RP820

NATIONAL SYMPOSIUM ON COCONUT BREEDING AND MANAGEMENT

KEY-NOTE ADDRESS

Dr MV Rao,
Special Director General,
Indian Council of Agricultural Research,
Krishi Bhavan, New Delhi 110 001

It gives me immense pleasure to be with you today to participate in the National Symposium on Coconut Breeding and Management and to share my thoughts with you. I would like to congratulate Dr EC Silas, Vice Chancellor, Kerala Agricultural University for organising this National Symposium in collaboration with the Central Plantation Crops Research Institute and other agencies involved in coconut research and development in the country.

Among the world's approximate 2700 species of palms, coconut is the most versatile providing edible and industrial oil, protein-rich milk and invigourating water and also valuable source of timber, fibre, roofing and matting material and also a number of products from its shell. Coconut fibre is valued for its elasticity and resistance to mechanical wear and dampness. By-products of coir industry such as pith fibre, dust etc. are put to a variety of uses for improving the soil tilth and conserving moisture. The trees is rightly called the tree of heaven "Kalpa Vriksha" as very few other cultivated plants have such highly diversified utility as the coconut.

..2

Coconut is grown in more than 90 countries of the tropics and India occupies the third position in terms of production among the countries next only to Philippines and Indonesia with an annual production of 6484 million nuts. An analysis of the trend of production and area in the country shows that the area increased from 0.59 million hectares in 1949-50 to 1.23 million hectares in 1986-87 and t he production during the period increased from 3,448 million nuts to 6,484 million nuts. The per capita availability in India is estimated to be 11 nuts in comparison with 220 nuts in Philippines and 200 nuts in Sri Lanka. This only shows the need to raise our per capita availability by increasing the productivity of palms. Eventhough the productivity of coconut per hectare is comparable with yields of other coconut growing countries the per palm productivity is also low i.e. about 35 nuts/palm/year.

Traditionally Kerala accounts for the lions share in coconut production with 56.8 per cent of area and 47.5 per cent of total production in the country (1985-86). It has been estimated that in Kerala there are 170 million coconut palms with a palm density of 229/ha. I have been told that about 10 million people depend directly or indirectly on coconut culture and industry for their livelihood. Coconut cultivation alone provides 78 mandays work/ha/year, which works out to about 75 million mandays per year.

Unlike other commerc ial crops, coconut is essentially a small-holder's crop. It is mostly grown in homesteads and

small farms. There are about five million coconut holdings in the country with 98 per cent of them less than 2 ha in extent. In Kerala State alone it has been estimated that there are about 2.5 million holdings.

Coconut contributes to about 7 per cent of the total vegetable oil production in the country. Annual per capita consumption of vegetable oil in the country is only 5 kg compared to 20 kg in developed countries. The available oil production from traditional annual crops in India is highly inadequate to meet its increasing demand. India has imported 1.6 MT of edible oil during 1986-87 and 2.3 MT during 1987-88 at an estimated foreign exchange worth Rupees 1,400 crores. As the gap between demand and supply is widening every year, the monetary drain due to import of vegetable oil will also increase unless we resort to drastic action immediately. The role of perennial oil yielding crops like coconut and oil palm to bridge this gap is obvious.

Research on coconut improvement and management in India started in 1916 with the establishment of four centres, one each at Kasaragod and Pilicode and two at Nileshwar in the west coast under the erstwhile combined Madras State. India was the first country in the world to initiate coconut hybridisation programme in the early 30s at the Central Coconut Research Station, Nileshwar and Central Coconut Research Station, Kasaragod. It is to the credit of pioneers like Dr JS Patel that the exploitation of hybrid vigour was conceived and implemented in coconut more than half a century ago.

...4

Inspite of having an early start in terms of research efforts to improve the coconut production and productivity, we will have to admit that t he progress has been slow till recently. The perennial nature of the crop combined with inherent difficulties in st udying the successive generations, the long juvenile phase afe some of the major factors responsible for this slow progress.

