



# Enhancing productivity and income from coconut farming in Kerala- need for interventions on soil health management

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Coconut plays a significant role in the cultural and socio-economic life of people of Kerala state. There is no other crop which is so closely interwoven with the daily life of Keralites. However, Kerala state, known as the land of coconut, is gradually losing its days of coconut prosperity. An analysis of the performance of coconut sector in the state indicates such a trend. Even though Kerala stands first in area and production of coconut among the leading coconut producing states in India its contribution to the total area and production of coconut in the country is declining over the years. Moreover, the productivity of coconut in Kerala is very low and it is less than the national average. Kerala's share in the total area and production of coconut in the country during the year 1956 was 69% and 71% respectively while its share has reduced to 37 % and 34 % respectively during the year 2015.

As per the statistics (2015-16), Kerala state stands first in coconut production in India. With an area of 7,70,620 ha under coconut cultivation, Kerala is having the largest share (37 %) of coconut area in the country. However, during the last decade the area under coconut cultivation in the state is steadily decreasing. In comparison with the year 2005-06 there is a marked reduction of 14% in the area under coconut in the state. Kerala ranks first in coconut production in the country closely followed by Tamil Nadu. As per 2015-16 statistics, coconut production in the state is 7,429 million nuts compared to 6,171 million nuts of Tamil Nadu. Productivity of coconut in

the state (9,641 nuts per ha) is below the national average (10,614 nuts per ha) and productivity of Tamil Nadu (13,423 nuts per ha).

Factors such as low price price fluctuation of coconut in the market, predominance of old and senile palms, fragmentation of holdings, absentee landlordism, replacement of coconut land with more remunerative crops, crop loss due to pest and disease incidence, high cost and scarcity of labor leading to the neglect of the crop, lack of irrigation facilities, lack of adoption of recommended crop management practices especially nutrient management etc have contributed to the low productivity and negative growth rate in area and production of the crop in the state. Apart from creating favourable policy environment and implementing appropriate institutional support programmes by the government agencies, efforts are required for implementing a comprehensive coconut rejuvenation scheme, interventions for empowering coconut growers to utilise technologies for enhancing productivity and reducing cost of cultivation, adopting multiple cropping and mixed farming in coconut gardens instead of coconut monocropping and value addition through product diversification to revitalize the coconut sector in the state.

## Soil health in coconut gardens

A recently published report on the project coordinated by State Planning Board, Kerala, on the fertility status of soils of Kerala state clearly indicate that soils in the state are nutrient hungry

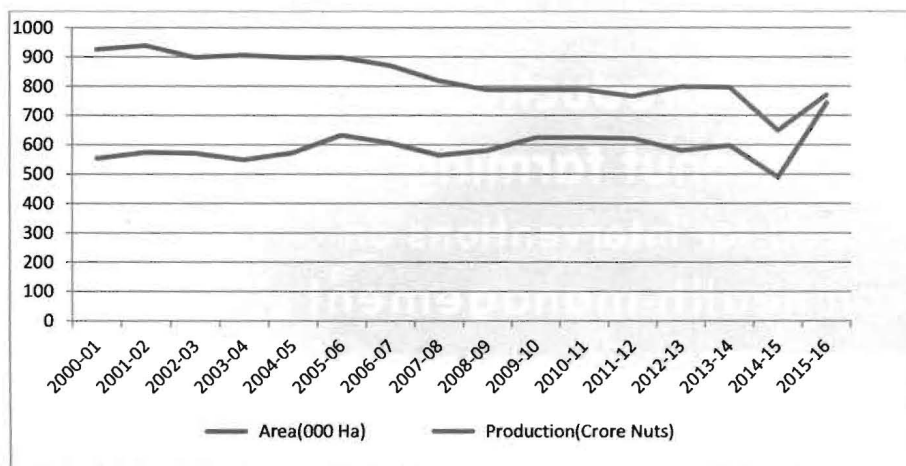


Fig 1. Trend in area and production of coconut in Kerala state

Boron deficiency symptom

and also suffer due to soil acidity adversely affecting productivity of crops like coconut. Strong soil acidity, deficiency of major nutrients especially potassium, extensive deficiency of secondary nutrients like calcium and magnesium and wide spread deficiency of micro-nutrients such as boron are the soil related constraints in coconut growing tracts resulting in poor health and low productivity of coconut palms in the state. Problems due to poor soil health are observed in all the major coconut growing tracts of Northern Kerala, Central Kerala, Southern Kerala and Coastal Sandy Plain (including Onattukara sandy plain) region. Study on assessment of soil fertility in rubber-growing areas has pointed to strong subsoil acidity and high levels of aluminium in soils of Kerala. The aluminium in soil solution can cause root injury to most crop plants.

