studies of growth rates should help to determine how fast is fast and how slow is slow. Perhaps one result would be a table of measurements showing annual average gains in height, or failing that, an averaged number of new leaves *per annum* for each species under surveillance.

A rapid succession of new leaves



2. *Arecastrum Romanzoffianum*, started from seed in 1952, has grown at the rate of about three feet a year.

manifestly indicates rapid growth, but in some palms this growth may be more in the bulk of the stem and foliage than in height gained, as for example in the *Phoenix canariensis*. While still quite young the king palms (*Archontophoenix* spp.) normally will add six inches or more of stem for each leaf produced, but the species of *Phoenix* must produce many leaves to gain an equivalent elongation of the stem.

Adulthood in palms materially differs from maturity. A palm is adult when able to reproduce itself from seed, even if only three years old, as in some species of *Chamaedorea;* but it is not mature until it reaches its fullest development, at which time, if it were a spruce or a fir, it should be harvested. Like timber trees, palms deteriorate from full maturity onward, notwithstanding that life may persist for a great many years. Even before maturity the expanse of the leaf crown is commonly much reduced, trunks develop cavities and fissures due to fungous attack or other causes, and a seeming shrinkage may be noted in the trunks (actually a wearing away of the perimeter) of ancient palmettoes. This peripheral erosion is the natural effect of heat, cold, wind, humidity and the heavy rainfall of countless storms perhaps throughout a century, perhaps three or four. The monocarpic palms and many others escape such extensive ravages because they are relatively short-lived.

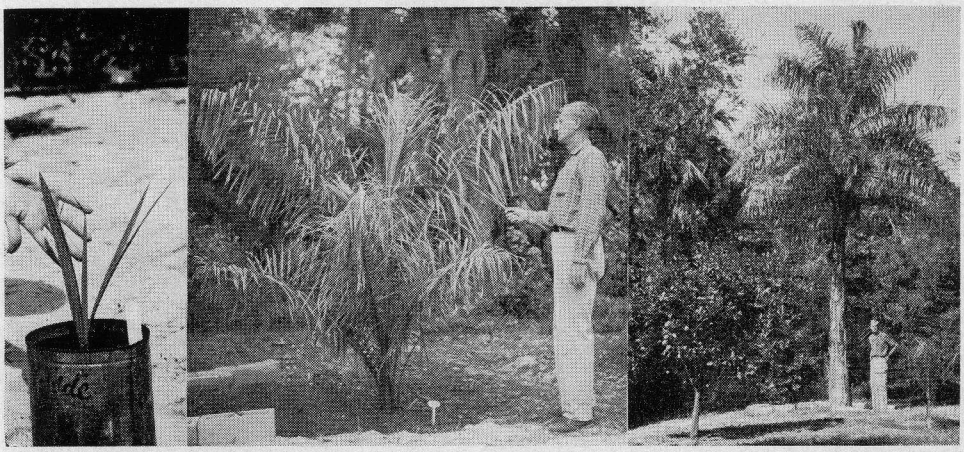
Granted that the growth rate or rates of a palm throughout its lifetime would be of more than passing interest to the gardener, his major concern would be the rate during its early years. Unless the garden is an old one, he works mostly with young plants. Usually his palm gardening begins with plants in pots or cans, and he wishes to know how rapidly each one grows so that he can intelligently choose a planting site. Human nature being what it is, his real interest lies in what is to happen over the nearer term rather than in the next century. Certain palms reach great heights in one hundred years, but planting for posterity is a project that stirs no enthusiasm outside of botanic gardens and arboreta, and very likely in those quarters altruism instead of enthusiasm supplies the motive. Thus anyone reaching the age when the actuarial calculations begin to look glum might do well to consider planting only those

3. *Archontophoenix Cunninghamiana.* (left), centered is a plant two years old photographed August, 1959; 3a (right), same palm in center but three years older in August, 1962.

palms that should give a good account of themselves over the earlier years, for surely the best rewards in gardening come from seeing the plants grow and develop into objects of wonder and inspiration. This is so patently true that also the youngest of gardeners, when it comes to planting palms, in all likelihood would prefer to plant those that promise not to delay good growth for a decade. The suggestion is not being made here that the notoriously slow starters, such as *Coccothrinax crinita*, are undesirable and should never be planted. The reverse is true, but one should know what one is getting into; which by itself is ample reason for trying to learn about growth rates.

