Vol.LXV No. 11 May - 2023 Pages-40 Price: Rs.6

Indian Coconut Journal

Thenga, Turns Trash into Treasure

Sustainable Development of Coconut Sector in Kerala: Status and Strategies

INDIAN
COCONUT
JOURNAL
Vol. LXV No.11
May - 2023
Kochi - 11

Publisher
COCONUT DEVELOPMENT BOARD
Ministry of Agriculture and Farmer's Welfare,
Department of Agriculture, Government of India
Kera Bhavan, Kochi - 682 011, India

Phone	:	0484- 2377266, 2377267, 2376553, 2375266, 2376265
Fax	:	91 - 0484-2377902,
Grams	:	KERABOARD
E-mail	:	kochi.cdb@gov.in
Website	:	www.coconutboard.gov.in

SUBSCRIPTION

Annual	Rs. 60.00
Single Copy	Rs. 6.00
Institutes / Libraries	
Annual	Rs. 200.00
Single Copy	Rs. 20.00

Articles, research papers and letters on different aspects of coconut cultivation and industry are invited for publication in this Journal. All accepted material will be paid for. The Board does not accept responsibility for views expressed by contributors in this Journal. All remittances and correspondence should be addressed to the Chairman, Coconut

Coconut Development Board

The Coconut Development Board is a statutory body established by the Government of India for the integrated development of coconut cultivation and industry in the country. The Board which came into existence on 12th January, 1981, functions under the administrative control of the Ministry of Agriculture and Farmers Welfare, Government of India, with its headquarters at Kochi in Kerala State and Regional Offices at Bangalore, Chennai, Guwahati and Patna. There are five State Centres situated in the states of Orissa, West Bengal, Maharashtra and Andhra Pradesh and in the Union Territory of Andaman & Nicobar Islands. DSP Farms are located at Neriyamangalam (Kerala), Vegiwada (Andhra Pradesh), Kondagaon (Chhattisgarh), Madehpura (Bihar), Abhayapuri (Assam), Pitapalli (Orissa), Mandya (Karnataka), Palghar (Maharashtra), Dhali (Tamil Nadu), South Hichachara (Tripura) and Fulia (West Bengal) besides a Market Development cum Information Centre at Delhi. The Board has set up a Technology Development Centre at Vazhakulam near Aluva in Kerala.

Functions

❒ Adopting measures for the development of coconut industry. ❒ Recommending measures for improving marketing of coconut and its products. ❒ Imparting technical advice to those engaged in coconut cultivation and industry. ❒ Providing financial and other assistance for expansion of area under coconut. ❒ Encouraging adoption of modern technologies for processing of coconut and its products. ❒ Adopting measures to get incentive prices for coconut and its products. ❒ Recommending measures for regulating imports and exports of coconut and its products. ❒ Fixing grades, specifications and standards for coconut and its products. ❒ Financing suitable schemes to increase the production of coconut and to improve the quality and yield of coconut.

❒ Assisting, encouraging, promoting and financing agricultural, technological, industrial or economic research on coconut and its products. ❒ Financing suitable schemes where coconut is grown on large scale so as to increase the production of coconut and to improve its quality and yield and for this purpose evolving schemes for award of prizes or grant of incentives to growers of coconut and the manufacturers of its products and for providing marketing facilities for coconut and its products. ❒ Collecting statistics on production, processing and marketing of coconut and its products and publishing them. ❒ Undertaking publicity activities and publishing books and periodicals on coconut and its products.

The development programmes implemented by the Board under the project Integrated Development of Coconut Industry in India are- production and distribution of planting material, expansion of area under coconut, integrated farming for productivity improvement, technology demonstration, market promotion and Information and Information Technology. Under the Technology Mission on Coconut, the programmes implemented by the Board are development, demonstration and adoption of technologies for management of insect pest and disease affected coconut gardens, development and adoption of technologies for processing and product diversification and market research and promotion.

Index

Dear Readers,

Coconut is a crop suitable to the concept of sustainable agriculture. It is not only possessing resilience and adaptive, but also has a pivotal role in the social, economic and livelihood security of the millions of coconut farmers and other stakeholders. The products from coconut are also gaining momentum owing to the contribution to the Sustainable Development Goals. The products are emerging in a very diversified manner and the applications of the products in day to day life is increasing manifold. If coconut oil was an exotic cooking oil of tropics earlier, it now finds a space in many super markets and health food stores across the globe. It finds its place as an effective ingredient in personal care and beauty products as lipsticks, lip balms and shampoos. Island countries are using coconut oil as a bio-fuel by blending with diesel. These are a few applications of one product, coconut oil. And coconut produces a variety of products through different stages of maturity of the nut; right from the inflorescence sap and its products like honey, jaggery and sugar through tender coconut water and coconut chips to the mature nut yielding desiccated coconut powder, coconut milk, coconut milk powder, virgin coconut oil, coconut oil, coconut water, coconut vinegar etc. Each product finds a multitude of applications in day to day life. The non food products from coconut shell including activated carbon also follow suit.

Sustainable, environment friendly, biodegradable, plant origin, social security, circular agriculture – all adjectives suit our crop coconut. It is important that we equip our farmers and manufacturers to produce quality products that suit the above definitions with priority for conservation of the natural resources and the environment. Ultimately in this changing world, these adjectives will determine the demand for our products in the future. Production and supply of such quality products to consumers globally will thus contribute to social security for the stakeholders, food security and health to the consumers and environmental and ecological balance to nature.

Export also assumes great significance in this scenario. The new Foreign Trade policy (FTP) 2023 has come into effect from 1.4.2023. The major feature of this FTP is that it is a policy with a starting year but does not have a sunset clause. It is flexible and amendments could be made whenever the need arises. Also the shift in policy from an incentive based regime to a remission based regime is very much evident in the policy. The cap of Rs. 5000/- for issuance of No Objection Certificate from State Trading enterprises is a welcome move, especially for exporters who import copra under advance authorization. The concerted efforts to promote exports from Indian Missions abroad is very much appreciated and will definitely be instrumental in taking our products to every nook and corner of the globe.

Let us make products in India locally and market it globally, make our presence felt across the globe through our products.

Editor

Sustainable Development of Coconut Sector in Kerala:

Status and Strategies

Thamban C, Jayasekhar S and Chandran K. P.
ICAR-Central Plantation Crops Research Institute, Kasaragod

Background

Coconut sector plays a vital role in the agrarian economy of Kerala, besides its unique place in the socio-cultural fabric of the state. Kerala is ranked first in both area and production of coconut in the country. Coconut occupies about 30% of the total cropped area in the state and coconut sector accounts for around 15% of the gross value output (agriculture) of Kerala, thus inextricably linked to the agricultural economy of the state. It is estimated that there are about 3.5 million holdings and at least five million people depend on this crop directly or indirectly for their employment and livelihood. However, the 'land of coconut' is gradually losing its supremacy in coconut production scenario of the country due to various factors and Kerala's share in area as well as production of coconut has been declining over time.

Status and strategies for the sustainable development of coconut sector in Kerala state is discussed in this paper.

Trend in coconut production

In the year 1956, the year of formation of the state, Kerala had accounted for 69 per cent area and 73 per cent production of coconut in the country. But, its share in area and production of coconut has been reduced to 35% and 33% respectively by the

Year	Area ('000 ha)	Production (million nuts)	Productivity (nuts/ha)
2000	925.8	5536	5980
2005	897.8	6326	7046
2010	788	6239.5	7918
2015	770.62	7429.39	9641
2020	768.81	6942.6	9030

Table 1. Coconut cultivation in Kerala state during the last 20 years (Source: Department of Agriculture & Co-operation, Ministry of Agriculture & Farmers Welfare, Govt. of India)

year 2020-21. As per the 2020-21 statistics, area under coconut in Kerala state was 7.68 lakh ha and the annual production was 6942.6 million nuts with a productivity of 9030 nuts per ha (Table 1). Area under coconut in Kerala is also on the decline. During the year 2000-01 coconut was cultivated in Kerala in 9.2 lakh ha which has been reduced to 7.68 lakh ha in 2020-21 indicating a 16% reduction in area under coconut cultivation in the state over the last 20 years.

Yield gap in coconut in Kerala

Though there is an increase in productivity of coconut in Kerala state from 5980 nuts/ha in 2000 to 9030 nuts /ha in 2020, it is still below the national average (9430 nuts/ha), which is a matter of concern. Studies have indicated that the yield gap is very wide in coconut in all the Agro-Ecological Units in the state where coconut is cultivated (Table 2). In some AEUs it is as high as 4.61.

Sl. No.	Agro-Ecological Unit	Average yield (nuts/palm)	Potential yield (nuts/palm)	Yield Gap Index
1	AEU 1	33	147	3.35
2	AEU 2	46	180	2.91
3	AEU 3	52	150	1.88
4	AEU 4	36	195	4.44
5	AEU 5	26	146	4.61
6	AEU 6	52	91	0.75
7	AEU 7	41.5	152	2.66
8	AEU 8	33	175	4.3
9	AEU 9	35	109	2.11
10	AEU 10	50	160	2.2
11	AEU 11	48	191	2.97
12	AEU 12	37	112	2.02
13	AEU 13	52	143	1.75
14	AEU 14	39	76	0.94
15	AEU 15	56	186	2.32
16	AEU 16	27	100	2.7
17	AEU 17	45	70	0.55
18	AEU 18	110	250	1.3
19	AEU 20	88	250	1.84
20	AEU 21	42	200	3.76
21	AEU 22	61	200	2.3
22	AEU 23	63	120	0.9
	Average	48.75	154.68	

(Source: Department of Agriculture & Co-operation, Ministry of Agriculture & Farmers Welfare, Govt. of India)

Better technology integration is essential for enhancing the efficiency of coconut sector. Systematic research in coconut in India has resulted in substantial number of viable technologies for enhancing income from coconut farming. These include high yielding hybrids and improved varieties, coconut based multiple cropping and integrated farming system models, agro-techniques for higher productivity including nutrient management, irrigation and water management, integrated pest/disease management and value addition through product diversification. However, the field level adoption of improved coconut technologies is not at a satisfactory level owing to various techno-socio-economic reasons.Hence, redemption of the traditional coconut farming and reorientation towards profitable ventures is becoming a necessity.

Sectoral challenges

Constraints such as high level of market fluctuation/ price crash in coconut, changes in the demographic characteristics of coconut growers with a shift towards absentee landlordism, predominance of senile and unproductive palms, predominance of small and marginal holdings, over populated stands of both coconut and other trees in the homesteads, low level of adoption of crop management practices resulting in low productivity, depletion of natural resources in coconut gardens and soil related constraints, inadequate irrigation facilities, lack of availability of quality planting materials, lack of skilled labour and high wage rate, crop loss due to incidence of various pests and diseases, low level of product diversification etc. adversely affects coconut farming in the state, and as such coconut has become a neglected crop. Hence, appropriate research, extension and policy interventions are to be formulated and implemented to enable coconut growers to alleviate these constraints and steer the sector towards achieving the goal of sustainability.

Strategies for sustainable development

Effective strategies and congenial policy environment are needed to improve efficiency of coconut sector in the state as discussed below.

i. Production of quality seedlings for coconut rehabilitation

The foremost strategy for improving the coconut production in Kerala is the massive cutting and

removal of senile and 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. Replacing old palms will require enormous quantity of seedlings. 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. In Kerala, on an average 30 lakh coconut seedlings are required annually. But the public sector institutions including State Department of Agriculture, CDB, CPCRI and KAU put together could supply only about 10 lakh seedlings per year, revealing a huge gap between demand and supply. The major constraint in enhancing production under public sector is the limited number of mother palms available with them. Many seed gardens established are facing various problems that have resulted in further reduction in number of palms. Rejuvenation of these seed gardens by planting mother palms of newly released varieties requires immediate attention. The existing mother palms 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 farmer participatory decentralized production mechanism is to be envisaged by maintaining a centralized pollen storage and supply mechanism. The three tier Farmer Producer Organisation system of Coconut Producer Society-Coconut Producer Federation-Coconut Producer Company facilitated by CDB can play a significant role in the decentralised coconut seedling production programmes. The implementation of two pilot projects in 12 districts by ICAR-CPCRI with the support of State Department of Agriculture during the period from 2017 to 2020 with focus on utilisation of elite mother palms available in farmers' gardens has clearly indicated the efficacy of decentralised participatory approach for production and distribution of coconut seedlings. It is also necessary to ensure quality control in the production and distribution of coconut seedlings to prevent unscrupulous elements exploiting coconut growers. Hence, it is important that an appropriate nursery accreditation mechanism is established and accreditation made mandatory for all coconut nurseries. The desired ratio of coconut palm population of tall/dwarf/hybrid varieties in farmers' gardens i.e about 60 per cent tall, 20 per cent each of dwarf and hybrids need to be emphasized and accordingly appropriate short term and long term strategies are to be formulated and implemented for production and distribution of coconut seedlings.

ii. Promoting coconut based intercropping and integrated farming

The strategy for revitalising coconut sector in Kerala needs to revolve around interventions for ensuring adequate care and management of coconut palms in the existing gardens to enhance productivity and income. CPCRI has developed many coconut based multiple cropping and integrated farming system models which are more efficient in utilising the basic natural resources and realise more income compared to monocropping of coconut. A coconut based mixed farming system comprising coconut, pepper, banana, crossbred cows, poultry birds, goat, and pisciculture has proved to generate returns up to three times higher than that of coconut monocrop. In addition to the economic benefits, the systems ensure food and nutritional security coupled with sustainability and environmental services. In Kerala, the average size of coconut holding is only 0.2 ha and income from such tiny holdings can't meet the diverse needs of farm families. Hence, systematic coconut based cropping/farming system as a strategy to make coconut farming economically viable in small holdings needs to be highlighted. Implementation of development schemes to popularise coconut based cropping/farming systems is highly relevant since coconut growers in Kerala are currently more exposed

to economic risks and uncertainties owing to the high degree of price fluctuations.

iii. Enhancing productivity and income through technology integration

Increasing productivity and reducing cost of cultivation through better utilisation of crop management technologies in the existing coconut gardens is an important strategy to be implemented for enhancing income from coconut farming. Studies have indicated that the extent of adoption of recommended crop management practices in farmers' gardens is not at a satisfactory level. Results of a recent study conducted by CPCRI in 1032 selected coconut gardens from four districts of Kerala state on the adoption of recommended technologies is furnished in Table 3.