### Soil fertility status of Kerala

Importance of soil health enhancement which holds the key to raising small farm productivity was highlighted in the report on the recommendations by the National Commission on Farmers headed by Dr. M. S. Swaminathan. The commission recommended that “every farm family should be issued with a Soil Health Passbook, which contains integrated information on the physics, chemistry and microbiology of the soil in their farm. More laboratories to detect specific micronutrient deficiencies in soils are urgently needed. Soil organic matter control will have to be increased by incorporating crop residues in the soil. Proper technical advice on the reclamation of wastelands and on improving their biological potential should be available. Pricing policies should promote the balanced and efficient use of fertilizers”.

National Mission for Sustainable Agriculture (NMSA) is being implemented by the Department of Agriculture and Co-operation, Ministry of Agriculture & Farmers Welfare with the objective to make agriculture more productive, sustainable and climate resilient; to conserve natural resources; to adopt comprehensive soil health management practices; to optimize utilization of

Year	Area (in thousand ha)	Production (million nuts)	Productivity (Nuts/palm/year)
1956-57	459.7	3182	6921
1966-67	609.6	3424.7	5617
1976-77	695	3348	4817
1986-87	706	3173	4494
1996-97	1006	5834	5802
2006-07	808.6	5921	7322
2015-16	770.6	7429	9641

(Source: Coconut Development Board)

Soil characters	Category	Percentage
Soil reaction (pH)	Extremely acidic(<4.5)	9.5
	Strongly acidic (4.6-5.5)	45.5
	Moderately acidic (5.6-6.5)	36.0
	Neutral & alkaline (>6.5)	9.0
Available Nitrogen	Low	24
	Medium	41
	High	35
Available Phosphorus	Low	19
	Medium	18
	High	63
Available Potassium	Low	33
	Medium	37
	High	30
Available Calcium	Deficient	40
	Adequate	60
Available Magnesium	Deficient	74
	Adequate	26
Available Sulphur	Low	30
	Medium	17
	High	53
Available Zinc	Deficient	12.5
	Adequate	87.5
Available Copper	Deficient	15
	Adequate	85
Available Boron	Deficient	59
	Adequate	41

(Source: Rajasekharan et al 2013. Soil fertility Assessment and Information Management for Enhancing Crop Productivity in Kerala)



water resources; etc. Soil Health Management (SHM) is one of the most important interventions under NMSA. SHM aims at promoting Integrated Nutrient Management (INM) through judicious use of chemical fertilisers including secondary and micro nutrients in conjunction with organic manures and bio-fertilisers for improving soil health and its productivity; strengthening of soil and fertiliser testing facilities to provide soil test based recommendations to farmers for improving soil fertility; ensuring quality control requirements of fertilisers, bio-fertilisers and organic fertilisers under Fertiliser Control

Order, 1985; upgradation of skill and knowledge of soil testing laboratory staff, extension staff and farmers through training and demonstrations; promoting organic farming practices etc.

Decentralized planning by the Local Self Governments for sustainable agricultural development and state sector schemes for development of coconut can implement interventions to alleviate the soil related constraints in Kerala state on a priority basis and support available under the National Mission for Sustainable Agriculture needs to be effectively channelized for improving soil health status in coconut holdings in the state to enhance yield and income from coconut farming.





### Enhancing the economic viability of coconut based land use systems

Soil related constraints and low level of adoption of soil fertility management practices are among the major factors resulting in the low productivity of coconut palms in the state. Application of manures and fertilizers based on the soil fertility status is important in the integrated nutrient management practices for sustainable coconut production. Studies have indicated that the extent of adoption of recommended nutrient management practices by coconut farmers in the state is very low due to various reasons. Of late, coconut palms in different localities in the state show the symptoms due to soil related constraints including deficiency of nutrients indicating the urgent need to adopt measures to improve the situation through appropriate corrective steps. Substantial improvement in yield can be achieved through appropriate inputs to alleviate soil related constraints and development of management strategies for the palm and the intercrops associated with it, taking into consideration the climatic and soil qualities in coconut-growing tracts across the state. It is imperative that an Agro-Ecological Unit wise perspective is necessary while Best Management Practices for improving soil health in coconut gardens in the state are evolved and validated in farmers' field and subsequently scaled up for wider adoption.

In this background a multi-institutional research-cum-demonstration network project was proposed for enhancing the coconut productivity in the state with the support of State Planning Board, Government of Kerala with National Bureau of Soil Survey and Land Use Planning (ICAR-NBSS&LUP) as the lead institute. Other organizations included Central Plantation Crops Research Institute (ICAR-CPCRI), Central Tuber Crops Research Institute (ICAR-CTCRI), Indian Institute of Spices Research (ICAR-IISR) and Krishi Vigyan Kendras (KVKs) of Alappuzha, Pathanamthitta, Ernakulam and Kozhikode districts.