Palms of the precise same age and species, even when planted at the same time, may or may not grow at the same rate. This may be graphically seen in

4. *Archontophoenix Cunninghamiana.* (left), a plant two years old in August, 1959; 4a (right), same specimen in August, 1962.



5. *Acrocomia Totai.* (left), one year old, November, 1953; 5b (center), same at three and a half years in February, 1957; 5c (right), same at seven years in November, 1960. In August, 1962, this palm had flowered and fruited in each of the latest three years.

Figs. 1 and 1a, showing two plants of *Coccothrinax crinita* of the same age and procedence, once nearly identical in size and appearance, the smaller now fulfilling its reputation for extremely slow growth and the larger violating the established speed limit.

Twelve years ago the writer began planting palms in Daytona Beach and has not yet called a recess, with the result that about one thousand individuals comprised of 71 genera and 182 species are now set out on the grounds. These are the figures after large losses due to freezing or other causes. Of almost 400 species tried here at one time or another, more than half proved to be unsuitable for the location. Some of the established palms were trucked here as large specimens, but most have been grown from seedlings and small potted plants, or else were started here from seed. The tallest palm grown here from seed is a rather spindly arecastrum now about thirty feet tall (Fig. 2); the seed was sown in the spring of 1952 and germinated in mid-summer of that year, thus making the palm ten years old as these words are being written (August, 1962) and giving it an average annual growth rate of three feet. Half a dozen other arecastrums from the same lot of seed have grown well, but at a slower and more usual rate.

Of the palms cultivated here the two species of *Archontophoenix* make the most rapid growth, being about equal to each other in that respect (Figs. 3, 3a, 4 and 4a); they grow faster than the fabulous willow of northern climes and faster than the European larch, that champion sprinter among the conifers. Several species of *Acrocomia* are very close contenders, but fall into second place (Figs. 5-5b, 6-6c and 12). Next in rapidity of growth at this locality are the royal palms (*Roystonea* species) despite occasional severe damage to the foliage by incursions of Arctic air (Figs. 7 and 7a). It would border on impossibility to rank the other rapid growers, of which there are many, in exact numerical order, for the differences in growth rate are not so apparent as in the three genera mentioned above. Even if hard and fast lines could be drawn, they would apply with full force to this locality only.

6. *Acrocomia* sp. belonging to section *Sentocomia*, evidently of low-latitudes because tender to cold. (top left), plant seven years old. May, 1953; 6a (top right), same in February, 1957, with adherent petiole bases; 6b (bottom left), same in October, 1957, with self-cleaning bole now bare; 6c (bottom right), same sixteen years old in August, 1962, despite total defoliation by freezes of 1957-58 winter.

Certain of the veitchias are said to grow faster than other palms in the Miami area, but that is not true at Daytona Beach, perhaps because the colder winters retard their growth. In any case the *Veitchia* species, especially *V. Merrillii*, are at best marginal in Daytona Beach. The *Archontophoenix* species, on the other hand, seem to maintain their winter pace quite as well as in a warmer climate.