Adoption of proper spacing to maintain optimum palm density is essential to realise production potential of coconut palms. But in Kerala it is observed that there are on an average more than 100 palms per acre of coconut garden resulting in overcrowding of palms leading to low productivity. Hence, while implementing interventions for rehabilitation of coconut orchards it is necessary that emphasis is given for adopting recommended spacing of coconut palms.

Sl. No.	Crop management practice	Extent of adoption (%)
1.	Improved varieties	8.98
2.	Spacing for optimum plant density	32.59
3.	Inter/ mixed cropping	47.49
4.	Mixed farming	27.68
5.	Soil and water conservation techniques	38.36
6.	Irrigation	51.83
7.	Nutrient application as per soil test based recommendation	11.97
8.	IPM	29.42
9.	IDM	8.75
10.	On farm recycling of biomass	31.66

Table 3. Extent of adoption of crop management practices in coconut

Studies on fertility of soils of Kerala have revealed that soil related constraints viz., very strong soil acidity, extensive deficiency of secondary nutrients calcium and magnesium and wide spread deficiency of micro-nutrient boron are among the important factors for low productivity of coconut in the state. Hence, it is important that interventions are implemented for improving soil health status in coconut gardens through soil test based nutrient management. Under the network project implemented during the period from 2015 to 2019 with the support of State Planning Board, Government of Kerala in selected agro-ecological units in Kerala it was revealed that 49% improvement in productivity could be achieved through scientific soil health management practices including soil test based nutrient management. The technology for vermicomposting of coconut leaves as part of on-farm organic matter recycling in coconut gardens is very relevant in the context of growing awareness about organic farming/eco-friendly farming in Kerala.Coconut gardens of one hectare area can generate up to eight tonnes of leaf biomass residues every year which can be utilised for vermicompost production. The coconut leaf vermicompost can also meet 50% of the nitrogen requirement of coconut palms grown in one hectare area, saving expenditure on inorganic fertilizer. Basin management with green manure legumes is another approach for enhancing the availability of organic manure.

Drip irrigation is the ideal method of irrigation for coconut. Hence, schemes to promote adoption of drip irrigation in coconut gardens assumes much significance, especially 'more crop per drop' is the strategy accepted worldwide for sustainable crop production. It is also important to implement schemes to promote adoption of soil and water conservation and water harvesting in coconut gardens for enhancing coconut productivity. There was 19 per cent improvement in yield of coconut due to the implementation of various interventions related to soil and water conservation under the Farmer Participatory Action Research Programme (FPARP)

implemented by CPCRI with the support of Ministry of Water Resources in selected localities of Kasaragod district.

Crop loss due to incidence of pests and diseases is one of the major constraints experienced by coconut growers in Kerala. Though viable technologies on palm health management amalgamating integrated pest and disease management with nutritional care of the palm are made available, due to various reasons the field level adoption of technologies recommended for the integrated pest management (IPM) and integrated disease management (IDM) of coconut is very low and as such crop loss due to incidence of pests and diseases continues to incur huge economic loss for the coconut growers. According to an old estimate the annual loss due to the incidence of root (wilt) disease alone was 968 million nuts in the state. The technical feasibility and economic viability of IPM/IDM technologies to manage rhinoceros beetle, red palm weevil, bud rot disease etc were successfully demonstrated in farmers' field at different localities under various action research projects implemented by ICAR-CPCRI ensuring active involvement of coconut farmers and other stakeholders. Community/group approaches ensuring active participation of farmers are needed for the effective implementation of integrated pest/disease management in coconut. Hence, interventions are to be implemented to promote community approach and farmers'

participation to enhance adoption of IPM/IDM in coconut. It is important to ensure the participation of coconut palm climbers in the implementation of technology transfer programmes on IPM/IDM in coconut. Besides, involvement of Coconut Producer Societies, Agro Service Centres and rural youth trained under Friends of Coconut Trees (FoCT) programme of

CDB is to be ensured for the effective implementation of schemes on plant protection in coconut under the decentralised planning programme by Local Self Governments.

iv. Upgrading the value chain

Technological research has been successful in evolving appropriate processing technologies for the profitable utilization of products and by-products of the coconut palm including tender nut, coconut kernel, coconut water, coconut wood, shell and leaves. To cope with the market fluctuations, there is a need for product diversification and by-product utilization. Encouraging more entrepreneurs in coconut sector by establishing 'Coconut Parks' for organized processing for value addition will help coconut farmers to de-link the over dependence on coconut oil in determining coconut price. In the case of Kerala, there is tremendous potential for the development of coconut sector especially in view of the investment friendly ambience due to the organized coconut farmer groups. The synergy of these farmer producer organisations can be effectively channelized for harnessing the potential for production and marketing of coconut value added products. The formation of coconut parks will indubitably provide new impetus to the Kerala coconut industry by ensuring income enhancement of the farmers and other stakeholders.

A recent study conducted by CPCRI in Kasaragod district revealed that major constraints experienced by coconut based enterprises to effectively manage the enterprises are marketing difficulties and lack of availability of raw materials. Financial constraints, inadequate infrastructural facilities and cumbersome licensing procedures were other important constraints faced by them. Steps such as expanding

of the marketing channels, adoption of innovative value added products, advanced machineries and technologies to enhance efficiency of enterprises, popularizing the coconut products through different advertising modes and to make available financial and technological support from government including handholding of enterprises to tide over difficulties during the initial stages of the enterprises are necessary to enhance efficiency and to sustain the coconut based enterprises.

v. Policy interventions in trade and marketing

Not ignoring the fact that, the integration of international and regional coconut markets indeed in a big way influenced the demand and price movement in Kerala and represent an important challenge to the millers with respect to the cheaper raw materials from neighbouring states. In this context, there is a larger ongoing 'crisis narration' wherein we argue that the cheap import of palm oil is the major cause of price instability of the coconuts in Kerala. Though it is partly true, we need to undertake a close scrutiny of this aspect. There have been umpteen pre-existing and proven advocacies to address such issues, like tariff restructuring, cluster formation, group synergy and value addition. On the contrary, most importantly we need to seriously address the issue of labour scarcity that demands novel policy interventions. Moreover we need to address the issues largely felt at meso and micro level like disorientation from coconut farming, the regional patterns of coconut cultivation, the domestic consumption pattern of coconut and coconut products, the functioning of domestic coconut value chains etc. The way in which the labour market is socially structured may prove challenging for newly trained climbers, wherein, for them, it would be difficult to access the regular employment. The field level findings necessarily validate this argument.

Raw coconut procurement can be implemented effectively as an ad-hoc regulatory measure. But as of now only meagre share of farmer produce gets support due to inadequate procurement, delay in payment and transaction drudgery that all leads to distress sale of the produce. With respect to this we need to improve the infrastructural and storage facilities of Krishi Bhavans. Alternatively we can think of establishing procurement hubs at panchayath levels using the vast network of established CPSs. We need to create a sort of accountability among the societies and also encourage them to proactively undertake the minimal processing.

Price spread analysis of coconut marketing revealed that near about 70 per cent of the farmers sell their produce through the village traders as raw coconuts. Less marketable surplus due to small and marginal holding size is the major reason for the farmers for not undertaking copra or oil for sale. In Kerala conditions, which are the same in many countries with predominantly small holder coconut gardens, the producer share in consumer rupee was found to be around 64 per cent and the market chain consumes as much as 36 per cent share in the total value chain. Higher price spread always indicates a lower share of the final price to the producer. In other words it reflects the low marketing efficiency of the market channel. The price spread and marketing efficiency can be improved only through collective and constant efforts in terms of adoption of higher value addition technologies at individual or group level.

Further, a regional trade agreement among major plantation crop producing countries should be facilitated at the policy level. The modalities for such a commodity-specific trade agreement should be worked out with the utmost care, wherein we should end up in a win-win situation. In this respect, we need to thoroughly analyse the existing tariff structure of each country on the specified plantation crops, and an unbiased tariff reduction schedule should be proposed. It is also essential to consider the existing tariff structure of close substitutes/ competing products of each country, thereby arriving at a consensus.

vi. Labour availability

Lack of skilled palm climbers and their high wage rate is a major constraint experienced by coconut growers. Hence, it is important to promote labour banks of rural youths trained in palm climbing and crop management practices at the grass root level and also to strengthen already existing Agro-Service Centres facilitated by State Department of Agriculture by providing more coverage to interventions related to coconut farming. Service of rural youth trained under the 'Friends of Coconut Trees (FoCT)' programme implemented by Coconut Development Board has to be effectively utilized in the implementation of interventions for coconut development. Besides, there is a need to strengthen research for developing a simple and safe palm climbing device.

vii. Promoting group approach

In Kerala, coconut is predominantly cultivated in small and marginal holdings. The income generated from coconut farming in small and marginal holdings does not provide enough for meeting the requirements of farm families. Technology options for enhancing income from coconut farming in such poor rural communities do exist, but not fully realised in field situation. The fragmented holdings do not render themselves viable for the optimum utilization of resources and the adoption of improved technologies by the cultivators. To augment the productivity and income of such small and marginal holdings it is suggested to have group management of resources, which helps to overcome the inherent weaknesses of the fragmented holdings. Various agencies, including Coconut Development Board and State Department of Agriculture, have thus facilitated farmer producer organisations to promote group approaches for implementing coconut development interventions. Kerala has about 7232 Coconut Producers' Societies (CPS), 467 Coconut Producer Federations (CPFs) and 29 Coconut Producer Companies (CPCs) already

Sl.No.	District	No. of Coconut Producer Societies	No. of Coconut Producer Federations	No. of Coconut Producer Companies
1	Kasaragod	580	33	2
2	Kannur	498	29	2
3	Kozhikode	1807	117	9
4	Wayanad	115	9	1
5	Malappuram	1308	99	5
6	Palakkad	458	26	1
7	Thrissur	477	26	2
8	Ernakulam	224	15	1
9	Kottayam	276	21	1
10	Idukky	182	15	-
11	Pathanamthitta	26	2	-
12	Alappuzha	719	50	2
13	Kollam	255	11	1
14	Thiruvananthapuram	307	14	2
	Total	7232	467	29

Table 4. Three-tier Coconut Farmer Producer Organizations in Kerala coconut

(Source: Coconut Development Board, Kochi)

registered with CDB, besides the FPOs of coconut growers facilitated by State Department of Agriculture as part of implementing 'Keragramam' project.

The FPOs in coconut sector are to be supported and strengthened to enable them to mobilise group action for implementing various interventions to improve coconut sector. Many a times it is observed that the FPOs are unable to organise any meaningful activities with group approach, instead act as intermediaries facilitating distribution of incentives under schemes implemented by governmental agencies. Though there are large number of FPOs in coconut sector in the state, many of them have become defunct due to various reasons, especially due to lack of continued support to sustain their activities. Discontinuance of large number of Neera based enterprises managed by FPOs indicate the need to implement interventions to revitalise the farmer collectives in coconut sector. The biggest challenge in Kerala context is to enhance productivity through adoption of crop management technologies in a substantial number of coconut orchards (which are almost neglected) owned by 'absentee landlords' whose primary source of income is not coconut farming. Policies and programmes to facilitate revival of such coconut holdings needs community action at grass root level with the support of governmental agencies. The FPOs can play a role in linking trained skilled palm climbers and coconut farmers by promoting labour bank concept under decentralized people's planning by LSGs to address the problem of shortage of labour and high wage rate.

Conclusion

Coconut sector in Kerala state is confronted by many challenges. But there are opportunities to combat and conquer the obstacles and steer the sector to a profitable, vibrant and sustainable road map. Concerted efforts by various research, development and extension agencies, active participation of coconut growers along with a congenial policy environment are needed for the effective implementation of interventions for the sustainable development of coconut sector in the state.

Thenga
Turns Trash into Treasure

Thenga is all about reusing and repurposing what is traditionally considered "waste." The team strives to make sure that nothing is left unused at their unit.

Sona John
Publicity Officer, CDB, Kochi

Ever wondered what 'Thenga' means? Thenga in Malayalam means coconut. Thenga.com is a homegrown brand from Kerala that repurposes coconut waste into lasting, sustainable and handmade home products.

Founded in the year 2019 by Maria Kuriakose, Thenga today is an established brand retailing all over India. A native of Kerala, Maria was always convinced that coconuts are more than just coconut oil and water. She naturally started looking at the byproducts of coconut processing units and that's how it all began. From making her first coconut shell bowl to exporting abroad, Maria and Thenga have travelled a long way.

Thenga's products are for the conscious customer. Each piece speaks of the hands that made it. Cut and polished to reveal the grainy detail in the shell, Thenga products are completely natural, safe and sustainable. Coconut shells are tough and inherently hardy, so they last for decades and make perfect substitutes for plastic products.

Thenga is all about reusing and repurposing what is traditionally considered "waste." The team strives to make sure that nothing is left unused at their unit. Thenga products don't come with the guilt that is innate in mass produced products. By making products close to nature, Thenga hopes to make better choices available to customers.

Coconut shells, however, are commonly considered as a useless by product and are generally considered a waste. Here at Thenga, discarded coconut shells are painstakingly handcrafted into partical aesthetic products, Thenga literally turns trash into treasure. Handmade and crafted to perfection, Thenga is a labour intensive brand.

By reusing coconut waste, Thenga currently saves shell leftovers from multiple coconut processing units in Kerala. This waste would have either ended up in landfills or burnt as rudimentary household fuel. Since its inception in 2019, Thenga has saved over 1,02,000 coconut shells from being dumped as waste. Transformed into finely crafted bowls and cups, they are being used all over India and abroad today.

