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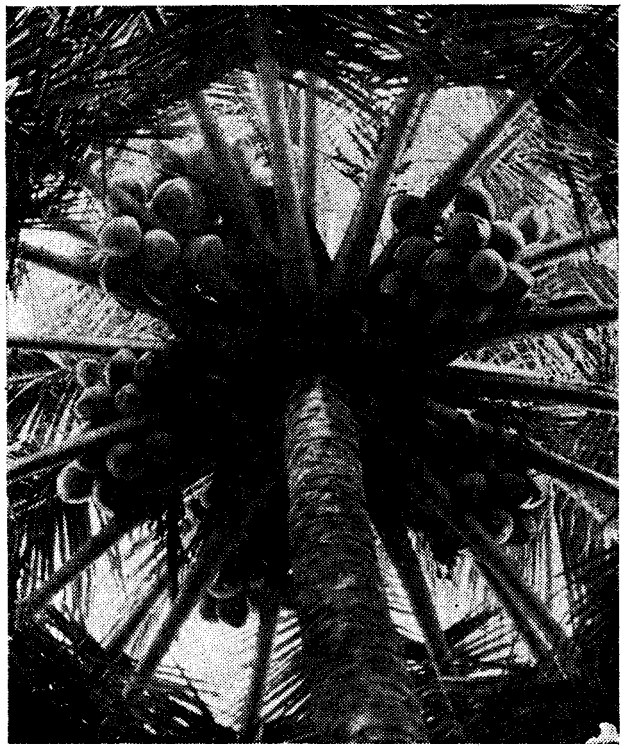

Elite palm with hemispherical crown and well supported bunches growing at Krishnapuram, Alleppey district, Kerala

SUPER YIELDERS IN COCONUT

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INDIA is one of the major coconut producing countries, ranking third in area under the crop. The crop contributes one per cent of the GNP and two per cent of the total agricultural income of the country. The total area under the crop is 1.12 million hectares, of which 0.7 million hectares are in Kerala State which accounts for 62.4 per cent of the country's coconut production. The rural economy of the State is very much dependent upon its production, processing and marketing. In India, coconut is essentially a small farmers' crop, with over 5 million holdings, half of which are in Kerala.

During the last two decades, coconut production has, in general, shown no significant increase on a global basis; while in India, and particularly in Kerala State there has been a perceptible reduction in productivity. In 1952-53 the all-India average yield was 6612 nuts per hectare compared to the 1975-76 figure of 5436 nuts per ha, whereas the corresponding figures for Kerala are 6926 and 4962 nuts per ha respectively. Although precision of information on productivity of a crop like coconut is difficult to ensure, there is evidently a decline in yield.

Some Constraints

Improvement in crop production through breeding and management has been one of the main objectives of coconut research workers during the last 60 years. There are many who hold the view that the exploitation of hybrid vigour could lead to a 'green revolution' in coconut. Even though the earliest coconut hybrid T × D (Tall × Dwarf) with high yield potential was produced in 1934 by Dr J.S. Patel, there has been no noteworthy improvement in this line of research during subsequent years, although recent researches have indicated the superiority of the reciprocal hybrid D × T, produced by crossing 'Chowghat Dwarf Orange' (CDO) as female with 'West Coast Tall' (WCT) as male parent. The main constraint in this lies in the long time lag required for the evaluation of the test materials before releasing them to farmers. Yet another difficulty which is not easy to overcome, is the heterozygosity in the existing populations of Talls and to some extent in the Dwarfs which in turn would lead to the differential combining ability of the parents. Using such populations as parents has resulted in the inconsistent performance of hybrid progenies under similar agro-climatic situations. Hence, large scale production of these T × D and D × T hybrids appears to have certain constraints that need to be overcome, the chief one being the limited availability of dwarf parents with high combining ability and of prepotent talls.

An alternative approach being explored at the Central Plantation Crops Research Institute (CPCRI)

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is to propagate the progenies of prepotent palms, which irrespective of the male donor, are capable of transmitting their high yield potential to their progeny. Here again, the scope is limited since prepotents occur so rarely in a population and only a few have been identified so far. Of late, attempts are being made at CPCRI, Kasaragod, to standardize the technique of tissue culture so as to clonally propagate the exceptionally high-yielding palms even when they are not found to be prepotents. If successful, this would be a major breakthrough in coconut breeding methodology.

