

IMPROVING THE COCONUT PRODUCTION : FUTURE NEEDS RELATED TO NUTRITIONAL ASPECTS

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INTRODUCTION

Coconut is one of the high value commercial crops providing enormous employment potential to the millions of farm families in the tropics. The constraints in the productivity of established coconut gardens continue to remain and shall be a major concern in the years to come. The primary reasons for low productivity of coconut could be attributed to the traditional cultivation methods, low yielding cultivars, reluctance towards the use of inorganic fertilizers and poor or no management of groves. The low productivity is also due to inherent low native soil fertility, poor nutrient retention capacity of soil and incidence of diseases and pests. The soils of humid tropics are dominantly of laterite, lateritic and sandy in nature where coconut is commonly grown. These soils are susceptible to heavy leaching losses of nutrients like N, K, Ca and Mg. The laboratory simulation investigations at the Central Plantation Crops Research Institute have indicated leaching losses to be in the order of 70.9% for N, 7-12% for K, and appreciable losses of secondary and micro-nutrients consequent to chemical change in the soil micro-environment following fertilizer application (Anon, 1986).

The loss of nutrients from the

available pool also aggravates the problem besides reversal of water soluble P to sparingly soluble and insoluble forms. The prevailing low soil pH also reduces the availability of nutrients. The input constraints and the time lag between the cost input in the form of fertilizers and realisation of economic return in the established coconut garden especially with inorganic nutrients pose a major problem. Besides, sustainability of high yields in the farmer's condition has to be thoroughly understood.

THE EXISTING SCENARIO

The summary of reports published so far indicates that about 1% of coconut plots receive inorganic fertilizers though around 50% of the plots receive meagre quantity of organic fertilizer in the form of farmyard manure and green leaf manures (Mathew, 1976). This figure could be slightly higher depending upon the availability of such materials in a region, which is largely due to the sincere efforts by various extension agencies in propagating the importance of manuring and cultural practices in coconut yield. However, the situation of poor management remained for a long time in spite of the efforts of the extension agencies. As a result, the

average yield of coconut groves is poor with smaller sized nuts and lower copra content. The average farm yield realised in Kerala is 4244 nuts per hectare (Table 1) which is lower than the national average of 5293 nuts per hectare and far below the yields obtained in Tamil Nadu and Andhra Pradesh.

A look at the international scenario where 4500 to 5000 nuts are required to produce one tonne of copra, the corresponding figure for India would be 6800 nuts (Thampian, 1988). The per capita availability of coconut in the country is as low as 10 nuts/year whereas it is as high as 53 nuts in Indonesia and 124 nuts in Sri Lanka. Population factor appears to be an important reason and more so it is to be realised that cultivation of coconut is confined to the coastal areas of the country which ultimately have to meet the entire demand. Major area under coconut in the country is concentrated in the four southern states viz. Kerala (60.52%), Karnataka (14.85%), Tamil Nadu (12.86%) and Andhra Pradesh (3.42%).

Thus major efforts are needed to increase the productivity of coconut groves in these states for an overall impact in coconut production in the country. The challenge remains and is centred around several factors.

TABLE 1. COCONUT STATISTICS - AREA AND PRODUCTION

State	Area '000 ha.	Production M. nuts	Yield/ha.	
Kerala	864.6	3669.5	4244	
Karnataka	212.2	1091.9	5143	
Tamil Nadu	183.8	1552.8	8448	
Andhra Pradesh	48.9	480.0	6794	
Total :	1309.5	6794.2	--	(91.66%)
5. Others (Orissa, Goa, Diu, Daman, Andaman & Nicobar Is., W. Bengal, Assam, Maharashtra, Tripura, Lakshadweep, Pondicherry)	119.2	768.1	--	(8.34%)
Total :	1428.7	7562.3	--	

Figures in parenthesis indicate percentage of total area.
Source: Statistics Division, CPCRI, Kasaragod.

FUTURE NEEDS TO INCREASE COCONUT PRODUCTION :

I. Nutritional and agronomic requirement :

- Increase in yield of coconut groves by systematic fertilizer application.
- Resorting to fertilizer application in the young coconut gardens.
- Systematic fertilizer application and agronomic management in the new plantings.
- Resorting to drip irrigation-cum-fertilizer application in the existing coconut gardens.
- Reducing dependence on inorganic fertilizer application (particularly N) by 50% through organic farming.
- Understanding the most limiting nutrients, their role in increasing productivity in existing gardens.
- Detailed studies on methods to manipulate the soil nutrient availability and improve fertilizer use efficiency.
- Introduction of high density planting in coconut gardens in areas with assured water supply or well distributed rainfall.
- Use of slow release fertilizers as a means of sustaining nutrient availability for a longer time in the soil especially nitrogen.
- Studies on mycorrhizal influence and biological nitrogen fixation on soil nutrient availability.