Maria, a native of Thrissur, Kerala completed her graduation in Economics from St Xavier's College, Mumbai and got her MBA from ICADE Spain. After working for 4 years in an MNC and start up in Mumbai, she decided to quit and start a business in her hometown that would enhance the agricultural economy of Kerala.

It has been her childhood dream to start a business of her own but she did not had any idea on what to do. Coconuts are ubiquitous in Kerala and it was quite natural that Maria was drawn to it. However from what she saw the coconut industry in Kerala was mainly limited to oil making units, coconut milk units, coir products etc. The sturdy coconut shells were mainly used as crude fuel in the units themselves or dumped.

Maria saw the inherent grainy beauty of the coconut shell that could be highlighted after some polishing and buffing with coconut oil. She knew that urban cities in India had a growing customer base that were environmentally conscious and willing to make lifestyle changes to protect the environment.

A visit to a coconut oil mill in Thrissur gave her the much-needed inspiration for her business. In 2019, once Maria decided to sell coconut-shell based products, she spoke to artisans and experts who were making its byproducts. She learnt that to make products from coconut shells certain machinery was required. Her 65-year-old father, Kuriakose Varoo, a retired mechanical engineer and her mother, Jolly Kuriakose helped her initially.

With the help of artisans Maria was able to take more orders and expand the range of available products. Artisans under the brand's umbrella hail from Thrissur, Kottayam, Wayanad, Kodungallur and Alappuzha. They are skilled at making traditional coconut shell-based kitchenware, but now they make sustainable jewellery and home decor items.

At Thenga, she oversees operations and takes up initiatives and strategies that would help Thenga grow to new heights. She handles all marketing initiatives, including social media to communicate Thenga's story and the women behind the business.'I also love spending time and ideating with the artisans who create Thenga products, and is the backbone of our initiative' says Maria. The feedback she received was overwhelmingly positive and she started receiving more orders.

One of the challenges faced by Thenga was to source uniform shells. Being a completely natural product, each shell is different in terms of shape, size, pattern etc. Sourcing and storing the shells took some effort from the team as bulk customers expected a certain consistency in terms of size and capacity.

"Coconut bowls are available in three sizes - mini which holds 150ml, medium-sized, 200ml, and Kerala Jumbo coconut shells being the largest can hold 500-600ml. She imports Vietnam coconut shells which can contain up to 900ml for those who need bigger containers. Thenga's handmade eco-friendly bowls can withstand room and cool temperatures,

At Thenga, Maria is proud of being a women-led business. The core team is all-female and growing every year. Thenga doubled its core team in the last year and has given steady income to countless artisans. As of date, Thenga has saved over 1,02,000 shells giving them a new life. Thenga is constantly searching for new ways of transforming discarded shells into innovative utility products. Thenga's collection of coconut shell products is always growing.

Thenga products don't come with the guilt that is innate in mass produced products. By making products close to nature, Thenga hopes to make better choices available to customers.

With time, experimentation and lots of creativity in terms of product design, Thenga has learnt to use even small fragments of coconut shells to create unique and differentiated products.From clocks to mobile phone holders, candles, teacups and soap dishes, Thenga is at the forefront of making the most of the coconut tree.

The women team of Thenga

Living close to nature is a choice and Thenga hopes to make the choice easier for customers by giving them access to durable plastic alternatives. Ultimately, natural handmade products might be slightly pricier compared to mass produced products, but in the long run natural products turn out to be more reasonable when we look at durability and cost to the environment.

Creating the brand Thenga and getting access to a large urban audience was mainly achieved through social media and digital marketing. Maria recognized the gulf between urban customers who were looking for sustainable products and artisans in villages making eco-friendly products. She understood that the only way to bridge this gap was through online retailing and marketing.

Thenga has been selected as one of the top 65 start-ups to be mentored and supported by IIM – Bangalore. Her team is learning and growing in one of the Best Management Institutes in the world

Thenga, which has a large pursuance of loyal customers, have also started offering branded products for B2B clients. Eco-friendly resorts and cafes have their logos engraved on Thenga bowls and key chains to drive home brand values and recognition. With a monthly turnover of about eight lakhs, Thenga and coconut shell products have become a household name.

Maria is proud to receive her first export order to Denmark, of 14000 pieces, which is scheduled to leave in June 2023.

Maria's dreams and a creative mind to see the immense potential within coconut shells has made her the successful entrepreneur she is today. An open mind ready to look past labels and see creative uses for what is commonly considered garbage has led to Thenga's present proud status.

According to Maria, anyone who has tried a Thenga product, will never go back to regular ones. They are convenient, practical and yet giving you the luxury of a 100% natural product.

Each time you buy a Thenga product, you save a shell.

Cocoa under Coconut

a Compatible Companion for future

R. Jnanadevan
Former Deputy Director, CDB, Kochi

1. Overview of cocoa under coconut

Cultivation of Cocoa as an understory crop in Coconut garden has been getting momentum in the major coconut growing countries particularly in Indonesia, Philippines, Malaysia, and India, during the last ten years. The crop association involving coconut and cocoa proved an excellent combination to the agro ecological condition that provides in coconut garden. It yields all the agronomic advantages in terms of sharing nutrients, smothering weeds, conservation of soil and water and enhanced growth and productivity of the both crops. Besides coconut garden, it was found that cocoa can also be grown as an under storied crop with other plantation crops. Presently cocoa is grown in the four major coconut growing states, Andhra Pradesh, Tamil Nadu, Karnataka and Kerala primarily as a mixed crop in the partial shade of coconut, areca nut and oil palm and to a limited extent in rubber plantation also. More than 65% of cocoa in India is grown in coconut garden and around 20% with areca nut, with the rest 15% in oil palm and rubber plantations. The total area under cultivation in the four southern states at the end of 2021-22 was 106090 ha with a production of 28426 metric tons of dry beans annually. State-wise production scenario of cocoa is given in table-1.

State	Area (hac)	% Share	Production (MT)	% Share
Andhra Pradesh	41,874	39	11,448	40
Kerala	17,920	17	10,130	36
Karnataka	14,216	13	3905	14
Tamil Nadu	32,080	31	2943	10
Total	1.06.090	100	28,426	100

Table-1 Production scenario of Cocoa (2021-22)

2. Why cocoa regained it popularity?

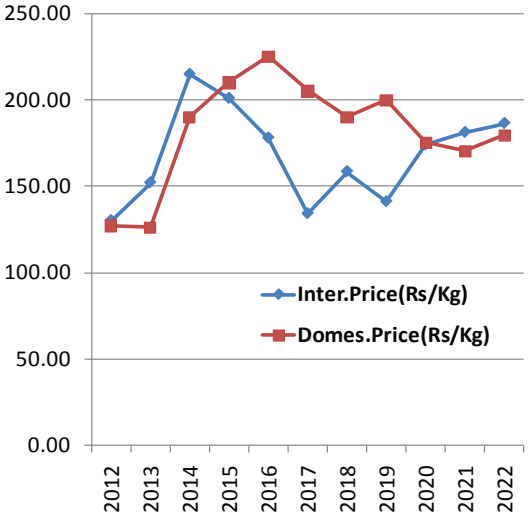
Distribution of cocoa in India

Cultivation of cocoa on a large scale started in India in the early 1970s due to the increase in price of cocoa both in international and Indian markets. However, due to collapse of procurement system, low price and related marketing problems the crop suffered a setback from 1980 to 1998.

The reasons for reacceptance of the crop are:

2.1. Stable and remunerative price of cocoa beans: During the last twenty years the cocoa price has become stable and remunerative and this lead to reacceptance of this crop by farmers. The price of domestic beans mainly depends on international price and the trend shows that it varies with the demand and supply. Cocoa is getting good price during the last ten years and it has become a crop that can generate decent income for farmers and their families. The price trend of cocoa beans in the international and domestic market shown table 2 below:

Year	Int Price (Rs/ Kg)	Domes Price (Rs/Kg)
2012	130.00	127.00
2013	152.00	126.00
2014	215.00	190.00
2015	201.00	210.00
2016	178.00	225.00
2017	134.00	205.00
2018	158.45	190.00
2019	141.00	200.00
2020	174.00	175.00
2021	181.23	170.00
2022	186.46	179.60
CAGR	3.60	3.49



Source: ICCO/DCCD

Price trend of cocoa in Int.& Dom. Market (2011-12-2021-22)

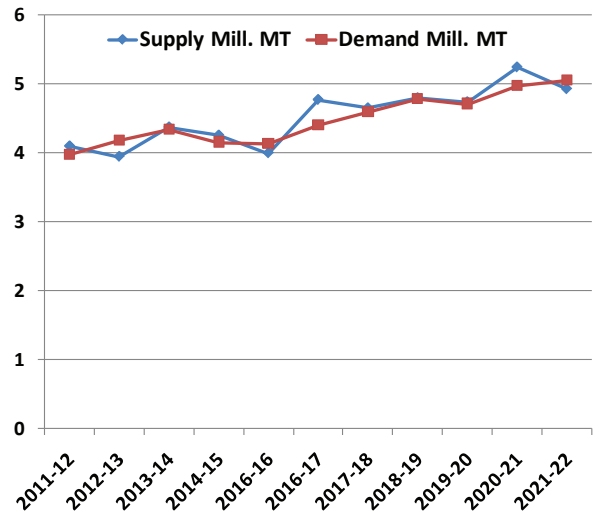
A considerable increase in prices of cocoa beans was observed during the last ten years (2012 - 2022) in the domestic and global market and it continues. The Indian price averaged at Rs127 /Kg in 2012 which has come up to 179.60/kg over a period of ten months or an increase by 41% with a CAGR of 3.49%. The international price also showed an increase during the same period The international price of cocoa dry beans averaged at Rs 186.46/kg in 2022 which was up from Rs130/kg eleven months ago in 2012 or an increase by 43.3% at a CAGR of 3.6% over the period as indicated in table-2.Besides there is a growing demand of organic cocoa beans in the international and domestic market offering premium price by chocolate companies.

2.2. Production and consumption of cocoa in the world is growing: According to International Cocoa Organization (ICCO) estimates world production of cocoa during last year (2021-22) was 4.92 million MT where as the consumption was 5.0 million MT. There was a deficit of 0.08 million MT which was met from the balance stock available from the previous years. However, there was an increasing demand and supply of cocoa beans in the world during the last 10 years due to the increase in consumption of chocolates in European, Latin American and Asian countries. Since cocoa beans and butter are widely used in chocolate, drug and cosmetic derivatives, it fetches high commercial value. Shortage of cocoa beans is the main problem now faced by the industry. The trend in demand (consumption) and supply (production) of cocoa beans in the international market is shown in table- 3:

Year	Supply (Mill T)	Demand (Mill. T)
2011-12	4.095	3.972
2012-13	3.943	4.180
2013-14	4.370	4.335
2014-15	4.252	4.152
2015-16	3.994	4.127
2016-17	4.768	4.394
2017-18	4.647	4.585
2018-19	4.794	4.784
2019-20	4.735	4.707
2020-21	5.240	4.973
2021-22	4.923	5.048
CAGR	1.86	2.43
% Increase	20	27

Global demand supply trend of cocoa (2011-12-2021-22)
Source: ICCO/DCCD

It is evident from the data at table-3 that the demand for cocoa beans overtaken supply in several years during the last 10 years. The world market is growing at a faster rate with CAGR 2.43% where supply



Global demand supply trend of cocoa (2011-12-2021-22)

is growing at a CAGR of 1.86% during the period (2011-12 to 2021-22). The growth rate over ten periods was 27% in terms of demand whereas the growth rate in supply was 20% only. Market experts and industry as a whole expect substantial increase in the global demand and the trend will continue in future. According to the chocolate manufacturers there will be shortage of around 0.80 million tons of cocoa beans in the world by 2030.

2.3. Widening gap in demand and supply in India: The processing sector in India depends on local production and import of dry beans and other countries. The current estimated demand of the chocolate and confectionary industries in India is 80000 MT of dry beans per year whereas domestic production is 28426 MT which could meet only to the extent of 35.50% of the demand. If we look in to the trend in domestic production and demand cocoa beans during the last 10 years we can see that there was steady increase in demand and rate of increase in demand is much higher than the increase in production resulted in widening demand supply gap.

2.4. Increase export and import of cocoa products: There was a tremendous increase in both export and import from India during the last 10 years. As could be seen in the table -4 Imports was increasing at a CAGR of 12.04 % where as export of cocoa products from India have been growing steadily at a CAGR of 20.60% even though shortage of cocoa beans exists. As per the trade Statistics maintained by APEDA, during the year 2021-22 India earned foreign exchange of Rs.1145.48 Cr. through export of cocoa products. While India became

the 19th largest importer of cocoa products in the world and the foreign exchange outflow was Rs.2713.93 cr. through import cocoa beans and cocoa products from different countries resulting in a trade deficit of Rs. 1156.45cr. Though present production in India is very small (0.57%) of global production compared to major producing countries there is much potential to increase production.

Introduction of this crop to potential areas is essential reducing import of cocoa beans and cocoa products and to increase export to earn more foreign exchange to our country. Proper linkage and co-ordination between all agencies associated with this crop is essential to enhance production to meet the demand. Coconut garden offers tremendous scope for crop mixing with cocoa which possesses sustained demand.