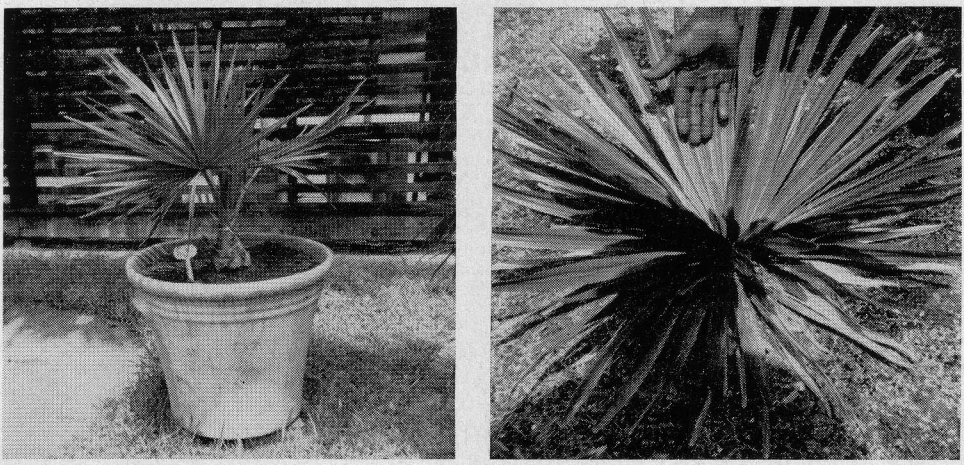
If a great many of the palms grow rapidly — and they do — many others grow with exasperating slowness. Then there are the medium growers, half way between fastest and slowest, and also the moderately fast, the moderately slow and yet others representing every shade of difference to be expected in so large a family. The notably slow growers may be arbitrarily divided into two general kinds: those that grow slowly through-

7. *Roystonea regia* (left), four years old, August, 1959, but greatly retarded by severe injury in heavy freeze of December, 1957; 7a (right), the same three years later in August, 1962.

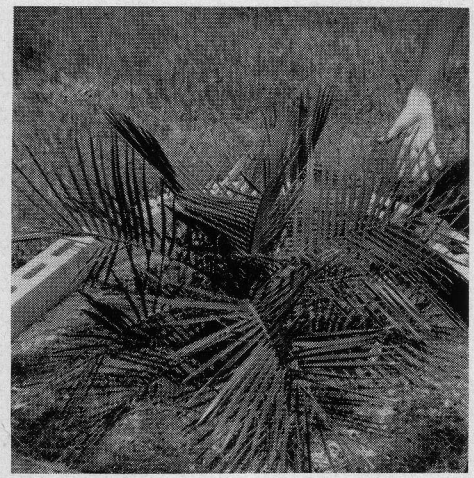
out their life span, as *Thrinax microcarpa, Rhapidophyllum hystrix, Pritchardia Hillebrandii, Serenoa repens;* and those that are laggards for all or a good part of their first decade, after which they make either good or fairly rapid growth, as species of *Corypha, Borassus, Copernica, Orbignya* (Figs. 8-10).

Here follow a few observations more or less at random on some of the palms in the writer's plantings:

The *Pseudophoenix* species are the slowest growing of all, which is true of them in this location during the long warm season as well as during the winter; the young plants, from four to ten years old, seldom make more than



8. (left). *Borassus flabellifer.* One of the "slow starters" already six years old in August, 1962. 9 (right). *Copernicia Torreana.* An extremely slow grower over the first decade. Seed from which this example sprang was sown nine years ago, in early 1953. Photographed August, 1962.



10 (left). *Orbignya speciosa* in center foreground at nine years from seed. A slow but most pertinacious palm photographed August, 1962.
11 (right). *Jubaea chilensis*, another laggard under Florida cultivation, eight years old, August, 1962.

two leaves in a year, and sometimes only one.

Here the *Jubaea chilensis* is one of the very "slow starters" (Figs. 11 and 20a). Whether it will one day begin to grow fast remains to be seen. The fact that this palm is nearly non-existent in Florida leads one to be somewhat skeptical of wider success with its culture in the state, though certainly any evidence is too meager to be conclusive.