During the past 70 years the studies conducted in different research centres on various aspects of the coconut palm in the country have produced valuable results of practical significance. In the process of field a pplication of valid research findings, the research is also fed back with problems from the field. However, the feed back has not always complete, so also the transfer of technology available at research centres. Many useful research results are often left unutilised and un-observed in the strategy of coconut development.

The initial programmes on coconut research included standardisation of selection procedures for mother palms including identification of prepotent palms and perfecting seedling selection criteria. Criteria for selection of mother palms/seednuts and seedlings established by the research workers have proved helpful in producing quality planting materials. The germplasm collection and conservation programme initiated in the early 1930s received further impetus with the support of IBPGR during 1970s. The coconut germplasm at CPCRI consists of 86 exotic and 41 indigenous

cultivars and under the Kerala Agricultural University we have 29 exotic and 34 indigenous types. The germplasm at CPCRI includes 24 accessions from six Pacific Ocean Islands collected with the support of FAO/IBPGR in 1981 and maintained at the World Coconut Germplasm Centre in Andaman ans. Thus the Indian germplasm holding collected from more than 25 countries represent the largest holding of coconut germpl asm, though the Ivory Coast collection with about 70 trees in each of the 32 accessions is the biggest population of coconut germplasm. Evaluation of the germplasm has lead to the identification of high yielding cultivars like Andaman Ordinary and Laccadive Ordinary (indigenous) and Philippines Ordinary and SS Green (exotic) with 25 to 30 per cent higher yield in terms of nut compared to the local cultivars. As all of you are aware based on the performance, Laccadive Ordinary has been released and accepted for large scale cultivation in Kerala State.

The most significant contribution in coconut breeding in this country has been the production of coconut hybrid between West Coast Tall and Chowghat Orange Dwarf and its reciprocals. These hybrids when raised under available conditions and with proper management have been found to bear earlier and yield more n number of nuts and higher copra out-turn than the local cultivar West Coast Tall. However, further analysis of the performance has indicated considerable variation in yield of progenies derived from cross combinations indicating the need for selection of

individual parental palms in hybridisation programme. I am happy to note that the breeders at the Central Institute, Kerala Agricultural University and Tamil Nadu Agricultural University have been continuously producing and testing the performance of various hybrids and in recent years they have released hybrids Chandra Sankara (COD x WCT), Chandra Laksha (LO x COD), Laksha Ganga (LO x GB), ECT x DG (VHC 1) and ECT x MDY (VHC 2) with an increase in yield ranging from 23.3% to 82.8% over the West Coast Tall. Though these works are commendable, I cannot help but mention the reluctance on the part of scientists in releasing high yielding varieties and hybrids in coconut. Dr JS Patel reported the manifestation of hybrid vigour in coconut in 1932 and the first Tall x Dwarf (T x D) was planted at the Research Centre at Nileshwar in 1934 and the first natural cross dwarf (NCD) (which later presumed to be D x T) was planted at Kasaragod in 1939. It took another 46 years for the scientists to come out with recommendation for release of the 3 hybrids about which I mentioned earlier. However, I am happy to note that after 1985 five hybrids have been released and the Kerala Agricultural University is likely to release another 2 hybrids, namely, Andaman Ordinary x Gangabondam and West Coast Tall x Gangabondam shortly. All these show that after considerable stagnation in coconut breeding, in recent years we are proceeding in the right direction and every efforts are being made to identify the best hybrid combination and thereby contribute to increasing production and productivity of coconut.

...7

It will be pertinent to analyse the availability of planting materials in these elite hybrids and varieties released in recent years. It has been estimated that the total production of planting materials in the country is about ten million seedlings every year. Out of this about six million seedlings are produced at various State Government nurseries, seed gardens, etc. and balance of about 40 lakh seedlings are produced by private nurseries and coconut growers. Among these, only about 0.3 million T x D hybrid seedlings and few thousands of D x T seedlings are produced at present. Though large scale production of T x D hybrid seedling programme was initiated in the 60s in the State of Kerala, Karnataka, Tamil Nadu, Andhra Pradesh and Orissa, the desired impact of these seed gardens in terms of seedling production has not been achieved . A national group meeting called by my colleague Dr KL Chadha, Deputy Director General (Horticulture) on "The strategy for production of planting materials in coconut" at Kasaragod in January, 1986 has estimated that the total demand for the planting materials in the country is about 15 million/ year which include seedlings required for (a) 30,000 hectares of new planting, (b) re-planting and under planting for rehabilitation of root (wilt) affected areas in Kerala and (c) replanting and underplanting of about 2 per cent of the area in other states. A look at the present infrastructural facilities available for production of hybrid seed lings shows that among major coconut growing states we have established about 960 hectares of seed gardens and another 80 hectares of seed gardens are proposed to be established in the states of Assam, Bihar, Madhya Pradesh and