3. Benefits of Growing Cocoa as a mixed crop in coconut garden.

There are multi-fold benefits of growing cocoa as a mixed crop. They are:

3.1. Increases income and profit: Cocoa produces pods throughout the year enabling the farmers to fetch regular income like coconut palm. Experience of farmers reveals that average net income per ha comes to Rs.1,57,500/- per year at a spacing of 3mX 3m accommodating nearly 500 cocoa plants and 160 coconut palms. On an average, minimum 30 fresh pods per tree are obtained annually from a cocoa plant from

Crops	Plants/ ha (No)	Yield (nuts/ha/kg/ha)	
		Per Plant	Per ha
Coconut (nuts no.)	160	100	16,000
Cocoa (dry bean) (Kg.)	500	1.50	750

Cost of Prouction @ Rs 1 1.67/- per nut & Rs 100/- per Kg Cocoa bean	2,36,720
Gross income @ Rs. 13/nut 210/kg dry beans	3,65,500 (2,08,000+1,57,500
Net income	1,28,780 (21,280+1,07,500)

the third year onwards. 10 pods will give 1 kg wet beans and 3 kg wet beans give one kg dry beans. The yield potential of a well managed cocoa is 100- 200 pods per tree. Average production per tree is 2-3 kg dry beans or 90 pods per tree. There are trees which produce up to 150 pods per year. As per the present price @ Rs.210per kg for dry beans, if a cocoa tree gives 1.50 kg dry bean per year the minimum additional gross income per hectare of coconut garden after five years of planting of cocoa is Rs.1,57,500/- per year. This is in addition to the income from coconut which is Rs.2,08,000/-@ 100 nuts per palm per year (16,000nuts /ha)

Basic Assumptions in the above analysis are: Cost of production per coconut @Rs.11.67 per nut based on the average cost of production per nut estimated in Copra policy report 2021-22 seasons. Price of Product (coconut and cocoa beans) is based on 2022 national average farm gate prices. Yield estimates were estimated based on the average yield reported by famers by adoption of best agronomic practices.

3.2. Maximizes resource utilization: Coconut, when grown as a mono crop, does not fully utilize the available resources such as land space, aerial space, water and nutrients. The rooting pattern in coconut is such that only 25% of land area is effectively utilized; the remaining land could be used for raising other profitable subsidiary crops. Cocoa cultivation in the interspaces offer considerable scope for increasing production and productivity per unit area by more efficient utilization of resources in the aero and soil phase, like sunlight, soil , water and labor. Coconut as a mono crop provides employment only for about 135 man days/ha under rain fed conditions and consequently the family labour remains unemployed for larger parts of the year.

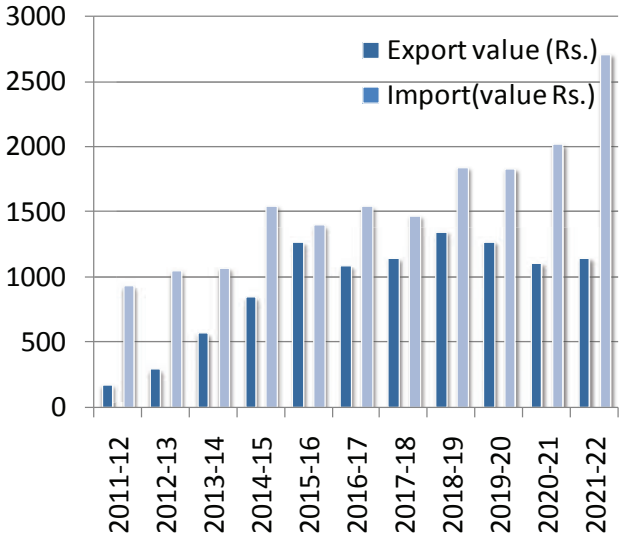
3.3. Increases soil fertility and crop productivity:. Its cultivation enriches coconut land with organic matter and improves soil's micro-climate, thereby enhancing productivity of existing main crops. Studies conducted at coconut research station in India and coconut growing countries reported better flowering and higher yield from coconut mixed with cocoa. The organic matter added by cocoa by way of annual leaf fall (5.3 tones). (KAU 2009) improves extent of soil microbial profile development. Nutrient return by leaf fall is estimated @ nitrogen-66.9Kg, phosphorus-5.0Kg, potassium-9.7 Kg, calcium-84.9 Kg and magneisim-40.30KgIt also provide 2.5 tones of pod husk which is rich in potassium (2.5 to 5.3%).So coconut cocoa farming system could be called a non-expensive input to build up soil fertility.

3.4. Reduces risk of dependence on only one crop for income: Coconut is primarily a crop of small and marginal farmers. About 98 per cent of the coconut holdings in the country are less than 2.0 ha in size and more than 90 per cent of them are less than 1.0 ha in extent. The income derived from such small holdings is not sufficient to sustain even the small families. Besides, coconut growers are more exposed to economic risks and uncertainties owing to the rapid price fluctuations. Cocoa is a crop with low cost of production and high net income compared to coconut.

3.5. Soil and moisture conservation: Moisture stress was less when cocoa is grown as mixed crop with coconut. Coconut provides protection to cocoa from direct rays of sun and provides cool microclimate while cocoa canopy act like an umbrella to prevent fall of direct sunlight at the coconut basins and there by conserves moisture.

4. Critical factors for successful crop mixing with cocoa in coconut:

Year	Export (value Rs in Cr)	Import value (Rs Cr)
2011-12	175.976	934.322
2012-13	293.921	1049.249
2013-14	573.217	1071.549
2014-15	848.657	1551.09
2015-16	1266.994	1398.91
2016-17	1089.987	1542.307
2017-18	1144.373	1473.097
2018-19	1350.86	1845.888
2019-20	1274.34	1833.974
2020-21	1108.38	2020.98
2021-22	1145.48	2713.93
CAGR	20.60	12.04
% Increase	551	190



Trade performance cocoa and cocoa products from India ((2011-12-2021-22)

4.1. Correct selection of coconut land: Though climatic conditions similar to tropical forests of Africa and America is not available in India, it can be cultivated successfully in the in the partial shade available in coconut, areca nut and oil palm gardens. Always remember that cocoa is one of the most sensitive crops that needs irrigation in summer months. Hence selection of suitable coconut land with irrigation is essential for cocoa cultivation. Temperature and rain fall are two most important parameters for selection of land. Coconut land located in humid tropics with temperature 18-32°C could be selected and temperature falls below 10°C can damage cocoa tree. Coconut land receiving well distributed rainfall (1200-2000 mm)is ideal for cocoa mixing. Soil requirement of cocoa is humus rich forest soil. The natural habitat of cocoa is the dense shade of the warm rain forests. The soil should allow easy penetration of roots and capable of retaining moisture during summer. Clay loams, loams and sandy loams are suitable for cocoa. Shallow soils should be avoided. Cocoa is grown on soils with a wide range of PH from 6-7.5 where major nutrients and trace elements will be available. Cocoa does not come up in coastal sandy soils where coconut flourishes. Avoid wind prone areas as cocoa is highly sensitive wind damage. Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Pondicherry, Goa and parts of Orissa and Maharashtra are coming under the limit

4.2. Correct system of planting: Cocoa should be planted at least 2.5 m away from coconut. Cocoa rows should be laid in the east west direction. Every 5-6 rows of coconut have an avenue free of cocoa to allow movement of carts and tractors. In a coconut garden of above 10 years, with a spacing of 7.5X 7.5 m, cocoa can be planted at a spacing of 3 meter, between two palms in a single row system in the middle of two rows of coconut. In between each coconut palm in a row, one more coconut palm can be accommodated. Thus in one ha of coconut garden, about 500 cocoa plants can be planted. Six month old hybrid forestiro seedlings is the recommended variety for planting in pit size of 50 cm x 50 cm x 50cm

4.3. Correct application of manures and fertilizers: Separate manures and fertilizers for coconut and cacao should be applied timely as per recommendation. Organic fertilizers serve best as soil conditioners and fertilizer supplements to the coconut- cocoa cropping system.Organic fertilizers should be applied about a month ahead of the application of the inorganic/ mineral fertilizers

4.4. Correct and timely pruning: It is essential to follow Correct and timely pruning and achieve the economical tree height, to have adequate air circulation and sunlight penetration within the crop; to minimize incidences of pest and diseases; and to produce higher and quality yield

4.5. Correct life saving irrigation: The annual rainfall of about 1500 mm is required to meet evaporative demand. When it is less or when distribution is not fair, supplemental irrigation becomes necessary.

4.6. Correct planting material: Quality plating materials selected from accredited nurseries based on the quality parameters. At least 5 recommended clonal materials to be grown at the same period, since cocoa trees are normally incompatible in terms of flowering and pollination) Forestro with high bean weight.

5. Scope of expansion in Coconut garden

Nearly 21.98 lakh ha of coconut garden is available in India of which 35% is under irrigation. Availability of such areas in the states like Kerala, Karnataka, Maharashtra, Pondicherry, Tamil Nadu, Andhra Pradesh, Orissa and West Bengal will therefore offer very good scope for its cultivation, where coconut is being cultivated under cocoa. Therefore emphasis will have to be given on new area development in potential areas with assured irrigation. The NPK requirement of coconut can be reduced to a greater extent by growing cocoa as inter crop in coconut garden. Deficiency of potassium and magnesium is now commonly noticed in most of the coconut gardens especially in the root wilt affected areas. Introduction of cocoa as a companion crop in coconut gardens improves the soil health and thereby the productivity of coconut on a sustainable basis.

In conclusion, there is vast potential for Indian farmers to start cocoa cultivation and enter in to cocoa market to utilize the vast opportunities available in the global and Indian market. The major ten multi-national cocoa processing companies in India are facing acute shortage of raw materials. The present scale of production is not sufficient to meet the demand. Hence there is an urgent need to expand cocoa cultivation in all potential areas and replanting of old and senile cocoa plants. Potential to increase the productivity of existing cocoa gardens being established also should be looked in to. If cocoa cultivation is taken up in 10 % of coconut area with assured irrigation the production will surpass the demand. This crop combination can become a regular source of income for the small and marginal coconut farmers in the country.

Statement of ownership and other particulars about
INDIAN COCONUT JOURNAL
FORM IV
(See Rule 8)

1.	Place of Publication	:	Kochi - 11
2.	Periodicity of Publication	:	Monthly
3.	Printer's Name	:	Mini Mathew
	Nationality	:	Indian
	Address	:	Assistant Director, Coconut Development Board, Kochi - 11, Kerala.
4.	Publisher's Name	:	Mini Mathew
	Nationality	:	Indian
	Address	:	Assistant Director, Coconut Development Board, Kochi - 11, Kerala
5.	Editor's Name	:	Deepthi Nair S
	Nationality	:	Indian
	Address	:	Director, Coconut Development Board, Kochi - 11, Kerala
6.	Names and addresses of individuals who own the newspaper and partners or shareholders holding more than one percent of the total capital	:	The periodical is owned by the Coconut Development Board which is a body corporate set up by the Government of India under the Coconut Development Board Act, 1979.

I, Mini Mathew, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Sd/

Date : 01-03-2023

(Mini Mathew)

Sustaining soil health in coconut gardens through grass –legume fodder combinations

Jeena Mathew and A. Abdul Haris
ICAR-Central Plantation Crops research Institute, Regional Station, Kayamkulam

At present, Kerala has 13.42 lakh head of cattle (livestock census 2019) and Kerala produces only 60% of the roughages required for cattle in Kerala. The daily requirement of green fodder for the cattle is 8-10kg per 100kg weight (Rajesh Singh, 2019). Because of very limited land holdings, there is scarcity of fodder and subsequently the productivity of livestock will be limited. It is therefore necessary to make best utilization of available land for the maximum production of fodder crops. Intercropping fodder grass in coconut based mixed farming systems is an inevitable component to sustain livelihood and ensuring the feed availability to the cattle in an economically viable manner. Soil fertility is equally important as that of sustaining the farm productivity.

Continuous cultivation of fodder grass resulted in the depletion of soil nutrients such as potassium, which is the critical nutrient for coconut production. Both fodder grass and coconut are monocotyledonous crops. The fibrous root system of these crops explore nutrients from surface layers. This results in the competition for the exploration of nutrients from the soil from the limited soil volume. In such a situation, short duration crops will gain advantage over the perennial crops such as coconut. Though the fodder crops are planted outside the 2m radius of coconut basin, many times root spread of the fodder grass within the coconut basins occurs frequently. Here comes the importance of the inclusion of leguminous fodder crops such as cowpea and stylosanthes hamata as intercropped along with the grass fodder crops in coconut gardens. The border rows of leguminous fodder hinder the proliferation of the grass fodder roots in the basin and also supply nutrients through the residue addition.

Investigations conducted at ICAR-Central Plantation Crops Research Institute, Regional Station Kayamkulam during 2013-2016 have shown that fodder cowpea and

stylosanthes in the border rows of hybrid bajra napier grass in coconut garden of an average age of 25 years could enhance the soil fertility status. The depletion of available potassium in the soil can be reduced to a certain extent if the leguminous fodder crops are intermixed in the grass fodder plots. This in turn will decrease the completion for these available nutrients in the coconut gardens. Leguminous fodder crops have the potential to fix atmospheric nitrogen in its root nodules and thereby can enrich the soil fertility. The organic carbon content in the soil was found to be enhanced in the combination as compared to the sole crop of hybrid bajra napier grass. After three year study the organic carbon content was 0.642% from an average of 0.56%.

Varieties

Hybrid Bajra Napier Var. Suguna, fodder cowpea Var. EC4216, and stylosanthes hamata were found to be suitable to grow as intercrop in the border rows of hybrid bajra napier grass fodder legume combination for enhancing the soil health and crop productivity.

Planting

Hybrid Bajra Napier grass var. Suguna was planted at a spacing of 60cm X 60cm. In the border rows, stylosanthes hamata or cowpea can be planted.

Manuring and fertilizer application

In the case of Hybrid Bajra Napier grass, the recommended dose of fertiliser was 200:50:50 kg ha-1 NPK (KAU, 2016). Entire P and K were applied as basal. Nitrogen @ 200kg/ha was given in three split doses. Field should be provided with adequate drainage especially during the rainy season. Depending on the rainfall and weather conditions irrigations can be given to avoid moisture stress. In the case of cowpea, the NPK as basal dose was applied @ 40:30:30kg NPK per ha. Stylosanthes hamata was given NPK@ 20:80:30kg/ha.

Harvest

The first harvest of fodder grass can be done 60days after the planting of slips. The harvest of fodder cowpea and stylosanthes can be taken at 30 to 45 days interval. The yield from the hybrid Bajra Napier grass was 132t/ha/year. Intercropping cowpea with hybrid bajra napier grass recorded yield 5.96t/ha whereas stylosanthes hamata recorded the yield of 15.75t/ha. The leguminous fodder will supply proteins and improve the nutritional quality of feed for better animal productivity.

