

# Prospects of Clonal Propagation of the Coconut

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With its distribution in the region of four million hectares around the world and producing a substantial quantity of food and products of great utility, the coconut is rightly eulogised as the 'Kalpak Vriksha' or the tree that provides all necessities of life. However, this 'Heavenly Tree' has not attracted itself to those interested in its genetic improvement, so that it has not been possible to apply some of the conventional crop improvement methods to this perennial palm. The need for evolving a method for propagating the coconut through one of its vegetative organs (i.e. 'clonal propagation') is possible with crops like pine-apple, banana and sugarcane therefore continues to remain a matter for investigation.

Being a palm, the coconut is devoid of off-shoots and the single stem grows to over 30 metres high. The enormous height coupled with its smooth slippery stem, and swaying crown make the trunk most hazardous for a geneticist desirous of shinning and carrying out the pollination work himself. Of the two varieties—the Tall and the Dwarf,—the former accounts for over 95 per cent of the coconuts in cultivation. This variety is highly cross-pollinated in nature, and due to generations of such free-mixing, it has become highly heterozygous. Though its male and female flowers are produced in every inflorescence—"Spadix", the male phase of the floral branch is completed before the female phase commences. Further, until the female phase is over, the next younger spadix usually does not emerge out of its cover. In the Dwarf variety, the male and female phases within and/or between spadices frequently overlap, accounting for the fair degree of purity that exists in this variety. Evolving pure parents for breeding purposes would cover a very long period of time, since the judgement of the productive capacity of a coconut seedling would take a minimum of 15 years. Thus, if one has to study the Tall variety for a few generations, the experimenter's useful span of life would be completed before he could obtain useful results. The cumbrous size of the coconut makes attempts of its study within laboratories or limited field spaces almost impossible. A 15-year palm may have a root-spread of 30-metres across the diameter. In addition, the lack of vegetative propagation which demands the crop to be solely multiplied through seed makes research on the coconut a matter for perpetuation by generations of scientists.

## Partial solution to some problems

Attempts are being made to solve some of the problems mentioned above. The specialist tries to improve the quality of the palm by pollination between ideal parents. To achieve this, the scientist may easily reach the crown of young palm with the help of platforms or ladders. But to scale the tall palms, only professional climbers who are generally illiterate and irresponsible are hired. Due to the height and profuse foliage of the crown, it is often impossible for the expert standing under the palm to convey appropriate instructions to the professional climber who is operating in the crown. Thus, it is essential that the scientist himself should be able to reach the crown to carry out his pollination work and record his observations. To facilitate this a satisfactory palm climbing gadget (working on the cantilever principle and equipped with friction rollers) has been devised by the author.

Scaling the trunk can be avoided if the height of the palm is reduced by a suitable method. Aerial layering of the crown has been achieved by a simple method which consists primarily of fixing a wooden box at a convenient pre-determined height of the stem by suitable means. The box is then filled with sand and coir dust and the layering medium constantly kept moist. When sufficient roots have been induced, the stem is sawn below the rooted region and the shortened palm planted at a convenient site for experimental purposes. Though this method can give a new lease of life to selected palms, it provides no scope for multiplication.

## Vegetative propagation

It is an easy matter to divide the growing points of young coconut or palmyra seedlings and induce them to produce branches. Each of these branches at the proper time would produce roots and ultimately develop into separate but genetically identical palms. However, the main defect of this method is that the productive quality of the new seedling which is thus produced cannot be known without multiplying it. On the contrary, it is very difficult to split the growing point of a bearing palm. However, in Nature, due to a variety of causes (lightning, fire, beetle-attack etc.), some palms produce ramifications from the aerial stem (Fig. 1). Many cases of suckering or branching from the base of the stem have also been reported in the coconut. This is actually not surprising, because members of the palm family are known to produce suckers, although the coconut has evolved into a single-stemmed species. The various suckers or shoots of a palm can be layered and multiplied as clones in a manner similar to the propagation of banana suckers.

The most promising method of propagating the coconut clonally would appear to be the reversing of the floral branches (or individual flowers) of selected palms into vegetative shoots, popularly known as bulbils. (Fig. 2A). These bulbils have to be layered and nurtured into individual palms. Transformation of the floral branches into vegetative shoots has been reported in the coconut, arecanut, palmyra, wild date and the African oil palm. Some of the bulbil-shoots of these palms produce secondary bulbils and others strike roots, thereby simplifying the process of air-layering. One may entertain doubt that a bulbil when layered and propagated into a palm



Fig. 1. A Coconut palm bearing numerous branched shoots



Fig. 2.A. A Coconut inflorescence modified into a 'bulbil-shoot'  
B. A coconut inflorescence bearing numerous small vegetative shoots

may not produce fruits. Actually, there is a good chance that such bulbil-shoots would reverse back to the fruiting condition. Such a reversal has been reported in the oil palm, a palmyra and a few coconut palms. In a case when the terminal bud of a coconut was destroyed, the author is aware that one of the spadices transformed into a vegetative shoot and replaced the lost terminal bud.

Since the coconut palm produces only about twelve flowering branches every year, multiplying the palm through bulbils transformed from these spadices is bound to be very slow. However, if the many flowers of a palm (with desirable characteristics) are reversed into bulbil shoots, layered and propagated as palms, within a short time it should be possible to multiply the palm clonally and replace several hectare of the existing plantations. It will be seen that hundreds of flowers of a spadix in (Figure 2B) have been transformed into vegetative shoots. Within a year, one such palm could produce three to five thousand identical shoots. There are yet a few other coconut palms which produce both bulbil-shoots as well as normal nuts in the same inflorescence. These naturally-occurring bulbil-shoots clearly demonstrate that the generative and vegetative phases of exceptional coconut palms can be interchanged by mild shock treatment. These observations would no doubt be an encouragement to those who are working along these lines.

There is every reason to hope that effective methods of vegetative propagation in the hitherto seed-propagated economic palms such as the coconut, oil palm, and areca will be evolved in the near future. The impact of such an achievement can be visualised when we consider that the average annual yield of a coconut palm is not more than 35 nuts whereas a few individual palms have been yielding annually as much as 800 nuts each. If clonally propagated, such palms could be expected to maintain the capacity for such high yields as long as management and agronomical practices are satisfactory.

#### ASIAN COCONUT COMMUNITY

*"The Asian countries have been long on talk about what ails them, but short on the action necessary to correct their defects.*

*What the Asian Coconut Community has to do is to work out the means for implementing their good resolutions.*

*It has to settle down to some form of action on the agreement which existed even before the conference began on what is needed to give new hopes to a basic source of Asian wealth.*

*The conference must translate the platitudes of diagnosis and prescription into special agencies and other means of action."*

CEYLON OBSERVER, 4.9.69