Principes, 26(1), 1982, pp. 44–48

Observations on the Natural History of the Cabbage Palm, Sabal palmetto

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Several articles appeared in *Principes*, Vol. 20, in which the life history of the cabbage palm, *Sabal palmetto*, was explored in depth in an attempt to explain the plant's natural distribution. In the more detailed dissertation (Brown 1973) a number of interesting facts were recorded which were not included in the series of articles. An account of those observations follows.

Vegetative Habit

Sabal palmetto is normally arborescent attaining heights of 9 to 17 m in coastal populations (Fig. 1) or 20 to 27 m and rarely to 30 m or more at inland sites. The U.S. champion tree grows in Highlands Hammock State Park near Sebring, Florida. The trunk is usually less than 0.5 m in diameter but in rare instances may reach 0.67 m. A large globular crown of deeply cleft, segmented, costapalmate leaves, 2–3 m long, caps the stem. Young trees growing in the shade of forests may attain crowns up to 6 m across, whereas emergent adult trees usually have a crown of 4 m or less. Persistent leaf bases may give the trunk a latticelike appearance, but more often the leaf bases slough off leaving a rather smooth trunk. Adventitious roots arise from the stem base and form a dense, fibrous root system (Fig. 2). Short stubby roots are often found on the trunk above the ground surface. Small (1936) suggests that the upper limit of these roots indicates the maximum water level for the site. Little is known about the lateral extent of palm root growth (Tomlinson 1962), but I have observed broken lateral roots 12.5 m long on uprooted plants along Florida beaches.

While the trunk is normally unbranched, photographic records of multiple branching do exist (McCurrach 1960, Hodge 1965). I have observed trees in Florida with two branches, generally thought to be due to sublethal damage to the apical meristem (Davis 1969). The same author reports artificial inducement of branching in several palm genera not including *S. palmetto*.

Morphological Variants

At least two morphological variants occur in the southernmost portions of the range around Miami. One race appears to be acaulescent having leaves and inflorescence normal in appearance but without trunks (Fig. 3). Flowering does not usually occur until trees have at least 2–3 m of visible trunk. These acaulescent plants are found growing in solution pot-holes in lime rock. Although it has been suggested (R. W. Read) that they are stunted as a result of limited root growth, no experiments have been made to determine whether this feature is ecophenic or ecotypic. I have also observed the acaulescent form north of Ormond Beach in Volusia County, Florida, growing on relic sand dunes with *Sabal etonia* Swingle ex Nash and normal *S. palmetto*. One is tempted to

1. *Sabal palmetto* in the maritime scrub on Bald Head Island, N.C.

consider the possibility of hybridization here with the acaulescent *S. etonia*. However, temporal isolation seems effective since *S. etonia* has flowers and sets fruit before *S. palmetto* begins flowering.

The second variant maintains the juvenile leaf characteristics on otherwise normally developed trees. These leaves are more nearly palmate than costapalmate and plants possessing them have been known as *Sabal jamesiana* Small. Observations by Bailey (1944) proved that these plants eventually produce mature costapalmate leaves and thus should not be recognized as belonging to a distinct taxon.

Natural Enemies

The mature plant is apparently long lived and is subject to very few natural enemies. A few insects are known to feed on mature trees (Wolfenbarger 1961) including the cabbage palm caterpillar, *Lioprosopus futilis* (G & R), and the palm leaf skeletonizer, *Homaledra sabalella* (Chambers). I have observed the leaf beetle, *Hemisphaerota cyanea* (Say), and also the results of feeding by the larvae of the giant palm weevil, *Rynchophorus cruentatus* (Fab.). This last insect is probably the only potentially fatal biotic threat to mature trees. It will attack healthy trees as well as weak or dying ones (Woodruff 1967). In addition to pests, *S. palmetto* is also seriously threatened by an encroaching ocean on the Atlantic coastline. From northern Florida to North Carolina, mature trees are being uprooted and washed away in areas of active beach erosion.

