Phyllody of the spadix in *Areca catechu* Linn.

The female and/or male flowers of exceptional palms transform partially or fully into vegetative shoots as have been reported in *Cocos nucifera* (Andy[1], Shortt[2], Venkataraman[3], Davis[4–6]) and in *Areca catechu* (-Murthy and Bavappa[7]). But a little more frequently, palm spadices turn into bulbil-shoots such as those recorded in *Cocos nucifera* (Ridley[8], Burkill[9], Furtado and Bareto[10], Iyengar[11], Sands[12], Davis[13] and Thomas[14]), in *Elaeis guineensis* (Davis[15], and Nair and Pillai[16]) and in *Borassus flabellifer* (Davis[17]). There is another *B. flabellifer* palm growing in the Hooghly district of West Bengal (Davis and Basu[18]) showing similar peculiarities. However, there seems to be no report of spadices of *Areca catechu* vernating into bulbil-shoots. A bulbiferous areca palm growing near Ernakulam (Kerala State) was observed at regular intervals and experimented with by me from 1953. When first detected, this palm about ten years old, bore several bulbil-shoots, each developing from a separate node in the place of an inflorescence. From first 'flowering', this palm produced only bulbils and never bore a flower.

The bulbil-shoots

At an early stage, the bulbils resemble inflorescences, and the outermost reduced leaf looks like a large spathe as seen in shoot 6 of Fig. 1, and less clearly in shoots 1-4 of the same illustration.

The ten bulbils in Fig. 1 represent various stages of growth from a time just before its emergence from the subtending leaf sheath to a stage about four years after emergence. Shoots 5, 7, 8 and 9 belonged to a compound bulbil. The one at extreme right is also a compound bulbil bearing four secondary bulbils. Similar secondary shoots in the coconut have already been reported.

Fig. 1.

1–10, stages in the development of areca fulfils. No. 10 is a fulfil with lateral branches.

The development of an areca bulbil from an inflorescence is almost like that of a coconut bulbil. The outermost leaf looks like the spathe, but the second leaf which pierces out of this pathe shows a few crumpled leaflets at the tip, a condition similar to the spathe of a peculiar coconut plalm recorded by Davis *et al*[19]. The third leaf has a slightly bigger crumpled lamina, and the fourth one (4 of Fig. 1) develops like a leaf of a young palm rather than that of a seedling where the leaflets on each half are united marginally and form

two large lobes. The subsequent leaves increase in size, bear greater number of leaflets and possess prominent petioles. The sheathing base of the petiole which clasps the younger leaves firmly is well-developed.

Aerial-layering attempts

In December, 1953, two bulbils removed freshly from the palm and which were planted at Ernakulam withered away before producing any root. During the heavy monsoon (July) of the succeeding year, fifteen shoots (many of them secondary shoots) were lopped from the palm and planted with care at the premises of the Indian Central Coconut Committee office at Ernakulam. The larger seedlings seen in Fig. 1 formed part of the shoots planted. Though many of the bulbils remained green for over four months, none of them got established.

Air-layering of the shoots was attempted in 1959 according to the method tried on the coconut palm (Davis[20]). To start with, the palm was cleared of many of the lean and lanky shoots leaving only a limited number of the healthier ones. This palm was shadowed by coconut palms, *Thespesia populnea* trees and a bamboo clump. The branches and/or leaves of the adjoining trees were cut off to enable the areca palm to receive direct sunlight. As a result, the subsequently developed bulbils (Fig. 2) look healtheir, stumpier and strikingly

Fig. 2. Arcea fulfil-shoots in shoots C.D.E. roots have been induced by aerial layering.

shorter compared to the set of bulbils in Fig. 1. The bases of the bulbils were tightly wound with fine straw ropes, and the gaps filled with coir dust and river sand. The entire set-up was wrapped with jute gunnies and periodically watered. By 1961 many of the bulbils produced several roots (Fig. 2) when they were separated, and three of the best ones got established in special containers at Nagercoil, a place over three hundred kilometres from Ernakulam.

Clonal propagation

Phyllody, especially in the economically important single-stemmed palms, has a speial significance. The most important palms such as *Cocos nucifera*, *Elaeis guineensis*, *Arenga Saccharifera*, *Borassus flabellifer* and *Areca catechu* are single-stemmed and are solely seed-propagated. *Phoenix dactylifera*, with its suckers, however, is an exception. As the former group of palms is invariably cross pollinated and require many years before the performance of each generation can be judged, the conventional breeding methods are unsuitable. However, if a method is evolved to propagate the best palms clonally, that alone can serve as an effective short-cut for increasing the fruit production in palms (Holttum[21], Harland[22], Haldane[23], Davis[24]). Among the methods that are likely to yield favourable results on clonal propagation, reversing the invididual flowers or flower bunches of a palm whose performance has already been known, into vegetative shoots and propagating them as fruit-bearing individuals seem to be promising. Naturally occurrence of rare palms like the bulbilferous *Areca catechu* demonstrates that such a possibility is not beyond the capacity of the scientist.

T. A. Davis

Crop Science Unit,
Indian Statistical Institute,
Calcutta-35.
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