The combination of hybrid Bajra napier grass with leguminous fodder crops such as stylosanthes hamata and cowpea in coconut based mixed farming system is advantageous in terms of maintaining the soil fertility, organic matter status, content of potassium, calcium and magnesium. Due to the management of soil fertility, and favourable microclimate overall improvement in the yield of coconut was also observed. Adequate care should be taken to provide the recommended dose of nutrients to coconut as well as inter crops. Always it is advisable to adopt a crop combination of legumes and grass fodders in coconut garden so as to enrich the cattle feed and enhance the soil health and system sustainability.

Retirement

Smt. Lakshmi Devi M. P. Administrative Officer, retired from the services of Coconut Development Board on 31st December 2022 after completing 34 years of service.

Shri George Peter, Senior Field Officer, retired from the services of Coconut Development Board on 31st March 2023 after completing 33 years of service.

Improved Coconut Varieties Suitable for Quality Ball Copra Production

Ranjini T.N.[1], Niral, V.2 and Samsudeen, K.[2]
[1] Scientist, Division of Crop Improvement, ICAR- CPCRI, Kasaragod, Kerala
[2] Principal Scientist, Division of Crop Improvement, ICAR- CPCRI, Kasaragod, Kerala

Coconut (Cocos nucifera) palm is a most useful palm in the world, which gives all that is necessary for human life. Hence, in India coconut palm is endearingly called 'Kalpavriksha' meaning the tree of heaven. It is cultivated in most of the tropical countries as a commercially important tree and they produce many economically valuable products to the world including edible oil, copra, refreshing drink, fiber, charcoal and a variety of miscellaneous products for domestic and industrial use. The crop significantly contributes to the national economy in view of its contribution to the rural employment generation.

In India, coconut is grown in an area of 2.08 million hectares, across 18 states and three Union Territories. Traditional areas of coconut cultivation in India are in the states of Kerala, Tamil Nadu, Karnataka, Goa, Andra Pradesh, Maharashtra, Pondicherry, Orissa, West Bengal, Islands of Lakshadweep and Andaman and Nicobar. India ranks among the top three coconut producing countries in the world, with an annual production of 20,736 million nuts(CBD, 2020-21).Of the total production of coconuts in the country, about 91 percent was used as mature coconuts, out of which, 30 percent was for domestic consumption and 69 percent for industrial usage. Out of the industrial use, about 80 percent was converted to copra, of which about 31 percent as ball copra and 69 percent as milling copra to produce coconut oil for edible, toiletry and other purposes. The remaining 20 per cent was for other industrial uses i.e. for production of value-added products like desiccated coconut, virgin coconut oil, coconut milk/cream, slice/grated/dry coconut, etc. (CAC&P 2022).

Copra the dried kernel of coconut produced from the fresh nut which has been shelled and dried is a very important commercial product comes next to coconut oil in terms of production and usage. In India, two types of copra are produced one is milling copra and another is edible copra. Milling copra comprises of cups and chips mainly used to extract oil whereas edible copra/ ball copra is usually a fine grade, well-dried whole of the coconut kernel and is used in various food preparations are consumed as dry fruit and mostly used for religious purposes as well as in traditional medicines preparation.

Ball copra from Tiptur Tall coconut variety

In our country, states like Kerala and Tamil Nadu producing nearly 92% of total domestic production of milling copra. Of which, Kerala had the largest share and accounted for 47 percent of total milling copra production while the share of Tamil Nadu was 44.6 percent and Karnataka 4.5% during the year 2021-22. In case of edible/ball copra, Karnataka accounted for 65.5 percent of total production, while Kerala's share was 13.5 percent and Andhra Pradesh's share was 10.3 percent. In Karnataka, nearly, 60 % of the coconut produced is consumed as raw and 25% are converted into edible ball copra and desiccated coconut powder.

The top three producers accounted for more than 96 percent of total milling copra and 89.3 percent of edible copra production in the country(CAC&P 2022).

For edible ball copra, Tiptur and Arsikere in Karnataka and Vadagara in Kerala are the two main biggest wholesale markets in India. Ball copra, prepared in Vadagara is referred as ''Calicut Gola'' in trade and they are classified into five types according to the size. Ball copra produced in Karnataka are graded into four groups based on the size such as, "Mysore", "Madras", "Ras" and "Barik" and rejected edible copra is called kavathu. These grades are not defined in any measurable unit but classified only based on the visual assessment. Ball copra from Godavari district is referred to as Madras copra which is not as good as Karnataka or Vadagara varieties. The ball copra from vadagara and kozhikode areas is considered slightly inferior to that of Tiptur area of Karnataka(Ayoob, 2004).

Traditionally, edible ball copra is prepared by more than 12 months old whole nuts, immediately after harvest are stored in gardens for 5-6 weeks, subsequently they are partially dehusked and stored on a raisedbamboosplatform, inside a shed for a period of about 8-12 months. It is also dried by passing hot air especially for the nuts harvested during monsoon season. The nuts harvested in summer season are sun dried and converted into ball copra. During this time, coconut water is absorbed by the kernel and dries out slowly and loosens itself from the shell. Later by de husking and de shelling separates the dry kernel in ball form which is relatively softer, sweet and oily with moisture content below 7 percent.

Earlier, demand for ball copra is limited to winter season starting from November to January in a year. But recent years, demand for the edible ball copra increased from North Indian states like Delhi, Ahmadabad, Kolkata, Pune, Rajasthan, Mumbai, Jaipur, Patna, Nagpur, Cuttack, Indore, Puri, Guwahati, etc. when it started using in the preparation of sweets, bakery products and confectionaries. Hence, ball copra is gaining popularity in both traditional and nontraditional areas, thus opening new vistas for coconut entrepreneurs to invade the widening market for ball copra in our country.

In order to meet out the raising market driven demands for the ball copra it is necessary to increase the production of the quality coconuts suitable for the production of ball copra in the country. In this regard ICAR- Central Plantation Crops Research Institute, Kasaragod a premier research institute in the National Agricultural Research Systems of India is continuously evaluating the available germplasms, accessions and hybrids in the institute and identified better lines and hybrid combinations which are high yielding and suitable for the ball copra production and released for the cultivation in different agro ecological regions of the country. Similarly, AICRP on palms, Arsikere Centre also developed a hybrid suitable for ball copra production. Detailed information about varieties suitable for the production of ball copra is discussed below (Chowdappaet al., 2017).

Varieties suitable for the production of ball copra

Kera Keralam: A tall variety, selection from a population of West Coast Tall (WCT) from Kerala. The palms are sturdy with compact spherical crown and yields economically for about 75 years or more. It is a high yielding variety, regular bearers, moderately resistance to leaf spot disease, tolerant to moisture stress and suitable for the production of copra and oil. The nuts

of this variety are highly suitable for preparation of ball copra, since only9.09% spoilage is observed in this variety during the process of ball copra production. Fruits are green yellow, medium size and oval with copra content of 176 g/nut with copra oil content of 68%. Potential copra yield is 6.56 t/ha/year. The palms normally come to bearing in about 6-7 years, under rainfed conditions. However, under favorable conditions of irrigation and ample sunlight, early flowering within four years of planting has been recorded. The average annual yield under rainfed condition is 80 nuts per palm. This is recommended for cultivation in states like Kerala, Tamil Nadu and West Bengal.

Kalpatharu: A tall and high yielding variety, highly suitable for the production of quality ball copra, relatively tolerant to moisture deficit stress, basal stem rot and leaf blight. This variety is a selection from population of Tiptur Tall from Karnataka. The palms of this variety are tall with circular crown and are regular bearers and have an economic life span of up to 80 years, under favorable conditions. The average time taken for flowering in the population is about 6 years, under rain fed conditions. The shape of the fruit is oval with husked nuts being round in shape. The average fruit weight of this variety is around 958 g, with copra content of 175

g/nut and oil content in copra is 67.2%. The variety is especially suitable for ball copra production, as spoilage percentage (3.92%) during the process of ball copra production is lower as compared to other released varieties.

Approximately 5600-6800 nuts are required to make one tonne of copra. This gives potential copra yield of 4.56 t/ha/year. The variety is relatively tolerant to drought and suitable for cultivation under both rainfed and irrigated regions of Karnataka, Tamil Nadu and Kerala.

Kalpa Mitra: It is a tall, high yielding, regular bearing variety, selection from a population of Java Tall from Indonesia, tolerant to moisture stress and suitable for the production of ball copra and oil. The palms of this variety are tall in habit with stout trunk and spherical canopy with large number of leaves. The palms are regular bearers and commence flowering 7-8 years after planting in the field, under rainfed cultivation. Its fruits are large, oval and average weight is 1001.19g and, on an average, 241.14g of copra (dried endosperm) per fruit can be obtained. The copra contains about 66.50% of oil. It has the potential to give yield of 5.41 t/ha/year. This variety is suitable for the cultivation in the states like Kerala and West Bengal.

Chandra Kalpa: It is a selection from Lakshadweep Ordinary (LCT), an indigenous coconut cultivar from Lakshadweep Islands. It resembles WCT in growth habit and fruit characters.However, the fruits of this variety are comparatively smaller and angular with three prominent ridges seen on the mature fruits. The fruit colour varies from greenish yellow to yellow-green. The average annual yield is 100 nuts/palm and the estimated copra yield of 17 kg/palm/year. Fruits are medium sized with an average fruit weight of 800 g, copra content of 176 g/nut and copra oil content of 72%. About 6000 to 7000 nuts are required to make one tonne of copra. The palms of this variety are also good for tapping 'neera' (inflorescence sap), which can be consumed as such or converted to palm sugar/ jaggery. This variety is suitable for the cultivation in the states like Kerala, Karnataka, Andhra Pradesh, Tamil Nadu and Maharashtra.

KalpaSreshta: A high yielding, dual purpose hybrid developed by crossing Malayan Yellow Dwarf (female parent) and Tiptur Tall (male parent) variety suitable for the production of premier quality ball copra as well as for tender nut production. The palms of this variety are vigorous in growth, tall in plant habit. The fruits of this variety are oval shaped with good quality tender water (368 ml) and the dehusked fruits being round in shape give 216 g copra/ nut. The palms of the variety KalpaSreshta are regular bearers and commence flowering in 6-7 years after planting. However, under irrigated conditions, the palms are expected to commence flowering within 4 years after planting. The average annual nut yield of this variety is 167 nuts/palm/annum, under irrigated conditions, with an estimated annual high copra out turn of 35.9 kg/palm/ year (6.28t/ha copra). It is recommended for cultivation in Karnataka and Kerala.

Chandra Sankara: Chandra Sankara was the first hybrid developed at the institute to be recommended for commercial cultivation in the year 1985 and is the most popular Dwarf x Tall hybrid in the country. This hybrid was produced by crossing Chowghat Orange Dwarf palms (female parent) with pollen from elite West Coast Tall palms (male parent), suitable for copra and tender nut production. The palms of this variety are semi tall in habit, with circular canopy. The palms come to bearing

early when compared to tall WCT parent. It bears brown, medium size fruits with 208-225 g of copra per nut and the oil content in copra is 64-68 per cent. The average time taken for flowering is about 3- 4 years, under favorable growth conditions and yields copra of 7.74t/ ha/year and 2.99 t oil/ha. This variety is sensitive to low moisture stress and performs well under irrigation and good management. This hybrid is recommended for cultivation in Kerala, Karnataka and Tamil Nadu.

Kera Sankara: A high yielding dual purpose hybrid variety developed by crossing West Coast Tall as female parent and Chowghat Orange Dwarf as male parent. The palms of this variety are tall in habit, with circular canopy. The palm comes to bearing by the 4th year of planting. The variety bears brown, medium sized, oblong fruits with

187 g copra/ nut with 68 per cent oil in the copra. It yields copra of 7.80t/ ha/year. This hybrid can be cultivated in the states of Kerala, Karnataka, Coastal Maharashtra and Coastal Andhra Pradesh.

Kalpa Ganga: A hybrid developed by crossing Gangabondam (female parent) and Fiji Tall (male parent) suitable for ball copra production. It is a semi tall palm with circular crown, oblong shaped nuts of green color. The palms take about 4-5 years for flowering. It gives 120 nuts/palm/year and yields copra of 3.38t/ ha/year. This hybrid is recommended for cultivation in Karnataka state.

Conclusion

Most of the dwarf coconut varieties are not suitable for ball copra production. Further, some of the tall varieties released from ICAR- CPCRI such as Kera Chandra, Kalpa Pratibha, Kalpa Haritha and Kalpa Shatabdi are also unsuitable for the production of ball copra due to early germinating nature of the fruits andhence there is greater percentage of spoilage when the nuts are stored for longer period of 8-12 months which is necessary for the production of ball copra.

Quality seedlings of the improved coconut varieties suitable for ball copra production is supplied by ICAR-CPCRI, various SAUs, State Department of Horticulture and the centres under AICRP on Palms as well as the Coconut Development Board to the farmers and NGO's to facilitate the higher production/ productivity in the country.

It is advisable to plant improved varieties and hybrids which give higher yield of ball copra in order to meet the market driven demand as well enable coconut farmers to get higher net income. In addition, this will help to improve overall profitability of coconut farming and promote coconut cultivation in the country.

References:

Ayoob. C.P., 2004. A study on the role of co-operative marketing agencies in the marketing of coconut in Kerala. Report submitted to Department of Commerce and Management Studies, University of Calicut.

Chowdappa P., Niral V., Jerard B.A. and Samsudeen K. (Eds.) (2017) Coconut. Daya Publishing House, A Division of Astral International Pvt. Ltd. New Delhi, India. 440p.

Coconut Development Board (2020-21). Area, Production & Productivity of Coconut in India. http://www.coconutboard.nic.in/stat.htm

Commission for Agricultural Costs and Prices (2022) Price Policy for Copra 2023 season.