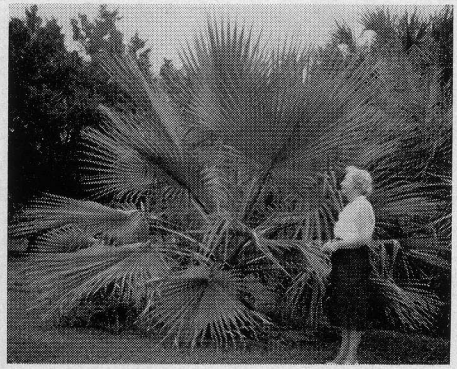
The *Sabal nematoclada*, native in British Honduras, is definitely the slowest-growing of eighteen *Sabal* species established here, and the *S. mauritiaeformis*, Colombian, is but a hair ahead of it. The *S. parviflora*, endemic in Cuba, is here the fastest grower in the genus. These superlatives are not intended to imply that the growth rates would or

12. *Acrocomia crispa.* (left), plant at six years and nine months of age, August, 1962; 12a (right), detail of sudden growth of specimen in August, 1962.

13. *Phoenix dactylifera* 'Deglet Noor' with five small offshoots, grown from seed in eight years. August, 1962.

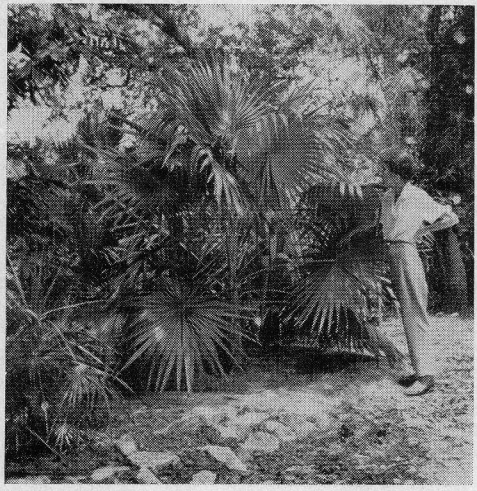
should be the same elsewhere, but perhaps valid inferences may be drawn to suit different conditions.

The *Sabal Palmetto* is extremely variable in growth rate and also in the proportions it attains. On these grounds it is usually a rapid grower, becoming in about ten years a massive tree already bearing fruit, with a root system extending outward from its base, in some directions at least, thirty to forty feet.

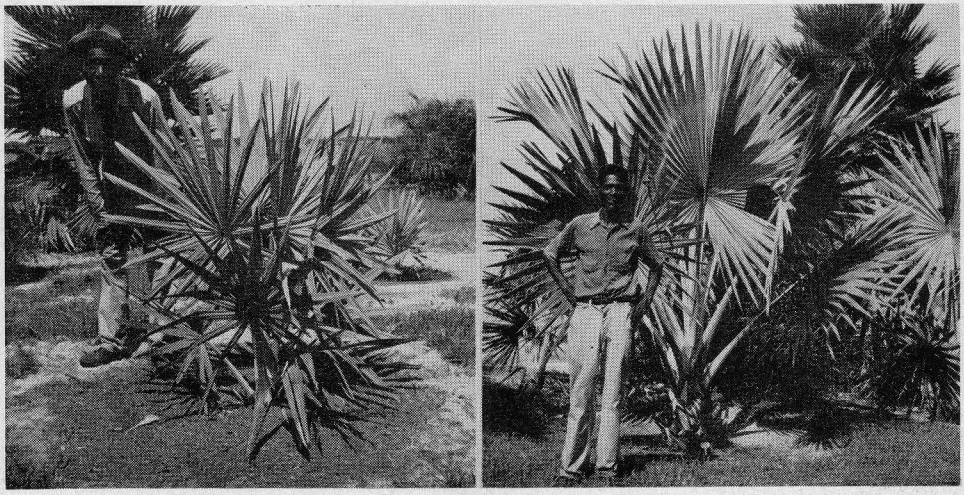


14. *Washingtonia filifera*, August, 1962, four years and seven months after germination of seed.

During their first seven or eight years the *Scheelea* species uniformly grow faster than the *Attalea*, and the *Attalea* faster than the *Orbignya*. The difference is quite marked, and long ago Nehrling correctly observed that the *Orbignya* palms are "hard to get started." He could have added with equal truth that they are hard to stop. Patience and enough time are the chief requisites for success with these palms, for they are extremely tenacious of life and withstand adversities that would destroy many others.