II. Selection of high Yielding and/or hybrid planting material for new planting/replanting.

III. Combating diseases, pests, etc.

If the above suggestions are understood and adopted judiciously, the coconut production in the country could be increased substantially besides increasing the net economic return to the farm families. This will also generate additional employment to the farm families.

YIELD GAP ANALYSIS:

The existing scene indicates the national yield to be 28-30 nuts/palm/year (@ 175 palms/ha) when range of values for 15 years was computed. This palm density had to be assumed as it varies widely in the cultivated gardens. Nevertheless, the farm yields have reached a plateau (farm yield plateau) and has to be improved or elevated to have an overall impact on coconut production in the country.

Fig. 1 depicts the relationship between yield and yield increase due to fertilizer management and research efforts. The research-cum-fertilizer demonstration experiments conducted in the country have demonstrated that fertilizer application as recommended in the package of practices can improve yields by 30-35% in the existing coconut plantations which were hitherto under neglect (1). This yield gap is not due to the technology transfer process. The adoption of suitable agronomic fertilizer practices although could increase the yields, is constrained by several socio-economic factors at farmers' level.

The yield could be improved

by economic assistance to farmers through funding agencies, for fertilizer application or through national fertilizer application programme. As the minimum holding is 0.25 ha of coconut garden and 80% of such holdings constitute the major area under coconut, building of this yield gap or elevation of farm yield plateau will have a major impact on overall production (2).

Thus there is a need for economic assistance to the coconut growers through national/regional funding agencies. This is more or less an attempt to repair the damage already done to the yield potential of coconut by not adapting required fertilizer and crop management over a long period of time. Our experience shows that such mid-term corrections can increase the yield of palms on an average by 40% in the existing neglected gardens.

A quick appraisal of figures suggests that an intensive fertilizer application in 5% of existing neglected gardens can produce additional 13.23 million nuts per annum. The impact of concerted efforts to fertilize 25% of existing holdings can produce additionally 66.15 million nuts contributing substantially to the farmers income and additional copra and oil production in the country. The only question left with is to how far the increase in yield can be sustained under fertilizer application alone in the existing gardens. This is another area of interest which needs to be understood coupled with response to most limiting nutrient. Such fertilizer application should be based on sound soil and plant analysis recommendations.

The young plantations which have not started yielding will also be

benefited if fertilized with inorganics. The likely yields will, though be less than research farm yields (3), be substantially higher than those obtained under fertilized condition in existing gardens. Such young plantations cannot be located in isolation, but needs to be identified and fertilized.

New plantings as a part of area extension in traditional areas or non-traditional areas should be fertilized from the beginning as indicated in the package to obtain near research farm yields (3).

A yield of more than 417 nuts per palm per year has been obtained with stray palms (Swaminathan, 1976) indicating the yield potential. Genetic investigations and plant breeding strategies can strive to attain such higher yields in palms (4).

MANAGEMENT:

The package of practices for cultivation and management of coconut groves as envisaged in the technical bulletin of Central Plantation Crops Research Institute, Kerala Agricultural University and Tamil Nadu Agricultural University provide valuable information.

a) Green Manure and Green Leaf Manure:

Available technology on cultivation of certain green manures viz. *Pueraria phasecoloides*, *Mimosa invisa*, *Calopogonium mucunoides* indicates an average yield of 19.43, 17.00 and 14.71 kg green manure respectively when cultivated over an area of 1.80 m around the coconut bole. Cultivation *in-situ* and incorporation of the above green manures in

