Coconut Research and Development in Kerala : Achievements and Aspirations

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Prologue

Coconut plays a very significant role in the economy and culture of Kerala. The name for the state "Kerala" is believed to be given after the coconut tree with "Kera" meaning coconut tree and "Alam" meaning land, thus giving the meaning as "land of coconut trees". Various terms like copra and coir are derived from the native Malayalam language. In Kerala, the coconut tree is called as "Kalpa Vriksham" which essentially means that all parts of a coconut tree is useful in one way or the other. Coconut palms have many uses; their leaves are used for thatching traditional houses, making sheds, baskets, and the husk for making coir and other coir products. The shell is used for making charcoal and activated carbon, ladles and spoons, and fruits for making copra and coconut oil and other value added products. Coconut is a staple ingredient in traditional cuisines of Kerala. The inflorescences are tapped for neera and coconut toddy. Kerala, the state which once enjoyed the premier position in coconut cultivation and production is now facing scarcity of suitable land for expanding the area under coconut. Instead, the growth in real estate, speedier urbanization and faster substitution of coconut area for more remunerative crops like rubber have resulted in decelerating growth in the area under coconut.

Coconut in the economy of Kerala

Coconut plays a very important role in the socio-economic development of the state. Among the leading coconut producing states in India, Kerala rank first in area and second in production of coconut. The coconut sector contributes to around 15 per cent of total agricultural GDP of Kerala, thus inextricably linked to the agricultural economy of the state. However, it is paradoxical to note that the average yield of this crop in the state is very

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low. As in the case of other crops, the yield realized by the farmers from coconut is only 30 to 40% of the potential yield reported under ideal management conditions. Kerala's share in the total production of copra in the country has declined to 46% from the 90% which existed fifteen years ago. The area under coconut has been shrinking continuously since the year 2000. It has declined from 8.98 lakh ha to 7.66 lakh ha during the period from 2005-06 to 2011-12. Similarly the production in the state has come down to 3992 million nuts in 2010-11 from 6326 million nuts in 2005-06 with a negative average growth rate of -7.9%. Despite its 40.2% share in the net cropped area in the state, Kerala is losing its share to other competitive states. Kerala contributes about 37 % of share in area and 26 % in production of coconut in India. Coconut provides raw material support for the traditional industries of coir and oil milling of the state. It is estimated that there are about 3.5 million holdings and at least 5 million people depended on this crop for their employment and livelihood in the state. The average size of coconut holdings in the state is only 0.2 ha. Of the 14 districts in the state, 11 are having area more than 11,000 ha. The toppers in area and production are the districts of Kozhikode and Malappuram and these districts possess more than one lakh ha under coconut.

The prevalence of old and senile palms, poor genetic base of a good proportion of the palms being cultivated, over populated stands of both coconut and other trees in the homesteads, poor management attention given to the crop on account of shortage of farm workers and exorbitant input costs, and severe incidence of pest and diseases are the major reasons for the low productivity of coconut plantations in Kerala. Higher price of coconut being realized, of late, is providing an incentive for the farmers to adopt systematic agro-management and plant health management for increasing production and productivity.

Coconut research in Kerala

Coconut research started in India in 1916 in the erstwhile Madras State with the establishment of four research stations, one each at Kasaragod and Pilicode and two at Nileshwar, which are now located in the Kasaragod district of Kerala. When the Indian Central Coconut Committee was established, the research station at Kasaragod was taken over by the Committee in 1947 and during 1970, it became the Central Plantation Crops Research Institute (CPCRI) under the Indian Council of Agricultural Research (ICAR). With the formation of Kerala State in 1956 the remaining three stations came under the Department of Agriculture, Govt. Kerala. Another research station was set up at Kayamkulam in 1948 which now forms the Regional Station of the CPCRI. Two research stations were started at Kumarakom and Balaramapuram under the State Department of Agriculture, Travancore during 1947 and 1948, respectively.

When the Kerala Agricultural University came into existence during 1972, one of the stations at Nileshwar (Nileshwar-II) and the station at Pilicode were transferred to KAU with headquarters at Pilicode. Under the National Agricultural Research Project (NARP), these stations have been reorganized to form the Regional Agricultural Research Station for the northern region since 1st August 1980 onwards. Another Coconut Research Station was established in 1948 at Pachalloor, near the College of Agriculture, Vellayani by the Department of Agriculture, Kerala as a scheme partly financed by the Indian Central Coconut Committee. The present coconut research station at Balaramapuram in Thiruvananthapuram District was taken over by the Kerala Agricultural University in February 1972.