Alpinia 'Jungle King' – A ornamental intercrop in coconut plantation for aesthetics and income

K.Nihad*, A.Abdul Haris* and Ravi Bhat**

*ICAR-Central Plantation Crops Research Institute, Regional Station, Kayamkulam

** ICAR-Central Plantation Crops Research Institute, Kasaragod

Coconut (*Cocos nucifera L.*) is the major plantation crop of coastal humid tropics which provides ample scope for inclusion of other compatible enterprises in the system. Landscaping the coconut plantation with traditional and underutilized perennial flower crops is a new trend towards eco-tourism promotion and horticultural therapy. Inclusion of shade loving flower crops with low maintenance and cost of cultivation is a viable option for medium and large farmers for aesthetics and income generation.

Plants from the order zingeberales are already identified as potential income generation from coconut ecosystem which include spices (ginger, turmeric), fruits (banana), and ornamentals (*Heliconias*). Alpinias are another group of plants belonging to ginger families with ornamental (*A. purpurata*) and medicinal (*A. galanga*) properties that can be grown as an under storey crop in coconut plantations.

Alpinia purpurata is commonly known as Red gingers producing inflorescences in different hues of red. It is an evergreen tropical ornamental with brightly coloured flower bracts and white inconspicuous flowers. It grows to a height of 90 cm to 4.5m. The plant starts producing flowers from five months after planting.

Varieties

The popular varieties of Alpinias are Jungle King (dark red globe shaped inflorescence), Jungle queen (light pink), Kimi (dwarf type plants with lavender pink inflorescence), Red ginger (dark red elongate inflorescence), Madikeri (white inflorescence with overlapping bracts). Among them, Var. Jungle King is identified as a commercial variety suitable for growing as an intercrop in the natural habitat of coconut gardens. It is becoming popular among growers and florists for its longer vase life and unique floral characteristics.

Growing conditions

Red gingers can be grown in varied climatic conditions from tropics to sub tropics. It prefers organic rich moist soils with drainage facility. It can be grown under full sunlight to partial shade. The performance of plants to light intensity varies with variety.Pilot studies conducted at ICAR-CPCRI reveals Alpinia '

Jungle King' as a potential variety which can be grown as a commercial intercrop in coconut plantations. It recorded two flowering seasons under coastal humid conditions ie; from January to March and August to December. The inflorescences produced were had market preferred attributes like longer inflorescence (more than one meter length) with round compact flower head of desirable spike length (more than 9 cm) and circumference (more than 16 cm). If grown under full sunlight, the leaves showed chlorophyll bleaching and necrosis producing lesser number of inflorescences. The studies conducted at ICAR-CPCRI revealed that commonly grown 'Red Ginger' variety prefers full sunlight which can be grown as an ornamental hedge plant or border plants in coconut plantations.

Planting material

The offshoots or small plantlets developing from the rhizomes or rhizomes along with mature vegetative pseudo stem can be used for planting. The plants developed from offshoots take more than one year for flowering where as the latter flowers in four to six months time.

Planting

Alpinia rhizomes are planted in pits of size 30cm x 30 cm x 30cm. Planting can be done except during heavy monsoon seasons. However, the ideal time for planting is from August to November. The rhizomes are planted

at 1.25 m spacing leaving an area of 2m around the coconut basins. The pits are filled with top soil mixed with 250g bone meal and 1kg dried cowdung.

Irrigation

Alpinias always require moist soil. It needs to be irrigated once in two days during summer. The frequency of irrigation can be reduced to once in four days by providing mulching with coir pith compost (2kg/pit) during February-March.

Manuring

The manures and fertilizers are applied at quarterly intervals beginning from three months after planting. Application of vermicompost (dried coconut leaves can be converted to vermicompost using earthworms of *Eudrillus sp.*) along with neemcake (200g and 100 g per clump respectively) and drenching the plant pits with diluted cow dung slurry in the ratio 1:10 at six monthly interval enhances the production of quality inflorescence.

Harvesting

Alpinias starts flowering at six to eight months after planting. Harvesting is usually done before 9am in the morning or after 4pm in the evening by cutting the rhizome along with the inflorescence and foliages at ground level. After cutting, the outer leaves are stripped off and the inflorescence is wrapped using the top most leaf blades. The wrapped inflorescences are then packed for marketing. A total of seven layers of inflorescences can be packed inside a box of 120cm x 45cmx45cm size holding 42 inflorescences per box.

Marketing

Inflorescences of around one meter length and compact spikes are selected for sale. Smaller inflorescences can be used for value addition such as bouquets and table top arrangements. At least 4 to 5 marketable inflorescences are produced in the first year of planting itself. It produces 12 to 15 inflorescences/ clump/year in the subsequent years and needs to be replanted after 3-4 years. The vase life of 'Jungle King' inflorescences is 5 to 7 days where as 'Red Ginger' has a shorter vase life of 3 to 4 days.

Alpinia 'Jungle King' for income generation from coconut ecosystem with coastal sandy soils - Farmer's experience

Seaside Agri Exports is a leading floriculture exporting agency situated at the outskirts of Thiruvanthapuram district of Kerala state. The firm markets tropical ornamentals for more than three decades which are bloomed in their own coconut garden. Mr. Vinoo, the owner of the firm is a passionate photographer

and florist who travel a lot to gain insights into his passion-driven floriculture business. He always tries to include novelty and uniqueness in his products which constantly creates a curiosity among his customers mainly spread out in Mumbai, Delhi and Bengaluru markets. According to him Alpinias are newly emerging tropical cut flowers which are gaining market demand since last decade. He introduced Alipinas into his coconut plantation during 2006 and started marketing the flowers since 2008. Among the varieties, Alpinia Jungle King is the most preferred variety among the florists due to its unique colour, compactness and longer vase life. The variety thrives well in coastal sandy loam soil under minimum management as an intercrop in coconut plantation. It produces a minimum of 10 to 12 quality inflorescence per pit annually. The inflorescence fetches around ninety rupees in the major markets of India. For commercial cultivation, a minimum of 250 to 300 plants is needed which requires a minimum of 25 cents of coconut plantation. The dedication and involvement of the farmer coupled with the up-to-date knowledge regarding the emerging market trends are the key towards the success of floriculture business.

Conclusion

Though wild types of Alpinias are common in our country, commercial cut flower types with unique characters are fetching up higher demand among the florists. Among the varieties Alpinia 'Jungle King' is identified as a potential variety which can be grown under the natural niche of coconut ecosystem. It produces quality inflorescences during cooler seasons (August to February). At present marketing of Alpinias is concentrated in domestic markets of metros which itself is fetching a reasonable profit. A single inflorescence of Alpinia 'Jungle King' with around one meter length and preferred spike characteristics fetches around sixty rupees and is a viable option for medium and large coconut farmers for aesthetics and income generation.

ICAR-CPCRI celebrated the valedictory function of KalpaVajra

To commemorate 75 years of service to coconut community, ICAR-Central Plantation Crops Research Institute, Regional Station, Kayamkulam has been celebrating a year long Platinum Jubilee, KalpaVajra since April 2022. Dr. A. K. Singh, DDG (Horticulture Science) ICAR, New Delhi inaugurated the valedictory programme of KalpaVajra on 13th May 2023. In his inaugural address he complimented the innovative technological solutions offered by the Institute to the coconut community. He highlighted the need to digitize the agriculture sector and exploit the potential of artificial intelligence and sensor-based technologies for maximization of income. He stressed upon the ecosystem services and carbon sequestration potential of coconut as the key economic benefits. He also urged the scientific community to evolve sustainable developmental goals in palm health management through one-health approach

Dr. P. Anithakumari, Acting Head summarized the address made by DDG in Malayalam for the benefit of the farming community. Dr. Byju G. Director, ICAR-CTCRI, Thiruvananthapuram highlighted the importance of growing tuber crops as potential intercrops in plantation crops for enabling continuous income by farmers and Dr. K. Suresh, ICAR-IIOPR Pedavegi, appreciated the Regional Station for its stellar research achievements and farmer participatory approach. Dr. Mini V, Head ORARS, KAU Kayamkulam recalled the outstanding contributions of past researchers and the collaboration between ICAR-CPCRI and KAU towards farmer's prosperity.

Dr. B Hanumanthe Gowda, Chief Coconut Development Officer, Coconut Development Board who further spoke during the occasion highlighted on the planting materials and CDB funded schemes for the benefit of coconut community.

Dr. K. B. Hebbar, Director, CPCRI welcomed the gathering and highlighted the research accomplishments of the Regional Station and Dr. Joseph Rajkumar A. Principal Scientist, CPCRI delivered vote of thanks.

Dr. A. K. Singh, handed over KalpaVajra seedling to progressive farmers. launched a modified ground pollination tool kit for accurate delivery of pollen onto the female buttons without climbing the crown. He handed over MoU of customized nutrient formulation viz., KalpaPoshak and KalpaVardhini to FPO and KVK and the bunch of millet products developed by Odanadu Farmer Producers' Company Limited. He also commissioned a coconut pollen processing laboratory and announced Kalpa Vajra Award for the Best coconut farmer in the root (wilt) disease tract of the country. Five publications were released during the occasion. Earlier Dr. A. K. Singh, inaugurated the planting of coconut seedling in Kalpa Vajra block and Agri-tech Exhibitions.

A farmers' seminar cum interface programme on the theme Processing and value addition for doubling farmers income was held. Shri D. Kuppuramu, Chairman-Coir Board, Kochi inaugurated the programme. Dr. E. Jayasree, Principal scientist, ICAR-IISR, Kozhikode, Dr. M. R. Manikantan, Principal Scientist, ICAR-CPCRI, Kasaragod, Dr. M. S. Sajeev, Principal Scientist, ICAR-CTCRI, Thiruvananthapuram, Dr. K. N. Shiva, Principal Scientist, ICAR-NRC on Banana and Dr. U. K. Priya Scientist, ICAR-CPCRI, RS, Kayamkulam spoke on processing and value addition of spices, coconut, tuber crops, banana and cocoa, respectively. Dr. P. Anithakumari, Acting Head, CPCRI welcomed the gathering and Dr. A. Abdul Haris, Principal Scientist proposed vote of thanks. More than 500 farmers participated in the programme.

Cultivation practices for coconut-June

Sowing of seednuts in nursery

Well-drained, coarse-textured soil near dependable irrigation water source should be selected for raising the nursery. The seed nuts can be sown in flat beds if there is no drainage problem. The seeds are to be sown in raised beds, if water stagnation is a problem. Nursery can be raised either in the open with artificial shade or in gardens where the palms are tall and the ground is not completely shaded. The seed nuts should be sown in long and narrow beds at a spacing of 40 cm x 30 cm either vertically or horizontally in 20-25 cm deep trenches. Advantage of vertical planting cause less damage during transit of seedling. However, in delayed planting, when the nut water goes down considerably, adopt horizontal sowing. It is better to go for horizontal sowing of seed nuts for better germination.

Seedling selection for planting

Only good quality seedlings are to be selected from the nursery for field planting. In tall varieties, vigorous seedlings which are one year old, more than 100 cm in height with 5-6 leaves and girth of 10 cm at the collar should be selected for planting. In dwarf varieties, the girth and height of good quality seedlings should be more than 8 cm and 80 cm, respectively. Early splitting of leaves is another character preferred for selecting good seedlings. Generally, one year old seedlings are preferable for planting. However, for planting in water-logged areas, 1½ to 2 year old seedlings are to be preferred.

Seedlings raised in poly bags perform better. The advantage of polybag seedlings is that, there is no transplanting shock since the entire ball of earth with the root system can be placed in the pits and the seedlings establish early and more vigorously. But the disadvantages include difficulty for transportation and higher cost of seedling production.

Planting

In well drained soils, seedlings can be transplanted with the onset of south-west monsoon during June. A spacing of 7.5 m x 7.5 m to 8.0 m x 8.0 m in the square system is generally recommended for coconut. This will accommodate 177 and 156 palms per ha, respectively. If the triangular system is adopted, additional 25 palms can be planted. Hedge system can also be adopted giving a spacing of 6.5 m along the rows and 9.5 m between rows. For facilitating multiple cropping in coconut gardens, it is advisable to go for wider spacing of 10 m x 10 m so as to provide ample opportunity to accommodate a number of perennial and annual crops in the interspaces.

The depth of planting pits will depend upon the type of soil. In laterite soil with rocky substratum, deeper and wider pits, 1.5 m length x 1.5 m breadth x 1.2 m depth may be dug and filled up with loose soil, powdered cow dung and ash up to a depth of 60 cm before planting. In case of laterite soil, application of 2 kg of common salt will help in loosening the soil. In loamy soils with low water table, planting in pits of 1 m x 1 m x 1 m filled with top soil to height of 50 cm is generally recommended. The coconut seedlings are planted in the centre of the pit by making small hole within the pits and the soil around the seedlings must be firmly pressed, but soil should not be allowed

to bury the collar region of the seedling or enter into the leaf axils. However, when the water table is high, planting at the surface or even on mounds may be necessary. While planting on the surface or mounds also, digging pits and soil filling has to be done. While filling the pits with soil, it is advisable to use top soil. Two layers of coconut husk (with concave surface facing up) can be arranged at the bottom of the pit before filling up. This will help in conserving the moisture. The seedlings, after field planting, are to be protected from heavy wind by staking and from sunlight by proper shading using plaited coconut leaves or palmyrah leaves or any other suitable shading materials. If there is no rain after planting, seedlings are to be adequately irrigated.

Further, if continuous heavy rain occurs after planting, care should be taken to avoid water stagnation in the pit by providing drainage. Bund should be made around the planting pit using bottom soil to avoid run-off water entering the pit.