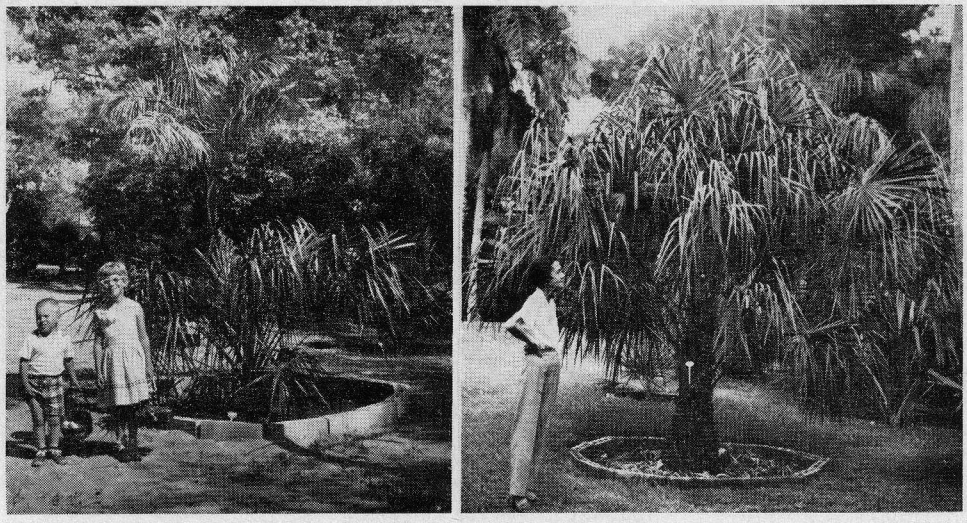


15 (left). *Phoenix canariensis* slightly over ten years old in August, 1962, from seed collected in February 1952. 16 (right). *Coccothrinax Dussiana*, August, 1962, from seed collected in October, 1953.



17. *Bismarckia nobilis.* (left), photographed in August, 1959, when four years old; 17a (right), the same plant, now seven years old, in August, 1962.

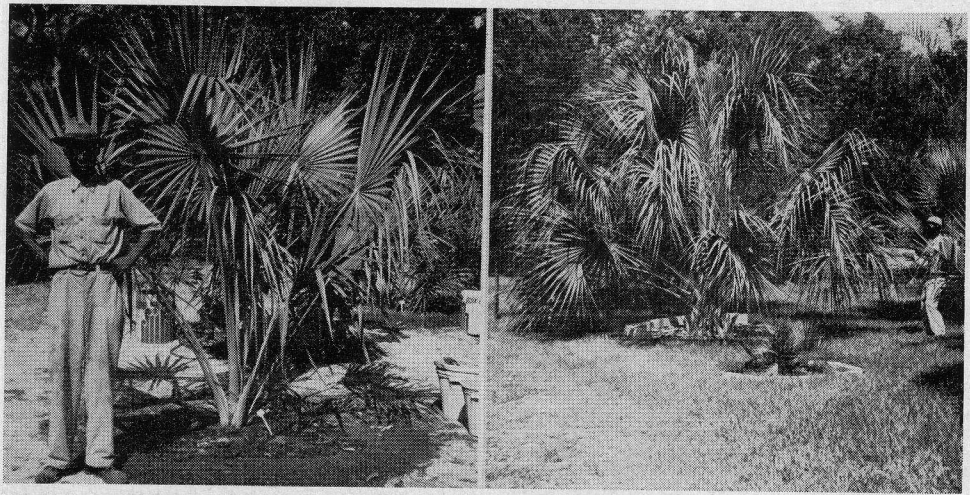
One more palm, the Cuban *Acrocomia crispa*, merits brief comment because of a remarkable development not observed by the writer in any other species of the genus. Although mention was made earlier of the very rapid growth of the acrocomias, a young specimen here of *A. crispa* had deviated from all the other observed species by not matching during adolescence the steady upward growth of the others; instead it had formed a broad crown of low foliage, but after six years and eight months had made no visible stem and hence no upward growth comparable to that of its congeners over the same short youthful span. It had not, that is, until late June, 1962, when suddenly a stem



18. *Livistona Saribus (L. cochinchinensis).* (left), seven years after germination of seed, April, 1960; 18a (right), same in July, 1962, at nine years of age.