Orissa. The seed gardens in Karnataka, Tamil Nadu and Orissa established in the late 70s have not achieved full scale commercial production due to various reasons. Repeated replanting had to be undertaken in many of these seed gardens due to lack of infrastructural facilities and financial resources. When all these seed gardens attain the full production level it is expected that the country will be in a position to produce about 1.5 million hybrid seedlings in the course of next five years.

I need not emphasis to this group here that evolving varieties and hybrids has to be a continuous process not only to achieve higher yield but also to develop tolerance to diseases like root (wilt), Tatipakka, Thanjavur wilt, etc.

Out of a total area of 0.7 million hectares under coconut in Kerala State, approximately 0.4 million hectares in the eight southern districts are affected by root (wilt) disease. A recent survey by CPCRI in collaboration with the Department of Agriculture and other sister institutions has indicated that the total annual loss due to the disease is about 968 million nuts. The causal agent for coconut root (wilt) disease has been established as Mycoplasma-like Organisms on the basis of consistent association of the MLOs in the disease affected palms and its total absence in the disease free palms, in the transmission studies and location of MLOs in the phloem tissues of the vector. All of us aware that it will not be possible to offer a cure to the root (wilt) disease by way of plant protection measures. Application of tetracycline has indicated temporary remission symptoms. However, this chemical cannot be

used for during mycoplasma l disease of plants in view of the need for repeated administration to get the desired effect, the cost and accumulation of residues in the system. The strategy for the highly diseased contiguous belt has already been spelt out by my colleagues at CPCRI in terms of proper management. Similar strategy has also been formulated for the mildly affected areas. However, as a permanent s olution it is imperative to evolve varieties tolerant/resistant to the disease.

In the case of root wilt disease which is only a debilitating but not lethal, the health and yield of affected palms can be improved through adoption of integrated management practices consisting of application of balanced fertilizer,additional organic matter raising green manure crops in the basins and summer irrigation etc.

Research programmes have been initiated by the breeders working on cocoonut by way of screening the available germplasm in disease endemic areas, collection and evaluation of germplasm from Pacific Ocean Group of Islands and also exploiting the genotypes which show field tolerance by appropriate breeding methodology. I am glad to note that though belatedly a dynamic breeding programme has been initiated at the Kayangulam Regional Station of CPCRI to exploit the available field tolerant types. It is in this context that the ICAR is contemplating collaboration with Mauritius and Maldives for exchange of coconut germplasm. The major objectives of the programme is to locate resistance/tolerance to root (wilt) disease. It is understood that very little work has been

carried out to conserve the variability in coconut germplasm in these countries. Therefore, the present collaboration proposed will benefit both India an d host countries in documenting and conserving the available variability in these two countries.

Another major production constraint felt in recent years is increasing drought situation in the coconut producing states. I am told that during the severe drought in 1986-87 many of the coconut plantations under un-irrigated condition suffered. The drought tolerant nature of recently released hybrids, namely, Lakswha Ganga and Chandra Laksha has been proved by laboratory screening tests and these information has been further supported from the field data. Likewise the susceptibility of Chandra Sankara to drought has been revealed through systematic studies. I am also happy to note during my recent visit to CPCRI that Dr V Rajagopal and his group have already identified the desirable traits for drought tolerance and based on the methodology developed few genotypes have been identified which are being effectively utilised in the breeding programme.