Research achievements of Kerala Agricultural University (KAU)

Research programmes at RARS, Pilicode in the beginning, were centered on introduction of coconut cultivars from different parts of India and other countries, selection, hybridization, identification of superior local and hybrid varieties and their distribution among farmers. The research station maintains a unique collection of coconut germplasm consisting of 35 exotic and 40

indigenous types. Hybrid vigour in coconut was first reported from this Station. The first ever hybrid *viz.*, WCT x CDG, popularly known as T x D was evolved and planted at Nileshwar in 1936. Later during five more hybrids were released from this station. The coconut hybrids developed from RARS, Pilicode are given in Table 1.

of seedlings, fertilizer dosage and application, intercropping, scheduling of irrigation for yield improvement etc. In the crop protection front, technology for management of stem bleeding has been developed.

KAU had developed methods for the extraction

Table 1.Coconut hybrids developed from RARS, Pilicode

Sl. no.	Name	Parentage	Nut yield (palm/year)	Copra yield (g/nut)	Oil content (%)
1	Keraganga	West Coast Tall × Gangabondam	100	201	69
2	Ananda Ganga	Andaman Ordinary × Gangabondam	95	216	68
3	Kerasree	West Coast Tall × Malayan Yellow Dwarf	140	216	66
4	Kerasowbhagya	West Coast Tall × Straight Settlement Apricot	130	195	65
5	Laksha Ganga	Laccadive Ordinary × Gangabondam	108	195	70

Kerasree ranked first in copra yield (216 g/nut) and it could produce 250 nuts/palm/year and copra outturn of 30 kg/palm/year, while Kerasowbhagya could produce 217 nuts/palm/year with copra outturn of 25 kg/palm/year under good management conditions.

Kerasagara is a selection from Seychelles (SE Asia). It is tall in nature and flowers in 8 years, with light green nuts and has a mean yield of 99 nuts/palm/year with the copra content of 209 g/nut and oil content of 68%. Chowghat Orange Dwarf, Bengal Laccadive ordinary were identified as suitable varieties for tender nut purpose. A variety named "Kera Madhura" has been developed for release from Malayan Green Dwarf variety which is suited for tender nut purpose. Research on developing dwarf hybrids of coconut, hybrids from crosses involving the highly productive variety, Ayiramakachi are in progress.

In the crop management front, the station has standardized the nursery techniques for production

of neera and standardized the technology for arresting the fermentation of the sap and its preservation. Three pilot plants are being set up by KAU on its campuses at Pilicode in Kasaragod district, Vellanikkara in Thrissur, and Vellayani in Thiruvananthapuram, each with a production capacity of 1,000 litres of neera per day. The KAU brand of neera is known as 'Keraamritham'.

The Research and Development wing of the Agricultural Research Station, Mannuthy has developed a coconut climbing machine (KAU Kera Suraksha Coconut Climber) on which the user can sit and operate. The station has also developed a tiller for making basins in coconut fields. A basin of 1.8 m radius can be made around the tree in 10 minutes with two to three rotations.

Research achievements of Central Plantation Crops Research Institute

CPCRI maintains the largest coconut germplasm collection in the world and it maintains a total

of 433 coconut accessions, of which 301 are indigenous collections and 132 exotic collections from 26 countries. India also hosts the International Coconut Gene bank for South Asia (ICG-SA), one of the five multi-site gene banks of coconut. Crop improvement research conducted by CPCRI so far has resulted in the development of 27 selections and 15 hybrids of coconut suitable for cultivation in different states of India. The details of varieties/ hybrids suitable for cultivation in Kerala are given in Tables 2 & 3.

Table 2. Improved varieties developed through selection for cultivation in Kerala