Application of fertilizers

Under rainfed conditions one third of the recommended dose of chemical fertilizers can be applied to the coconut palms with the onset of south west monsoon. Application of 500 g N, 320 g P2O5 and 1200 g K2O per palm per year is generally recommended for adult plantations. To supply one-third of the above nutrients it is necessary to apply about 0.36 kg urea, 0.5 kg rock phosphate (in acidic soil) or 0.7 kg Super Phosphate (in other soils) and 0.7 kg of Muriate of potash (MOP). The recommended dose of fertilizers may be spread around the palms within the radius of 1.8 m and forked in. It is always advisable to test soil in the coconut garden periodically (once in 3 years) based on the results of which, type and dosage of chemical fertilizers can be decided. Skipping of phosphatic fertilizer application is recommended if the available soil phosphorus is above 20 ppm.

If the coconut palms are maintained under irrigation, one fourth of the recommended dose of chemical fertilizers should be applied to the coconut palms during June.

It is always advisable to analyse the soil and leaf once in three years and based on the results, fertilizer application should be done.

Application of soil amendments

If application of soil amendments has not been done during May because of non-receipt of summer showers 1 kg of dolomite or 1 kg of lime may be applied per palm during June at least 15 days prior to the application of chemical fertilizers.

Application of biofertilizers

Biofertilizer application should coincide with the onset of monsoon, especially when the palms are maintained under rainfed condition. Formulations containing *Azospirillum spp*. and Phosphate solubilising bacteria prepared in carriers such as talc or vermicompost each are to be applied @100 g per palm.

'Kera Probio' (a talc formulation of *Bacillus megaterium,* a phosphate solubilising bacteria) can be applied to coconut seedlings @ 25 g per seedling mixed with vermicompost or farm yard manure while planting. Similarly an Arbuscular Mycorrhizal Fungal (AMF) bioinoculant, '*KerAM*' can be applied @50 g per seedling.

Basin management with legume cover crops

Green manure legumes like *Pueraria phaseoloides*, *Calopogonium mucunoides*, cowpea (*Vigna unguiculata*), sunhemp (*Crotolaria juncea*), horse gram (*Macrotyloma uniflorum*), daincha (*Sesbania aculata)* and *Sesbania spinosa* can be raised in the coconut basin and incorporated into the soil as green manure at 50% flowering stage. Seeds of these crops @ 100 g per basin can be sown in the palm basin at a radius of 1.8 m during June.

Dismantling of drip irrigation system

After the monsoon sets in during June, laterals of the drip irrigation system should be dismantled and rolled back and kept tied on a pole or on a coconut tree trunk at the starting point of the irrigation system in the coconut garden.

Planting of intercrops

Planting of suitable inter/mixed crops can be taken up in coconut garden during June. Intercrops like banana, pineapple, ginger, turmeric, tapioca, sweet potato and perennials like, black pepper, nutmeg, clove, cinnamon, vanilla, cocoa etc. can be planted.

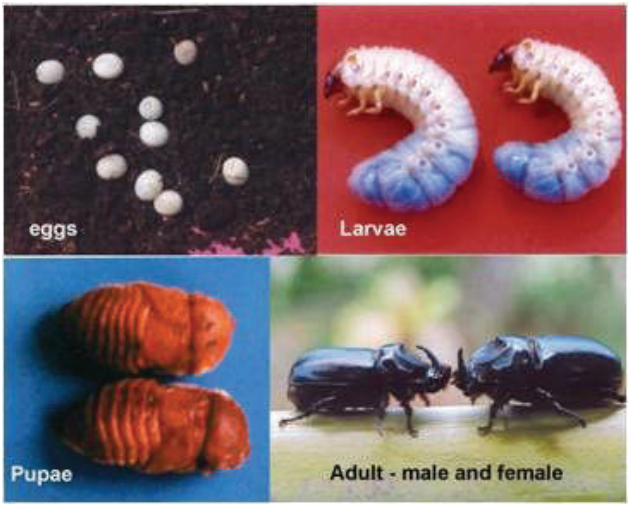
Plant protection

Peninsular India, the dominant coconut growing region in the country would receive South-West monsoon showers during the period of June. Palms therefore would re-adjust from dryness to wetness with the active formation of feeding roots in this period. Palm health need to be rejuvenated with soil-test based nutrition along with prophylactic management module and routine scouting to tackle pests and diseases. Heavy monsoon showers are likely to wipe away the sucking pest complex including coconut eriophyid mite and invasive whiteflies and also suppression of black headed caterpillar to a greater extent. Two major coconut pests, viz., coconut rhinoceros beetle and red palm weevil are a major concern in this period and the emergence of adult beetles of white grub would be quite prominent with receipt of monsoon showers which would be the right time for mechanical collection of beetles. Farmers should adopt all prophylactic measures such as leaf axil filling with neem cake admixed with sand and also application of 1% Bordeaux mixture in bud rot endemic zones. Timely prophylactic treatment in bud rot endemic zone is very critical to save the palm, as spotting the disease symptoms would be difficult in the initial stage of infection for which Unmanned Aerial Vehicle are smart tools in pest surveillance.

Pests

Rhinoceros beetle (*Oryctes rhinoceros*)

Being a ubiquitous pest, the incidence of rhinoceros beetle is quite common during all periods. However its damage is well pronounced during monsoon phase when seedlings are also planted. In seedlings just planted, the spear leaf gets damaged and distorted by beetle damage. Juvenile palms are also prone to pest attack and sometimes appearing as elephant tusk-like symptoms. Damaged juvenile palms are stunted and get delayed in flowering. Of late incidence of nut boring symptoms are also noticed. Moreover, the attack by rhinoceros beetle would invariably incite egg laying by red palm weevil as well as entry of bud rot pathogen in this period.



Life stages of the pest

▶ *Management*

- Prophylactic treatment of top most three leaf axils with either botanical cake [Neem cake /marotti cake / pungam cake (250 g)] admixed with equal quantity of sand or placement of 12 g naphthalene balls covered with sand.
- Routine palm scrutiny during morning hours along with brushing of teeth and hooking out the beetle from the infested site reduces the floating pest population. This strategy could reduce the pest population significantly.
- Shielding the spear leaf area of juvenile palms with

Nut damage

Elephant-tusk like symptom

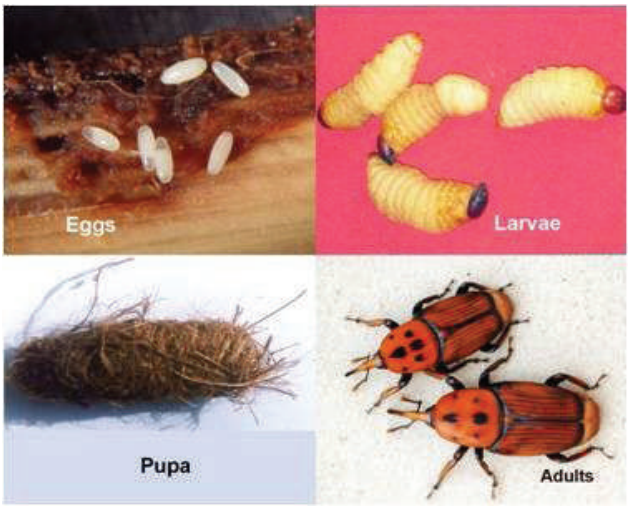
fish net could effectively entangle alighting rhinoceros beetles and placement of perforated sachets containing 3 g chlorantraniliprole / fipronil on top most three leaf axils evade pest incursion.

- Dairy farmers could treat the manure pits with green muscardine fungus, *Metarhizium anisopliae* @ 5 x 1011spores /m3 to induce epizootics on the developing grubs of rhinoceros beetle. Area-wide farmer-participatory approach in technology adoption could reduce the pest incidence very effectively and forms an eco-friendly approach in pest suppression.
- Incorporation of the weed plant, *Clerodendron infortunatumin* into the breeding pits caused hormonal irregularities resulting in morphogenetic transformational aberration in the immature stages of the pest.
- Crop diversity induced by intercropping and ecological engineering principles would disorient pests and provide continuous income and employment as well.

Metarhizium packets

Red palm weevil (*Rhynchophorus ferrugineus*)

This is the fatal enemy of coconut and any injury to palms will predispose pest invasion. Dwarf genotypes and palms aged between 5-15 years are relatively more susceptible. All life stages of the pest were noticed inside the infested palms. Leaf splitting at base, yellowing of middle leaves, presence of boreholes and oozing of brown fluid are some of the visible damage symptoms. Correct geometry is very crucial for accommodating



Life stages of the pest

intercrops as well as pest avoidance due to multiple odour cues.

▶ *Management*

- Field sanitation is very critical and all residual population in crown toppled palms should be destroyed
- Avoiding palm injury is very critical to disorient the gravid weevils away from the field and therefore leave out at least one metre from palm trunk when petioles are cut.

Red palm weevil infestation on palms

- Crop geometry and correct spacing is very crucial to reduce pest attack.
- Timely and targeted spot application of imidacloprid 0.002% (1 ml per litre of water) or indoxocarb 0.04% (2.5 ml per litre of water) on infested palms would kill the feeding grubs and induces recovery of palms by putting forth new spear leaf.
- Crop-habitat diversification (Ecological Bio-engineering) through coconut based cropping system strategy inciting defenders and pollinators would diffuse the palm-linked volatile cues and encouraged pest suppression. Diversified cropping system reduces pest incidence than mono-cropping.

Summer ploughing

White grub (*Leucopholis coneophora)*

This subterranean pest feeds on the roots of coconut and cause yellowing of leaves, premature nut fall, delayed flowering, retardation of growth and reduction in yield. Since grubs are hidden in soil, symptom diagnosis is very crucial in the identification of pest damage. Grubs initially feed on organic materials, roots of grasses and intercrops before feeding on the palm roots. Adults emerge from the soil during the month of June. The pest is very severe in certain sandy belts of Kasaragod, Kerala and parts of Karnataka.

White grubs

Adult beetles

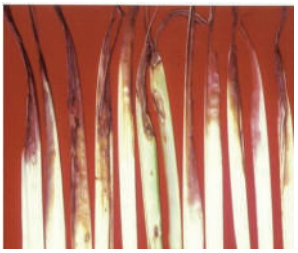
▶ *Management*

- Repeated summer ploughing to expose the immature stages for predation
- Handpicking of adult beetles during evening of two weeks commencing from the onset of monsoon.
- Application of neem cake in the palms basin @ 5 kg /palm for regeneration of roots.
- Soil application of aqua suspension of entomopathogenic nematode, *Steinernema carpocapsae* @ 1.5 billion Infective Juveniles /ha and need based repeated application.

Diseases

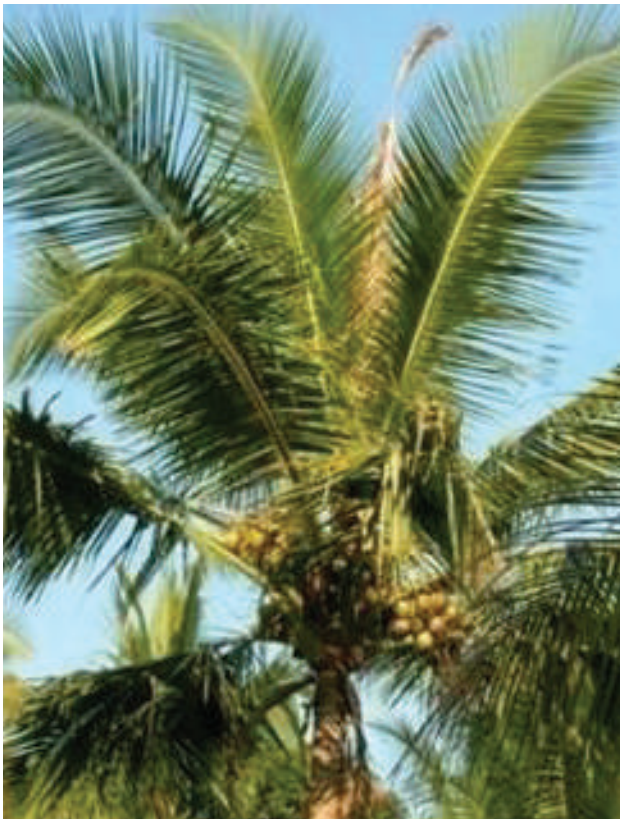
1) Leaf rot disease (*Colletotrichum gloeosporioides, Exserohilum rostratum*)

It is commonly observed on palms affected by root (wilt) disease wherein foliar necrosis of terminal spear leaf and adjacent leaves are registered. The disease is prominently noticed in the post-monsoon phase during the month of December. Affected leaves turn necrotic and are not detachable from the palm and remain intact. This disease could be initially observed as minute lesions which later enlarge, coalesce and cause extensive rotting affecting the photosynthetic efficiency of palms. The disease is endemic to root (wilt) affected regions of Southern Kerala



▶ *Management*

- Need based pruning and destruction of disease affected regions of spear leaf and other adjacent leaves in the terminal region
- Spot application of hexaconazole 5 EC 2 ml in 300 ml water on the affected spear leaf region .In disease endemic areas prophylactic fungicide treatment can also be given.



Bud rot or immature nut fall (*Phytophthora palmivora*)

In certain humid locations bud rot occurred regularly killing hundreds of trees.In India, bud rot incidenceis recorded as less than one per cent. Pathogen attacks the bud region leading to rotting of bud and death of palms. The first visible symptom is withering of the spindle marked by pale colour. The spear leaf or spindle turns brown and bends down. The affected spear leaf can easily be pulled out as the basal portion of the spindle is completely rotten emitting a foul smell. Temperature range of 20- 24ºC and relative humidity of 98% - 100% were found optimum for the development of the bud rot disease. Contiguous occurrence of such "favourable days" during rainy seasons determines the development of the disease and the intensity of infection. As Phytophthora diseases are known to be extremely fatal, a close scrutiny is mandatory during monsoon period to assess the health of the palm especially the spear leaf zone.