I am happy to note that the research workers in coconut have come out with number of recommendations in the past which if adopted can definitely increase the yield and income from the coconut palm. A four-fold increase by cultivation and manuring and six-fold increase by manuring and irrigation in yield has been achieved in the case of West Coast Tall. Nutrient uptake studies have indicated that the hybrids are more efficient convertors of applied nutrients than West Coast Tall. The drip irrigation

technique developed for coconut gardens at CPCRI ensures supply of daily requirement of water to the root zone eliminating loss through evaporation, percolation and seepage. This also helps in saving of 40 per cent of water than the basin irrigation system, with considerable other advantages. These management practices if adopted properly in the long way it will double the coconut yield from existing plantations.

At CPCRI, the economic evaluation of the hybrid COD x WCT under rainfed conditions showed that the pay-back period in the case of this hybrid is 8 years as against 10 to 12 years in the case of WCT. The fertilizer response of the same hybrid indicated that 500 g N + 300 g P_2O_5 + 1000 g K_2O/palm/year gives higher net return than higher levels of fertilizers under rainfed condition in sandy loam soil suggesting that this hybrid is efficient converter of energy, thus, most suited to small-holder environment.

The cropping system models at CPCRI, Kasaragod have attracted the interest all over the world because of their relevance to the present environment. Under rainfed condition, coconut + elephant foot-yam combination could fetch highest return followed by coconut + ginger. However, under irrigated system the multistorey cropping involving coconut + pepper + cocoa + pineapple could generate a net return of Rs.23,000/ha compared to Rs.6,900 from rainfed coconut monocrop and Rs.11,400 from irrigated coconut monocrop. Similarly, coconut-based mixed farming involving production of fodder grass in the interspaces of coconut, training of pepper

...12

on coconut trunk, raising of fruits and vegetables around farm house, rearing of rabbits and maintaining 5 units of cross-bred cows in 1 ha coconut gard en could yield a net return of Rs.14,500/ ha/year. When we consider the family labour involvement, the earnings to the family as a whole could be as high as Rs.35,000/ ha/year from this system. It is therefore considered as a self-reliant small-holder model.

I find from the programme that most of the problems connected with breeding for higher nut and copra production, better quality attributes, breeding for pests, diseases and environmental stress, crop management and biotechnology and processing technology are to be discussed in this Symposium. While these programmes are drawn with considerable thoughts, I am sure that the Symposium will give serious consideration to the following points which required attention.

1. The constraints in availability of quality planting materials has been indicated by me earlier. Even with the full production potential of seed gardens in the country, we may be able to meet only 1/10th of the planting material requirement annually. Considerable attention will have to be given by the Coconut Development Board and other agencies concerned for encouraging the production of quality planting materials.

2. I understand tha t though the hybrids have high production potential the recovery of hybrids is only in the range of 40 per cent in any particular cross combination. This obviously indicates that both Talls and Dwarfs are heterogeneous in their genetic

...

make up and breeders will have to bestow their attention not only to identify parents specially Dwarfs which are likely to give high hybrid recovery. I am rather surprised to note that no attempt has been made so far for effective inbreeding programme specially in dwarf coconuts. It will be advantageous to go for an inbreeding programme to develop homozygous dwarfs which in turn can be utilised for exploitation of hybrid vigour to the maximum extent.

3. Coconut tissue culture work initiated at CPCRI few years back has enabled the production of coconut plantlets for the first time from tender leaf segments of West Coast Tall and T x D hybrid seedlings. However, the result has been inconsistent indicating the need for perfecting the technique. The ICAR with the financial assistance from the Department of Biotechnology has strengthened the programmes in recent years. Even the limited success achieved so far is from the leaf tissues of the seedlings and hence our efforts in this direction should be towards perfecting a technique for culturing tissues from adult palm so that high yielding elite palms and disease resistant genotypes likely to come out the breeding programme, can be subjected to micro-propagation.

4. Our experience in collecting germplasm from the Pacific Ocean Islands in the past has shown that collection of nuts is cumbersome and expensive. Our strategy in this direction will have to be germplasm collection and conservation by <u>in vitro</u> methods by using zygotic embryos followed by cryopreservation.

...14