Variety	Important traits	Nut yield (per ha/year)	Copra yield (t/ha/year)
	Tall		
Chandra Kalpa	Drought tolerant, high copra oil content, suitable for neera tapping	17700	3.12
Kerachandra	High yield, dual purpose variety for copra and tender nut, suitable for soap industry	19470	3.86
Kalpa Pratibha	High nut and oil yield, dual purpose variety for copra and tender nut	16107	4.12
Kalpa Mitra	High nut and oil yield, drought tolerant	15222	3.68
Kalpa Dhenu	High nut and oil yield, drought tolerant	14160	3.41
Kalpa Harita	Dual purpose variety for copra and tender nut, less eriophyid mite damage	20886	3.70
Kalpatharu	Drought tolerant, ball copra, high yield, coir fibre amenable for dyeing	20709	3.64
Kera Sagara	High yield	17523	3.64
	Dwarf		
Chowghat Orange Dwarf	Tender nut purpose,orange colour fruit, coarse fibre	19824	2.78
Kalparaksha	Semi-tall, green colour, high nut and oil yield, for root(wilt) disease prevalent areas, tender nut purpose	13260	2.85
Kalpasree	Early flowering, green colour fruits, superior oil, rich in linoleic acid, for root(wilt) disease prevalent areas	15930	1.54
Kalpa Jyothi	Tender nut purpose, yellow colour fruit	20178	2.86
Kalpa Surya	Tender nut purpose, orange colour fruit	21771	4.07

Table 3. Coconut hybrids released for commercial cultivation in Kerala

Hybrid	Parentage	Important traits	Nut yield (per ha/year)	Copra yield (t/ha/year)
Chandra Sankara	COD x WCT	High yield	20532	4.27
Kera Sankara	WCT x COD	High yield, drought tolerant	19116	3.78
Chandra Laksha	LCT x COD	High yield, drought tolerant	19293	3.76
Kalpa Samrudhi	MYD x WCT	Dual purpose, drought tolerant, high nutrient use efficiency	20744	4.35
Kalpa Sankara	CGD x WCT	High yield, tolerant to root(wilt) disease	14868	3.20
Kalpa Sreshta	MYD x TPT	Dual purpose, high yield	29227	6.28

The germplasm conserved and some of the varieties/hybrids released have quality traits such as high copra content (>300 g /nut), high oil content (>72%), high copra/oil output (>4 t copra/ ha and >2.5 t oil/ha), suitable for ball copra production, higher quantity of tender nut water with good organoleptic quality, drought tolerance, root (wilt) disease tolerance, leaf spot disease resistance, eriophyid mite resistance, sweet endosperm etc.

Coconut has remained highly recalcitrant to *in vitro* culture. Eventhough plantlets have been regenerated and successfully established in the field, using plumular explants, a commercial scale protocol has not been achieved and conversion of somatic embryos into plantlets has remained one of the major bottlenecks. The coconut embryo culture protocol developed at ICAR-CPCRI was instrumental for introduction of exotic germplasm (45 accessions) from Indian Ocean islands and also for embryo rescue in coconut with special traits like sweet coconut (*'Mohachao Narel'*) and *'Makapuno'* type of coconut, which do not normally germinate in nature. Cryopreservation of coconut zygotic embryos and pollen has been successfully employed as an alternative method for long-term conservation of coconut germplasm, thereby sheltering genetic resources from biotic and abiotic threats. Selection of hybrid seedlings in coconut, relying on morphological parameters, often results in selection of undesirable out-crossed seedlings and also rejection of few good hybrids. Molecular markers have been identified for differentiating tall and dwarf cultivars of both coconut. These markers have been converted as Sequence Characterized Amplified Region (SCAR) markers and validated and also utilized to authenticate hybrids in D (dwarf) x T (tall) crosses in coconut and arecanut. A panel of SSR markers has been identified for confirming the hybridity of D x T hybrids, which will ensure supply of genuine hybrids to farmers.

Many crop husbandry practices have been deduced from agronomic trials conducted at CPCRI. They include optimum manurial schedule, water, cultural requirements, and drip fertigation schedules, eco-friendly technologies for crop residue management through vermicomposting and vermiwash production, exploitation of microbial resources for soil health maintenance, utilization of legume-rhizobium symbiotic systems through cultivation and incorporating green manure crops, use of plant growth promoting rhizobacteria for bioaugmentation of coconut seedlings in the nursery, technology for improving productivity of coastal sandy soils through adoption of soil moisture conservation measures and intercropping, as well as adoption of suitable agro-engineering measures

for soil and water conservation in coconut gardens. Package of practices for organic cultivation practices have been standardized. Various coconut based cropping system models involving cultivation of compatible crops like tubers, flowering, medicinal and aromatic crops, fruits, vegetables, spice crops, in the interspaces of coconut was found to be more remunerative compared to coconut mono cropping.