Inflorescence

The age at which *S. palmetto* begins flowering is unknown. Sub-canopy trees are retarded in flowering as I ob-

served many non-flowering trees in the understory of both maritime and inland forests, which equalled or exceeded in stature, flower-bearing trees exposed to sunlight.

The interfoliar inflorescence of *S. palmetto* is a panicle up to 3 m long with tertiary branching along two-thirds of its length. The panicles are semi-erect and normally exceed the crown on emergent trees. Variable numbers of panicles are borne depending on age and vigor of individual plants, with six to eight panicles per season being a common number.

The production of flowers on a single panicle is prodigious (Fig. 4). I estimated 85,890 flower buds per panicle on one tree at Ft. George, Florida. An average tree at this site, with six to eight panicles, has a potential production of approximately 500,000 to 750,000 flowers per year.

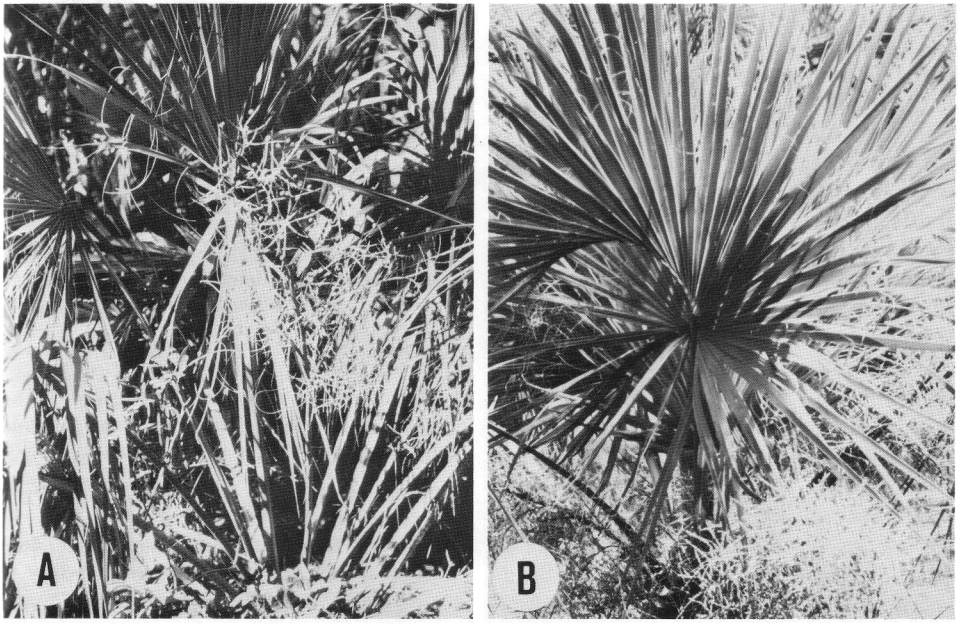
2. Uprooted *Sabal palmetto* showing the dense, fibrous adventitious root system.