19. *Washingtonia robusta.* (left), September, 1957, five years old; 19a (right), same in August, 1962, ten years old.

began to shoot upward by a startling vegetative process and within six weeks was something over six feet tall. Whether this belated but dramatic growth is habitual in young plants of *A. crispa,* the writer does not know though tending to suspect that it is; moreover it may be unique among palms, which again is a supposition and therefore far from certain. The sudden upward growth of the stem was not accompanied by a corresponding rapid increase in its diameter; on the contrary, at the end of the six week it was a very slender shaft appearing to be herbaceous growth and gave no sign it would expand into a woody bole, which of course in due time it would. The fleet transition from a squat



20. *Sabal causiarum.* (left), six years old in May, 1960; 20a (right), the same specimen in August, 1962, now eight years old. Steel tape held taut from stake at left to man's hand at right shows width of foliage to be 20 feet and 2 inches. Miniature palm in foreground is *Jubaea chilensis,* also eight years old.

shrub was attended by the formation of several short ascending leaves held closely parallel to the stem for half their length, clearly showing that the plant was spending most of its vigor on the erection of new stem at the expense of the foliar growth. The photographs in Figs. 12 and 12a were taken just as this account is being concluded, so that as yet there is no sequel. It is to be surmised, nevertheless, that the reduced foliage will soon be succeeded by a normal leaf crown, with some of the leaves arching or extending outward horizontally to five or six feet.

Coccothrinax Crinita

Nat De Leon

The genus *Coccothrinax* as it is presently understood consists of about 30 species. Geographically they range from South Florida through the West Indies, reaching their greatest development in Cuba where some 21 species are recorded.

At present there are a dozen species under cultivation in South Florida, but these are still poorly understood, for much work still remains to be done in the genus. One of the species, however, is so distinct that it could never be confused with others. Imagine, if you will, a palm whose trunk is completely covered with long strands of fiber that give the appearance of hair and you have *Coccothrinax crinita.*

This species, found only in Cuba, was first discovered by Charles Wright, but was not described until some 40 years later by Beccari. The original description was very fragmentary and it was not until some years later that better collections were to fill in the missing details. Specimens have only been collected in two widely separated mountainous areas in Santa Clara and Pinar del Rio, Cuba.

Coccothrinax crinita is a palm to 30 feet tall. Its large, palmate circular leaves are deeply divided into many segments, dark glossy green above, grey-green beneath. From the bases of the petioles are produced long strands of fiber that completely cover the trunk. If one inspects the trunk closely, he will find that the old leaf bases persist from ground level up, therefore, the long hairy mass also persists. A much branched inflorescence is produced from among the leaves, at first nearly upright, later almost hanging under the great weight of its fruit. The fruits, to one inch in diameter, are light purple at maturity and very fleshy; the furrowed seeds to half an inch.

Credit for the introduction of this interesting palm must go to our Society's president, Mr. David Barry Jr., plant introducer extraordinary. The record shows that in 1939 he sent young seedlings to the U. S. Plant Introduction Station, Coconut Grove, Florida. From these, three mature specimens can be seen today, one growing very close to the station's main office. These are the only mature palms growing in Florida. Also in cultivation are two mature trees growing at Atkins Gardens in Cuba, but their origin is unknown to me.

It is interesting to note that *Coccothrinax crinita* is without a doubt the hardiest species of the genus in cultivation today. During the very severe winter of 1957-1958, Mr. Dent Smith of Daytona Beach, Florida, recorded that two plants only several years old were unaffected by cold. Further proof was noted when I visted the Cowgill Nursery