Electron microscopic observation of root tissues of the root (wilt) diseased palms and PCR technique revealed presence of phytoplasma in the samples. Transcriptome profiling of coconut root (wilt) disease susceptible and resistant *Chowghat Green Dwarf* cultivar using RNA-Seq revealed transcripts up-regulated in resistant samples. Many of these differentially expressed transcripts were primarily involved in defense responses, signaling pathways, cellular transport and other metabolic processes. Hot spot survey, identification of root (wilt) disease escapes and their utilization in the breeding programme has resulted in the development of disease tolerant varieties. For the management of root (wilt) disease, an integrated package involving use of organic manures, improving soil chemical condition through application of dolomite and chemical fertilizers including MgSO4, raising and incorporation of leguminous green manure crop, adoption of inter/mixed farming, timely adoption of integrated pest and disease management etc. have been developed and successfully demonstrated.

There have been significant achievements in developing and refining integrated management strategies for pests and diseases affecting coconut. Red palm weevil, rhinoceros beetle, leaf eating caterpillar, eriophyid mite, white grub and coreid bug are some of the important pests affecting coconut. Integrated management strategies for these pests involving phytosanitation, behavioural manipulation, prophylactic as well as curative treatment through application of insecticides, bio control agents etc. were developed. Nanomaterials have been developed for pheromone delivery, and pheromone loaded in nanoporous matrix had extended field efficacy compared to commercial lures loaded in polymer membranes.

Diseases such as leaf rot, bud rot, stem bleeding, and basal stem rot are found to adversely affect the growth and productivity of coconut palms. Integrated management strategies for these diseases involving phytosanitation, prophylactic as well as curative treatment through application of fungicides/consortia of bio control agents etc. were developed.

On the farm mechanization and post harvest technology front, development of labour saving machineries /implements/gadgets was another significant achievement of the Institute. Some of the machineries include ultra light weight coconut harvester, power operated sprayer, copra dryers using different energy sources and capacities, coconut chips slicer, coconut chips dryer, power operated coconut splitting device, coconut deshelling machine, coconut testa remover, coconut grating machine, coconut milk expeller, coconut oil separator, modified snowball tender nut machine, tender coconut cutter, tender nut punching machine, VCO cooker, and a simple coconut palm climbing device and a safety device for coconut climbing. Technologies for making value added products like snowball tender nut (SBTN) and coconut chips of various flavours have been developed and are being promoted vigorously among prospective entrepreneurs. Technology/ know-how for production of virgin coconut oil by fermentation and by hot processing has been standardized, machineries for VCO production has been developed and transferred to several entrepreneurs, self help groups and NGOs.

Coconut development in Kerala

Developmental activities for coconut in Kerala are mainly taken up through the department o agriculture and the Coconut Development Board The main objectives of the schemes taken up by the department are to facilitate the adoption

of economically viable farming system and to maximize productivity of coconuts through cut and removal of old and senile palms, replanting with disease tolerant seedlings, scientific management of the existing coconut gardens and providing irrigation facilities. Apart from this, augmenting production of planting materials through departmental farms, coconut crop insurance and other schemes through Rashtriya Krishi Vikas Yojana are being implemented by the department. The Central schemes implemented by the department are the production of T x D hybrid seedlings and establishment of regional nurseries as well as national project on organic farming and CDBs scheme for integrated farming in coconut holdings for productivity improvement.

Coconut Development Board under the Ministry of Agriculture was established in 1981 with its headquarters in Kochi for the development of coconut cultivation and allied industries. The Board commenced implementing developmental programmes from 1982-83 which was the third year of the Sixth Five Year Plan Period. Programmes triggering the production, processing and export were effectively implemented through schemes *viz.*, production and distribution of planting material with emphasis on dwarf and hybrids, expansion of area under cultivation, integrated farming for productivity improvement, technology demonstration, coconut palm insurance scheme, and replanting and rejuvenation of coconut gardens. Realizing the importance of production and distribution of planting material, the Board has implemented various programmes, including production and distribution of hybrids and other improved varieties through state departments, establishment of regional coconut nurseries and assistance for establishment of nucleus seed gardens/ nurseries. Considering the importance of identifying suitable varieties and enhancing the production of seedlings, demonstration-cum-seed production farms were established in different agro climatic region of the country. At present the Board is having 7 DSP farms covering an area a total of 240 ha in different states and the one in Kerala is at Neriamangalam in Ernakulam district.