Elite Palms

Coconut palms yielding less than 40 nuts per year are generally considered low yielders, those yielding 41-80 nuts as medium yielders and over 80 nuts as high yielders. However, in nature, certain rare palms with remarkably superior yield potential are known to exist. Our attention was drawn to one such palm growing in Thazhave Village (Quilon District) through an article written in Mathrubhumi Karshikarangam Supplement (October 1976) by R. Hali of Farm Information Bureau, based on the information provided by D.A. Jalal of the Coconut Package Programme, Kerala. Subsequently, in a keynote address delivered at the International Symposium on Coconut Research and Development, held in December, 1976 at Kasaragod, Dr M.S. Swaminathan, Director-General, ICAR, emphasised the need for undertaking a systematic survey and scientific study of all palms yielding over 200 nuts per year, to use them as starting material for breaking the yield barrier in coconut. On an average, the local or common WCT palms yield about 60 nuts per palm per year under rainfed conditions with average management and this yield level can be pushed up to 90-110 nuts by providing irrigation. Well distributed rainfall is considered to be the most significant factor influencing coconut yield. The best T × D palms at this Institute under good management with irrigation, yield on an average, 174 nuts per palm per year. However, the 'super palms' have a potential to yield over 200 nuts (maximum recorded so far is 471 nuts) in one year, under rainfed conditions. A systematic survey to locate such high-yielding palms was undertaken by the CPCRI, and the observations recorded so far on these palms are reported here.

Elite palm with spherical canopy growing on a rice bund in Thazhava village, Quilon District. It has yielded .471 nuts in a year

Disease-free

Of the 19 such palms identified in this survey, six are in northern Kerala which is a root (wilt) disease-free zone and the remaining 13 are in southern Kerala where the disease is prevalent. All the super palms located in the disease prevalent stands are so far free from the apparent symptoms of root (wilt). Their healthiness was confirmed by the serological and colorimetric tests developed at the CPCRI Regional Station, Kayangulam to detect incipient infection. In most cases, there is enough sunshine and a perennial supply of water available to these elite palms. They are growing either on bunds along rice fields on river banks, or in house compounds near a well or they are receiving kitchen washing. Normally, these palms do not receive any additional inorganic manure, while in some cases it was reported that application of manures/ fertilizers is not being practised at all. One interesting feature of these palms is the high rate of leaf and spathe production and longer retention of leaves. In general, an ordinary tall palm produces one leaf and a spathe every month during its active production period (from about 15th to 45th year) and will have a crown of 30 to 40 leaves. In the elite palms, however, a leaf and a spathe are produced every 15 to 20 days thereby resulting in a higher number of bunches available for harvest every year (Table 1). Enhanced rate of growth is also reflected in the trunk in some cases. Usually in a metre length of trunk there are 16-17 leaf scars whereas in the elite palms, the number of leaf scars ranged from 12 to 31 per metre.

The crown shape in these palms approximated either to the hemispherical or spherical type. In general, all high yielders in any population also show either of these categories of canopy. In the hemispherical crown, the subtending leaf petioles offered additional support to

TABLE 1. CHARACTERISTICS OF NINE ELITE PALMS OF KERALA
(Data represent more than one observation)

Palm No. and Location	*Age of palm in yrs.*	*No. of leaves on crown*	*No. of spathes/year*	*Annual yield of nuts*	*Female flower distribution per rachilla*	*No. of leaf scars in 1 m length of trunk*
North Kerala						
Root (wilt) disease-free area						
SP I Chengala (Cannanore Dt.)	40	35	22	200	Usually 1 or 2 rarely 3 or 4	31
SP II Ezhom (Cannanore Dt.)	20	35	20	300	0, 1 or 2 only	10
SP II(a) Attaygoli (Cannanore Dt.)	16	43	24	250	0, 1 or 2 only	19
South Kerala						
(disease prevalent area)						
SP III Ernakulam (Ernakulam Dt.)	16	46	24	300	0, 1 or 2 only	12
SP IV Kayangulam (Quilon Dt.)	12	43	19	200	0 or 1 only	16
SP V Thazhava (Quilon Dt.)	20	35	24	471*	0 to 4	21
SP VI Krishnapuram (Alleppey Dt.)	21	40	19	300	0 to 9	18
SP VII Kalavoor (Alleppey Dt.)	20	46	21	250	0 to 1 only	NA
SP VIII Champakulam (Alleppey Dt.)	30	50	21	300	0 to 1 only	15

*Average of last three years harvests (1975-1977)

the heavy bunches, thereby preventing buckling losses in these palms. In the present study, eight palms had spherical crown and eleven palms showed hemispherical one.

In most cases, the female flower distribution per rachilla was found to be either 0, 1 or 2 only. This character is reported to have high heritability. However, two of the super palms did show a higher number of female flowers per rachilla, but this did not seem to have affected the setting per bunch.

Testing for Prepotency

After characterisation and cataloguing, it is proposed to test these elite palms for prepotency by studying their seedling progeny. If they prove to be prepotents, their multiplication through seed can be taken up, for use in disease resistance and adaptability trials directly. Alternatively, in nonprepotent elite palms, multiplication through tissue culture is envisaged to preserve their high yield potential in subsequent generations. However, initially attempts are being made to partition the genetic and environmental components contributing to the exceptionally high yields in these palms. The present efforts would be rewarding if more growers owning such elite palms bring it to our notice, so that they can be investigated scientifically and utilized in taking coconut to new levels of productivity.