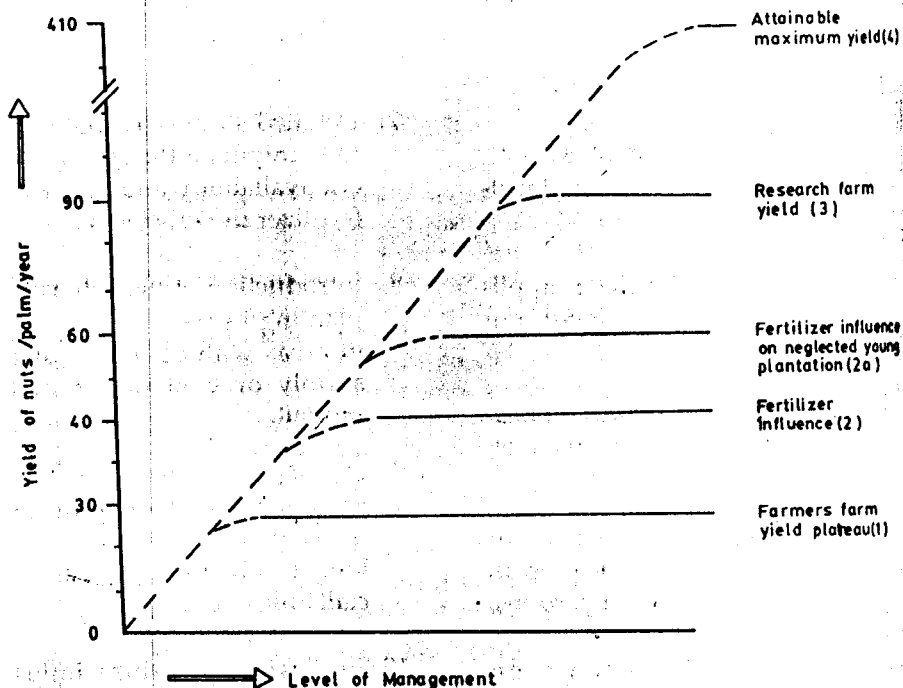


Fig.1. Management - yield relationship in coconut

e coconut basin (coconut basin management) can add nitrogen @ 3.19g, 129.29 g and 102.61 g/basin respectively on mineralization Thomas and Shantharam, 1984).

Preliminary studies with *limosa invis* grown in interspaces of coconut gardens show that it can yield 3282.5 kg dry matter/ha and can contribute 75kg N, 6.12 kg P₂O₅ and 37.74 kg K₂O per ha if incorporated to the advantage of palms.

These studies nevertheless suggest ways to reduce dependence on inorganics to a large extent which are less capital investive.

b) *Mixed farming* :

Research -cum-demonstration plots of 0.25 ha laid out by Central Plantation Crops Research Insti-

tute to educate farmers about performance of coconut hybrids and benefits of coconut based cropping systems had given convincing results. Growing subsidiary crops enhanced the coconut yields by 22.6% over control and an additional income of Rs. 1587 from 0.25 ha was realised. Mixed farming improved productivity by 21.2% and 1800 kg fodder grass was harvested from 0.25 ha unit (Muliyar, 1989).

c) *Fertilizer Management*:

Experimental evidences from farmer's field have indicated that application of double the recommended dose in the first year followed by recommended dose of 500:320:1200 g N, P₂O₅, K₂O respectively per palm per year helped in early enhancement of yield-Table II (Nelliat *et al.* 1982).

d) *Response of Coconut Genotypes to Manuring*:

Studies on the performance of WCT, COD x WCT, WCT x COD under rainfed conditions and interpretation of soil and leaf analysis data had indicated large responses to application of NPK fertilizers in all the three genotypes (Hameed Khan *et al.* 1986 a) Table III. The response of COD x WCT also showed that it utilises better the soil form of nutrients as well as applied nutrients (Hameed Khan *et al.* 1986 b)

e) *Irrigation*:

Though experiments with basin irrigation to adult coconut palms have given higher yields, drip irrigation is favoured which reduces conveyance loss of water to a large extent. The Centre for Water Resource Development and Management in Kerala recommends application of 30 L water/palm/day through three or four emitters which was found to be on par with 45 L/palm/day by basin irrigation.

TABLE II. RESPONSE OF PALMS GROWN UNDER NEGLECT TO MANURING

Treatment	Total nut yield/palm*
Control-Farmer's practice	101
Double dose and recommended dose subsequently	265

*for 5 years

TABLE III. YIELD OF COCONUT CULTIVARS UNDER DIFFERENT FERTILIZER LEVELS

Cultivar	Cumulative yield (from 1972 upto 1983)		
	M - 0	Fertilizer level M - 1	M - 2
WCT	131	435	578
COD x WCT	293	936	937
WCT x COD	87	473	503