The Govt. of India sanctioned the Central Sector Scheme "Technology Mission on Coconut" (TMOC) during January 2002 to provide technical support, evaluation and emergent requirement, management of insect pest and diseases as well as processing for value addition and product diversification. The new initiatives of the Board include enhancing the productivity and income from unit area of coconut holdings through cluster approach, rejuvenation and replanting in coconut gardens in 11 other districts (Thiruvananthapuram, Kollam and Thrissur-already implemented), creation of skilled labour bank through "Friends of Coconut Tree" programme etc. Welfare schemes like coconut palm insurance scheme and "Kera Suraksha" insurance scheme for coconut tree climbers are also implemented by CDB.

Recently the Board has initiated formation of coconut producer societies (CPS) by mobilization of small and marginal coconut farmers in a contiguous area and their federated forms of Coconut Producers Federation (CPF) and Coconut Producers Company aimed at socio economic upliftment of the farmers through productivity improvement, cost reduction, efficient collective marketing and processing and product diversification.

Aspirations and approaches for a vibrant coconut sector in Kerala

The immediate priorities for improving the coconut production in Kerala are; massive cutting and removal of root (wilt) disease affected coconut palms which are beyond recovery, removal of over aged palms; regulating the palm density and replanting with high yielding planting materials along with adoption of suitable agro-management practices in farmer participatory cluster mode.

It is of paramount importance to develop an exclusive policy for production and supply of elite planting materials to the farmer. Further, to increase

the quality seedling production in coconut, it is necessary to develop coconut seed gardens in a Private Public Partnership (PPP) mode so that the enhanced seedling production to the tune of 50% of the expected demand can be assigned to Coconut Producers Societies, accredited Coconut Nurseries and NGO's, through a decentralized seedling production programme which would thereby effectively complement the quality planting material production from the government sector.

Since most of the existing seed gardens in Kerala have been established more than 25 years back, the existing mother palms (especially dwarfs) in such seed gardens are nearing senility. Hence, urgent action should be initiated for replanting such seed gardens with parental lines of new and improved varieties recommended for the respective regions. Further, to increase the capacity for hybrid seedling production, a decentralized production mechanism is to be envisaged by maintaining a centralized pollen storage and supply mechanism.

It is also essential to develop a system of mandatory accreditation of all coconut nurseries. Meanwhile, sale of coconut planting materials from other non-recognized agencies should necessarily be banned to prevent sale of spurious planting materials. This is of greater significance in plantation crops like coconut, since there is a long juvenile phase and the genetic potential of the palm will be visualized only after a few years of planting, and use of inferior palms for planting would result in huge loss to the growers in terms of production capability and input-use efficiency.

Rainfed cultivation of coconut is one of the major reasons for low productivity in Kerala. The water scarcity being experienced by the palms during December to May months causes reduction of yield during the lean periods. Irrigating coconut palms wherever possible could be adopted. The drip irrigation system along with fertigation is found to be the best suited with maximum water saving and fertilizer use efficiency. There is need to provide assistance to the coconut sector for large scale adoption of this technology.

Massive campaigns for on farm organic matter recycling, especially in the context of Kerala going to be an organic farming state, identification and effective management of pests and diseases(especially red palm weevil and bud rot) in decentralized (panchayat level) mode are necessary. Crop surveillance and timely forecast of disease incidence should be carried out by the research and development agencies in endemic areas. Capacity building programmes for the benefit of small and marginal farmers on identification/understanding of field problems and adopting solutions is also essential.

Strengthening and popularization of systematic coconut based farming system as a strategy to make coconut farming economically viable in small holdings needed to be highlighted. Financial assistance extended under NHM as well as other state schemes can be made available to the farmers for adopting coconut based farming system.

It has been indubitably proved that a large number of value added products could be made from coconut meat, water, shell, coir pith through composting etc. Therefore, promotion of farm level and community level processing of diversified products and byproducts obtained from coconut palm are highly imperative.

Tender coconut marketing is one of the profitable activities which need to be promoted in the state. Farmer's collectives as well as enterprising youths are to be supported in organizing marketing outlets in potential areas for tender coconut. This not only helps to improve the farm level economy of farmers, but also create opportunities for employment to the rural youth in the state.