The experiments and demonstrations under the project were laid out in farmers' fields covering the major Agro-Ecological Units across the state. The project sites included Cheruthazham in Kannur district representing Agro-ecological Unit 11, Naduvannur in Kozhikode district representing Agro-Ecological Unit 11, Mookkannoor in Ernakulam district representing Agro-Ecological Unit 10, Chettikulangara in Alappuzha district representing Agro-Ecological Unit 3, Mayyanad in Kollam district representing Agro-Ecological Unit 1 and Pathanamthitta representing Agro-Ecological Unit 9.

The experiments under the project were aimed at characterization of soils for properties relevant to coconut production, sampling and analysis of soil and plant tissue, and interpretation of data sets generated and development of Best Management Practices (BMP) for coconut and intercrops such as pepper, nutmeg, tapioca and elephant foot yam, with focus on soil input management. The BMP were to be validated and demonstrated in selected farmers' field in the identified agro-ecological units. Technological interventions pertaining to the BMP developed under the project include regular input of chemical fertilizers to correct the deficiencies of primary, secondary and micro-nutrients, alleviation of surface soil acidity through liming and subsoil acidity through gypsum application, additional chlorine nutrition of the palm through input of common salt, on-farm recycling of biomass through incorporating coconut leaves alone as organic matter input and reducing cost of cultivation by avoiding basin opening. Farmer participatory demonstration of these interventions are being conducted in each of the six project locations in 10 coconut gardens each with a minimum of 40 coconut palms.

The technological interventions in the experimental/ demonstration plots in farmers' fields started during the year 2015 with the onset of South West Monsoon. Since then the scheduled activities pertaining to



application of inputs and crop management practices are being carried out systematically. It requires a minimum of three years for the improvement in nut yield due to the interventions to get reflected. However, the initial indications of improvement in yield are quite encouraging. Besides, the improvement in soil qualities and palm health were quite substantial in the experimental/demonstration plots pointing towards the beneficial impact of interventions carried out. Improvement in soil health is discernible by increase in soil pH (decrease in soil acidity), for both surface and sub soils and preponderance of earth worms in treated plots. Improvement in coconut palm health is evident in the treated plots through the decline in yellowing, especially in plots in southern Kerala (south of Thrissur district), reduction in visual symptoms of boron deficiency (hooking and fasciations of leaflets), greener fronds and reduction in nut fall, reduction in leaf rot disease and reduction in drooping of fronds due to the increased drought tolerance. From the encouraging initial trends it can reasonably be expected that there would be substantial increase in yield of palms as envisaged in the project with the treatments continued for the ensuing two more years.

### **Scaling up of soil health management centric production strategy**

Taking into cognizance the field level scenario of coconut farming in Kerala state, especially the extent of adoption of soil health management practices and profile characteristics of coconut growers and the encouraging initial results of the farmer participatory research-cum-demonstrations under the State Planning Board supported project, it is imperative that urgent efforts are made for scaling up of the soil health management centric production strategy for enhancing productivity and income from coconut farming. The recently constituted Coconut Co-ordination Committee by

the Government of Kerala can bring together all the relevant stakeholders including ICAR-CPCRI, Kerala Agricultural University, Coconut Development Board, Department of Agriculture, KERAFED, Coconut Producers Federation/Companies etc. It is important that institutional mechanism is ensured for convergence of functioning of these agencies for evolving agro-ecology unit wise technology package for soil health management for coconut, assessment and refinement of technology package for soil health management, empowerment of Farmers Producer Organisations (FPOs) on production and marketing of customized fertilizer inputs, facilitating group approach through coconut FPOs and organizing community interventions for enhancing production and value addition with focus on adoption of soil health management practices. In all these activities, meaningful participation of coconut growers is to be ensured for effective implementation. Large scale pilot testing of this approach can be done through the interventions under the scheme for Special Agricultural Zone for coconut to be implemented in Kozhikode district and also through the ongoing 'Keragramam' scheme of the State Department of Agriculture for further scaling up across the state.

### **Conclusion**

Trends in coconut farming in Kerala state clearly indicate that the state is gradually losing its days of coconut glory. Interventions are needed to be implemented to enhance productivity and income from coconut farming in the state. Apart from comprehensive rejuvenation programme, strategies and schemes focusing on soil health management centric crop production are to be implemented to bring back coconut prosperity. The relevance of such a strategy is quite evident under the ongoing State Planning Board supported project on enhancing the economic viability of coconut based land use systems in Kerala state. ■