Phenology

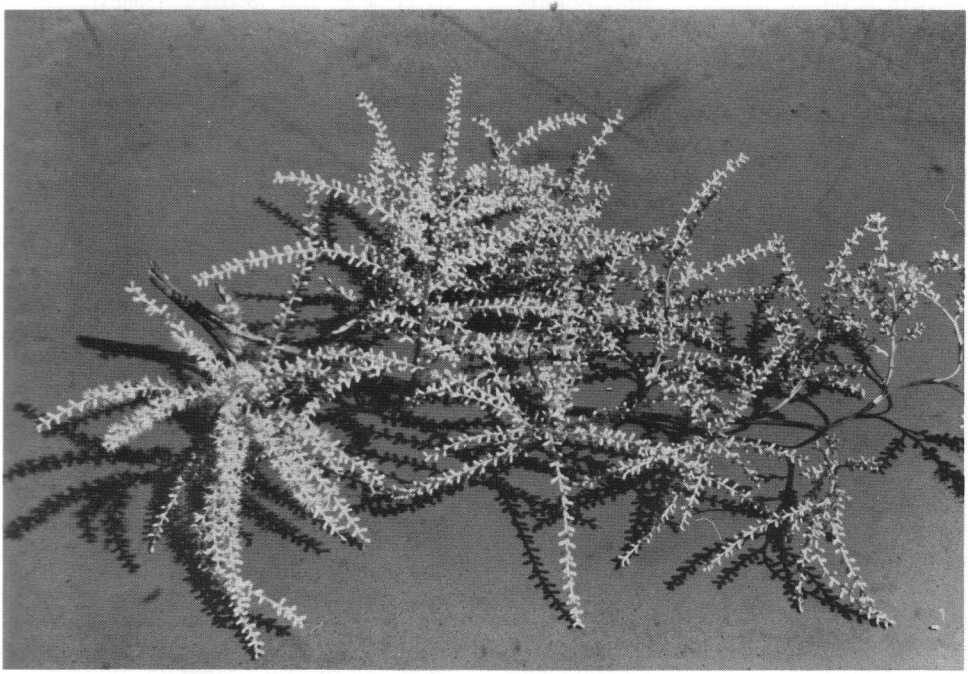
Vegetative events show no clear seasonal routine. New leaves are produced from the apical bud continuously, although most of the leaves will emerge during the warmer portion of the year. The latitudinal range of the species is so broad that in the southernmost portions growth never ceases during most years. Even at the northern limits some growth will occur during winter when plant temperatures are sufficiently above freezing. This phenomenon is not uncommon in trees in general (Perry 1971) and palms in particular (Mason 1914). Just as new leaves are produced in a continuous manner, so also are the old leaves continuously dying.

Reproductive events do exhibit seasonal periodicity. The mechanism of floral initiation is unknown but latitudinal differences in both time of first flowering and duration of flowering period do exist. Southern populations around Miami may begin flowering as early as April and normally continue until August (Scott Donachie, pers. comm.). Initial flowering activity proceeds up the coast reaching Ft. George (approximately mid-range) about July 1, and finally Smith Island, North Carolina (northern limit of range) in the second to third week of July. The period of flowering is compressed with increasing latitude so that at Smith Island it lasts only 4 to 6 weeks (Fig. 5).

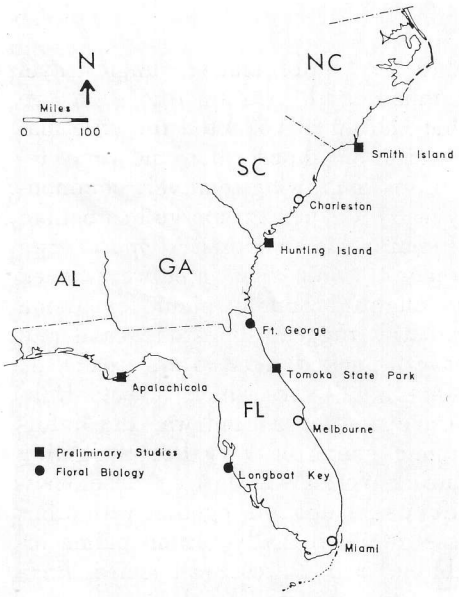
Growth of an individual panicle is basal and rapid. At Smith Island I found no external sign of inflorescence development on May 15. By July 16 panicles were fully expanded but flower buds were immature. First abundant presence of flowers was recorded July 21. Even though inflorescence



3. The morphological variant of *Sabal palmetto* which begins flowering while acaulescent. A. In a limerock pot hole near Miami, FL. B. In relic sand dunes near Ormond Beach, FL.



4. Flowers on a sub-branch of a panicle of *Sabal palmetto*.



5. Location of field study sites.

growth is basal, flower opening occurs randomly over the entire panicle for 1 to 2 weeks.

Corner (1966) states that fruit maturation in *Sabal* requires 4 to 5 months. This process, as with flowering, is compressed at the northern limit where it may require as little as 3 months and occurs in the presence of occasional fall frosts. After maturation fruit may remain viable on the trees for a year or more. Fall from the tree is accomplished by external means such as wind or animal activity.

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