Another strategic area yet to be utilized in the state is production of neera and palm sugar. Technologies are now available for preserving and packing coconut sap as 'neera 'or sweet toddy as non-alcoholic health drink. The Government

of Kerala has issued license to various Farmer Producer Organizations on a pilot scale in all the districts of Kerala to produce, process and market neera. The CPCRI technology for the collection of inflorescence sap (Kalparasa) is very hygienic and contamination free. Various value added products like coconut palm sugar, palm jaggery, coconut honey and coconut syrup can be made from neera. If effectively utilized, tender coconut and neera, are capable of helping the farmers to cope up with the price instability in coconut. Therefore it is essential to encourage farmers' organizations to produce various value added products from neera in attractive packing and exploit the domestic and international markets.

Encouraging more entrepreneurs in coconut sector by establishing 'Coconut Parks' by state government for organized processing for value addition will help coconut farmers to de-link the over dependence on coconut oil in determining coconut price. To begin with, Coconut Parks may be set up in districts with an area more than 20,000 ha under coconut cultivation. The Government of Kerala had announced establishment of three 'Coconut Bio Parks' in their 2012-13 budget.

Unilateral increase in production alone will not help the sustenance and stability of the sector. The growth of production must be supplemented with guaranteed procurement and remunerative price for the farmers. In order to create an impact in the market and for the benefits of MSP to reach the genuine coconut farmers, adequate quantity of copra should be procured. The studies on pattern of distribution of annual yield of coconut indicates that the number of nuts harvested, varied from harvest to harvest, and 60% of the production of a coconut palm is harvested during the peak production period *i.e.*, the first six months of the calendar year, and hence a stable price during these periods is utmost important. The copra procurement scheme should be designed keeping view of this important aspect of coconut production in the state.

Making available skilled climbers for undertaking timely plant protection operations as well as harvesting is another serious concern. Therefore, stakeholders must contemplate on this issue to come up with a sustaining labour bank for coconut climbing and related operations.

Participatory research involving farmer groups for refining and fine tuning of technologies for higher efficiency of the sector is to be given greater emphasis. Farmer organizations are to be facilitated for meaningful partnership in technology generation and transfer for achieving efficiency in coconut commodity chain.

Integrating youth/women farmers organizations with other main stream groups in agriculture with leadership roles and mainstreaming functions should be supported with policy prioritizing, for empowerment of the target groups and sustained development of the coconut sector.

Summing up

The current sectoral innovation system of coconuts in Kerala has huge strengths on the research front of coconut, but the lack of price stability, inadequate price support mechanism and marketing facilitation are the factors detrimental to the functioning of coconut value chain in the state. The lack of effective group coherence among different stakeholders is still remaining as a problematic facet. The Institutes should take a lead role to re-engineer and revitalize the coconut sector in the state by providing adequate emphasis on product diversification and creation of neo-market platform to promote coconut as a high nutrient value product.

With the growing realization of lesser profitability in small farm holdings, producers/farmers should be encouraged to get together and form into small cooperatives or crop based organizations to develop and utilize community facilities for farm operations, post harvest processing and marketing to economize on production as well as marketing costs. For the vision of developing a sturdy and vibrant coconut industry which does not depend on copra/oil to come true, we need to come up with breakthrough coconut products which are

strong enough to capture the niche export market segment. As the technologies are adopted only when profitable, policy interventions in market and regulation of trade tariffs to the benefit of the industry to compete with global players are the way forward. To encourage investments in the coconut sector, the government, as matter of policy, must consider coconut as a priority crop in its national agricultural development agenda. The government and private financial sector through the banking system should provide support through reasonable credit schemes for coconut processing business ventures.

At present, the ambience of coconut sector in the domestic arena is positive wherein the horizontal node of the value chain aspect is strengthened by the formation of coconut producer's society at the grass root level to producer's company at the highest level. Thereby provides an excellent auxiliary support for the ambitious export orientation programmes. The strategic positioning of developmental and research support (CDB, CPCRI, KAU, NAFED) is another very important factor which will provide the much needed impetus for the sectoral development. Moreover, Indian export sector has become vibrant with very high growth rate since CDB has upgraded to the status of Export Promotion Council (EPC). The initiative taken by Govt. in promoting neera in 2013-14 is also expected to revive coconut economy of the state.

The state of Kerala is all set to become an organic state as it is evident from the state agenda which will pave the way to develop an organic coconut supply chain targeting the niche high priced outward markets in the world. It is certain that in the near future, together we may create a vibrant, equitable and sustainable coconut sector through innovative and inclusive programmes and policies that contribute towards prosperity of all stakeholders of coconut. Vibrant, equitable and sustainable coconut sector through innovative and policies that contribute towards prosperity of all stakeholders of coconut.

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