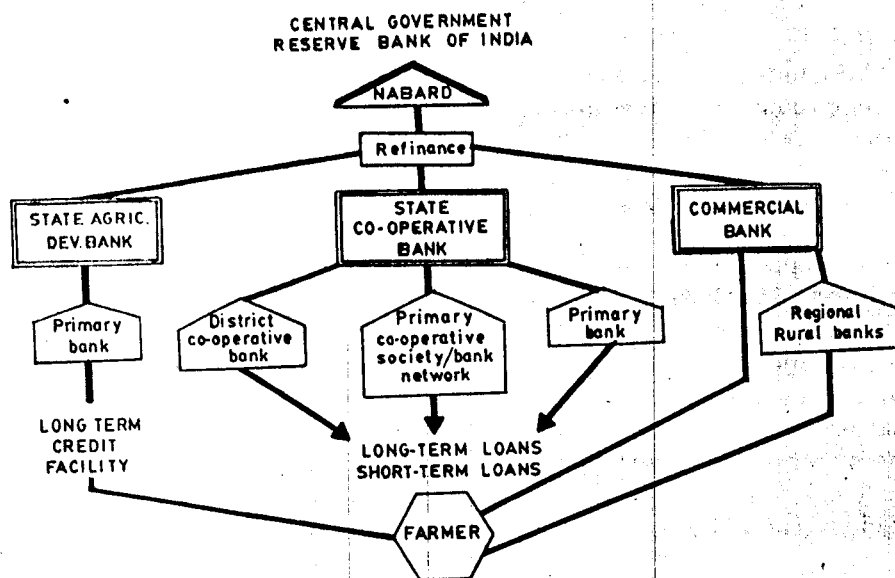
M-0 Control; M-1 - 500:1000:1000; M-2 - 1000:2000:2000 g N, P₂O₅ and K₂O/palm/year. COD - Chowghat Dwarf Orange, WCT - West Coast Tall.

FINANCE:

Realising that 80% of the holdings are small and the economic condition of farmers of such holdings will be poor, several institutions have come forward to extent financial assistance for cultivation of coconuts/maintenance of existing gardens/providing additional capital investive ventures like drip irrigation, etc.

The Coconut Development Board has a multi pronged strategy to boost coconut production by increase in area under coconut, rehabilitation of existing area, introduc-

NABARD'S NETWORK OF CREDIT FACILITY TO FARMERS



tion of irrigation facilities and systematic intercropping with high value crops. Such a scheme requires long term credit facilities/short term crop loans according to necessity.

The National Bank for Agriculture and Rural Development (NABARD) offers refinance facility to State Agricultural Development Bank, State Cooperative Bank, Scheduled Bank, Scheduled Commercial Banks and Regional Rural Banks.

In Kerala alone NABARD is implementing more than 300 schemes for development of coconut with a loan involvement of 600m rupees apart from the short term credit support being extended to co-operative banks.

NABARD had also sanctioned state-wise schemes for rejuvenation of the palms which were seriously affected by unprecedented drought situations.

The rate of interest for loan availed by small and marginal farmers for plantation development is 10% compared to 12.5% charged by other agencies. Loan for minor irrigation and land development is also available at 10% interest rate.

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HANDICRAFTS DEVELOPMENT CORPORATION OF KERALA LIMITED

The Handicrafts Development Corporation of Kerala Limited (HDCK) was incorporated as a State Government concern in the year 1968 with the objective of promoting the development of handicraft industry in the State. The HDCK serves not only as a promotional agency but also provides support facilities for the benefit of artisans engaged in the handicraft industry. Among the major handicraft items produced in Kerala are wood carvings, ivory, mats, fibre crafts, and other articles made from bamboo, coconut shell and shells. The estimated number of craftsmen engaged in the above crafts in the State alone is 1,42,000.

Support Facilities

The HDCK undertakes various service activities for the benefit of artisans. This includes the procurement of finished goods from artisans as well as the supply of raw materials to them. The purchases made by the HDCK from the artisans increased from Rs. 31.56 lakhs in 1975 - 76 to Rs. 175 lakhs in 1988 - 89.

HDCK also provides support facilities to the artisans by operating a Common Facility Service Centre and a Raw Material Depot. This Common Facility Service Centre provides workshop facilities to artisans as well as renders professional and technical assistance to them. About 95 persons currently receive direct employment at the Common Facility Service Centre located at Attakulangara near Trivandrum. The raw materials supplied to the artisans at this Centre include sandalwood, rosewood and screwpine products. Services of senior artisans, who have received National and State awards are also utilised for providing training and guidance to artisans.

The Raw Material Depot has been set up to assist the procurement and distribution of raw materials to registered artisans, whose names are approved by the District Industries Centre. Artisans who are eligible to receive assistance from the Raw Material Depot are identified by the HDCK in co-ordination with the Office of the Director of Industries and Commerce, Government of Kerala. 25 per cent of the value of raw materials supplied at this depot is subsidised by the State Government by way of reimbursement.

:Public Sector