▶ *Management*

- Regular cleaning of the crown and prophylactic spraying of Bordeaux mixture (1%) to the crown just before the onset of monsoon and one more spray after 35-40 days help in reducing the bud rot incidence.
- Field sanitation and provide proper drainage during rainy season.
- Placement of two Trichoderma (*Trichoderma harzianum* CPTD28 isolate) enriched coir pith cakes in the inner most leaf axils just before the onset of monsoon and again after every two months as prophylactic measure.
- In disease affected palms, remove the entire rotten

portion of the spindle by cutting with a sharp knife and apply 10% Bordeaux paste to the wound and cover with polythene sheet to prevent entry of rain water. The protective covering has to be retained till normal shoot emerges.

Area wide and farmer-participatory adoption of prophylactic management practices could reduce the inoculum pressure of pest /disease even in favourable weather condition. Greater emphasis should be given for correct diagnosis and timely adoption of pest management practices. The concept of ecological engineering should be given due importance to obtain regular income from the farm and induce pest regression as well. Soil test based nutrition is also very crucial for improving palm health and endure biotic stresses. ■

(Prepared by: Thamban, C. and Subramanian, P., ICAR-CPCRI Kasaragod and Joseph Rajkumar ICAR-CPCRI Regional Station, Kayamkulam)

Market review – April 2023

Domestic Price

During the month of April 2023, the price of coconut oil opened at Rs. 13600 per quintal at Kochi and Alappuzha market and Rs.14800 per quintal at Kozhikode market. During the month, the price of coconut oil at Kochi and Alappuzha markets opened and closed at the same price.

The price of coconut oil closed at Rs. 14700 per quintal at Kozhikode market with a net loss of Rs. 100 per quintal at Kozhikode market.

During the month, the price of coconut oil at Kangayam market opened at Rs. 11267 per quintal and closed at Rs. 11333 per quintal with a net gain of Rs. 66 per quintal.

Weekly price of coconut oil at major markets Rs/Quintal)				
	Kochi	Alappuzha	Kozhikode	Kangayam
01.04.2023	13600	13600	14800	11267
08.04.2023	13600	13600	14600	11133
15.04.2023	13400	13400	14600	11267
22.04.2023	13400	13400	14600	11200
29.04.2023	13600	13600	14700	11333

Milling copra

During the month, the price of milling copra opened at Rs.8550 per quintal at Kochi and Rs.8500 per quintal at Alappuzha and Rs.8650 per quintal at Kozhikode market.

The prices of milling copra closed at Rs. 8600 per quintal at Kochi market, Rs. 8550 per quintal at Alappuzha market and Rs. 8700 per quintal at Kozhikode market with a net gain of Rs.50 at Kochi, Alappuzha and Kozhikode market and it shows a fluctuating trend during the month.

During the month, the price of milling copra at Kangayam market opened at Rs.8000 per quintal and closed at the same price.

Weekly price of Milling Copra at major markets (Rs/Quintal)				
	Kochi	Alappuzha	Kozhikode	Kangayam
01.04.2023	8550	8500	8650	8000
08.04.2023	8550	8500	8500	7900
15.04.2023	8450	8400	8500	7900
22.04.2023	8450	8400	8500	7875
29.04.2023	8600	8550	8700	8000

Edible copra

During the month the price of Rajpur copra at Kozhikode market opened at Rs. 9300 per quintal expressed a downward trend during the month and closed at Rs. 9000 per quintal with a net loss of Rs. 300 per quintal.

Weekly price of edible copra at Kozhikode market (Rs/Quintal)	
01.04.2023	9300
08.04.2023	8900
15.04.2023	9200
22.04.2023	9200
29.04.2023	9000

Ball copra

The price of ball copra at Tiptur market opened at Rs. 9000 per quintal and closed at Rs.9200 per quintal with a net gain of Rs. 200 per quintal.

Weekly price of Ball copra at major markets in Karnataka (Rs/Quintal) (Sorce: Krishimarata vahini)	
01.04.2023	9000
08.04.2023	8800
15.04.2023	9000
22.04.2023	8856
29.04.2023	9200

Dry coconut

At Kozhikode market, the price of dry coconut opened at Rs. 10100 per quintal and closed at the same price during the month.

Weekly price of Dry Coconut at Kozhikode market (Rs/Quintal)	
01.04.2023	10100
08.04.2023	10100
15.04.2023	10100
22.04.2023	10100
29.04.2023	10100

Coconut

At Nedumangad market in Kerala, the price of coconut opened at Rs. 10000 per thousand nuts and closed at the same price during the month.

At Pollachi market in Tamilnadu, the price of coconut opened Rs. 23500 per ton and closed at the same price during the month.

At Bangalore market in Karnataka, the price of coconut opened at Rs. 20000 per thousand nuts and the price was almost during the month.

At Mangalore market in Karnataka, the price of coconut opened Rs. 30000 per ton and closed at the same price during the month.

Weekly price of coconut at major markets				
	Nedumangad (Rs./1000 coconuts)#	Pollachi (Rs./MT) ##	Bangalore Grade-1 coconut,(Rs./ 1000 coconuts) ##	Mangalore Black coconut (1 tonne) ##
01.04.2023	10000	23500	20000	30000
08.04.2023	10000	23500	20000	30000
15.04.2023	10000	23500	20000	30000
22.04.2023	10000	23500	20000	30000
29.04.2023	10000	23500	20000	30000

International price

Coconut

The price of coconut quoted at different domestic markets in Philippines, Indonesia, Srilanka and India are given below.

Weekly price of dehusked coconut with water				
Date	Domestic Price (US$/MT)			
	Philippines	Indonesia	Srilanka	India*
01.04.2023	137	147	239	287
08.04.2023	137	147	244	287
15.04.2023	136	149	NR	287
22.04.2023	143	NR	222	287
29.04.2023	144	150	226	287
*Pollachi market				

Coconut Oil

International price and domestic price of coconut oil at different international/ domestic markets are given below.

Weekly price of coconut oil in major coconut oil producing countries					
	International Price(US$/MT)	Domestic Price(US$/MT)			
	Philippines/ Indonesia (CIF Europe)	Philippines	Indonesia	Sri lanka	India*
01.04.2023	1081	NR	NR	2290	1378
08.04.2023	1081	NR	NR	2328	1361
15.04.2023	1060	NR	NR	NR	1378
22.04.2023	1069	NR	NR	2260	1369
29.04.2023	1057	NR	NR	2301	1386
*Kangayam					

Copra

The price of copra quoted at different domestic markets in Philippines, Srilanka, Indonesia, and India are given below.

Weekly International price of copra in major copra producing countries				
Date	Domestic Price (US$/MT)			
	Philippines	Indonesia	Srilanka	India* * Kangayam
01.04.2023	628	612	1328	978
08.04.2023	633	615	1320	966
15.04.2023	625	587	NR	966
22.04.2023	620	NR	1278	963
* Kangayam				

Coconut Development Board

Dr. N. Vljayalakshmi IAS
Chief Executive Officer : 0484-2375216

Dr. B. Hanumanthe Gowda
Chief Coconut Development Officer : 0484-2375999

Shri. R. Madhu
Secretary : 0484-2377737

Government of India,
Ministry of Agriculture and Farmer's Welfare
P.B. No.1012, Kera Bhavan, SRV Road,
Kochi – 682 011, Kerala, India.
Email : kochi.cdb@gov.in
Website: https://www.coconutboard.gov.in
Office:0484-2376265, 2377267,
PABX : 2377266, 2376553, Fax:91 484-2377902

Regional Offices

KARNATAKA
Director, Regional Office, Coconut Development Board, Hulimavu, Bannerghatta Road (Beside Horticulture Farm, Govt. of Karnataka), Bangalore South Taluk, Bangalore - 560 076 Karnataka. Ph: (080) 26593750, 26593743 Fax: 080-26594768
E-mail: ro-bnglr@coconutboard.gov.in

ASSAM
Director, Regional Office, Coconut Development Board, Housefed Complex (Sixth Floor), Wireless Basistha Road, Last Gate, Dispur, Guwahati - 781 006. Assam.
Ph: (0361) 2220632
Fax: (0361) 2229794
E-mail: ro-guwahati@coconutboard.gov.in

TAMILNADU
Director, Regional Office, Coconut Development Board. No. 47, F1, Dr. Ramasami Salai K.K.Nagar, Chennai - 600 078
Ph: 044-23662684, 23663685
E-mail: ro-chennai@coconutboard.gov.in

BIHAR
Director, Regional Office, Phulwari Road, Jagdev path, Phulwari Road, Patna - 800 014, Bihar,
Phone: 0612-29720200
Email- ro-patna@coconutboard.gov.in

State Centres

ANDAMAN & NICOBAR ISLANDS
Dy. Director, State Centre, Coconut Development Board, House MB No.54, Gurudwara Lane, Near Head Post Office, Opp. BSNL Quarters, Port Blair - 744 101, South Andaman. Ph: (03192) 233918
E-mail: sc-andaman@coconutboard.gov.in

ANDHRA PRADESH
Dy. Director, State Centre, Coconut Development Board, D.No.4-123, Rajula Bazar Ramavarappadu PO, New Zilla Parishad High School, Vijayawada - 521108, N.T.R District, Andhra Pradesh Telefax: 0866 2972723
E-mail: sc-vijayawada@coconutboard.gov.in

MAHARASHTRA
Dy. Director, State Centre, Coconut Development Board,Flat No. 203, 2nd Floor, Eucalyptus Building, Ghodbundar, Thane West - 400 610. Maharashtra.
Ph: 022-65100106
E-mail: sc-thane@coconutboard.gov.in

ODISHA
Dy. Director, State Centre, Coconut Development Board, Pitapally, Kumarbasta PO, District Khurda - 752 055 Odisha. Ph: 8280067723,
E-mail: sc-pitapalli@coconutboard.gov.in

WEST BENGAL
Dy. Director, State Centre, Coconut Development Board, DA-94 - Sector - I, Salt Lake City, Kolkata - 700 064. West Bengal, Ph: (033) 23599674
Fax: (033) 23599674
E-mail: sc-kolkata@coconutboard.gov.in

GUJARAT
State Centre, Junagadh, B-Wing, 1st Floor, Bahumali Bhavan, State Highway 31, Duruvesh Nagar, Shashikunj, Junagadh, Gujarat, 362001
Ph: 02852990230

Market Development cum Information Centre
Asst. Director, Market Development cum Information Centre, Coconut Development Board, 120, Hargobind Enclave, New Delhi - 110 092.
Ph: (011) 22377805 Fax: (011) 22377806
E-mail:mdic-delhi@coconutboard.gov.in

CDB Institute of Technology (CIT), Technology Development Centre and Quality Testing Laboratory,
Dy. Director, Technology Development Centre, Quality Testing Laboratory and CIT, Coconut Development Board, Keenpuram, South Vazhakkulam, Aluva, Ernakulam District. Pin - 683 105. Kerala. Ph: (0484) 2679680
Email: cit-aluva@coconutboard.gov.in

Field Office Thiruvananthapuram
Coconut Development Board, Agricultural Urban Wholesale Market (World Market), Anayara PO, Thiruvananthapuram. Pin 695 029 Kerala Ph: 0471 2741006
E-mail: fo-tvprm@coconutboard.gov.in

Demonstration-cum-Seed Production (DSP) Farms

ANDHRA PRADESH, Asst. Director, DSP Farm, Coconut Development Board, Vegivada (Village) P.O, Tadikalapudi (Via), W. Godavari (Dist.) Andhra Pradesh - 534 452. Ph: 8331869886, E-mail: f-vegiwada@coconutboard.gov.in

ASSAM- Farm Manager, DSP Farm, Coconut Development Board, Abhayapuri, Bongaigoan, Assam - 783 384. Ph: 9957694242 Email: f-abhayapuri@coconutboard.gov.in

KARNATAKA - Farm Manager, DSP Farm, Coconut Development Board, Loksara P.O., Mandya District, Karnataka - 571 478 Ph: 08232 298015 E-mail: f-mandya@coconutboard.gov.in

KERALA - Asst. Director, DSP Farm, Coconut Development Board, Neriamangalam, Kerala Pin-686 693. Ph: (0485) 2554240 E-mail: f-neriamangalam@coconutboard.gov.in

ODISHA - Farm Manager, DSP Farm, Coconut Development Board, At Pitapally, Post Kumarbasta,District Khurda - 752 055, Odisha. Ph:8280067723, E-mail: f-pitapalli@coconutboard.gov.in

BIHAR - Farm Manager, DSP Farm, Coconut Development Board, P.O. Singheshwar - 852 128, Madhepura District, Bihar. Ph: (06476) 283015 E-mail: f-madhepura@coconutboard.gov.in

CHATTISGARH - Asst. Director, DSP Farm, Coconut Development Board, Kondagaon - 494 226, Bastar District, Chhattisgarh. Ph: (07786) 242443 Fax: (07786) 242443 E-mail: f-kondagaon@coconutboard.gov.in

MAHARASHTRA - Farm Manager DSP Farm, Coconut Development Board, Dapoli Village, Satpati PO, Palghar District, Pin - 401405, Maharashtra. Ph: (02525) 256090 Mob:07767948448 & 7776940774 E-mail: f-palghar@coconutboard.gov.in

TAMIL NADU - Farm Manager DSP Farm, Coconut Development Board, Dhali, Thirumoorthy Nagar PO, Udumalpet, Tamil Nadu 642 112 Ph: (04252) 265430 Email: f-dhali@coconutboard.gov.in

TRIPURA - Farm Manager, DSP Farm, Coconut Development Board, Hichachera, Sakbari PO, Via: Jolaibari, Sabroom, SouthTripura, Tripura Pin:799141 Ph: 03823263059 Email: f-hitchachara@coconutboard.gov.in

WEST BENGAL -Farm Manager, DSP Farm, Coconut Development Board, Fulia,1st Floor, Near SBI Bank, Fulia Branch, NH-34, PO Belemath, Fulia, Nadia, West Bengal, 741402. Phone: 03473-234002, E-mail- f-fulia@coconutboard.gov.in

May 2023
Vol. LXV No.11
Price: Rs.6

Registered No.KL/EKM/721/2021-23
Licence No. KL/CR/EKM/WPP-18/2021-23
Licensed to Post Without Prepayment
RNI No. 3032/1957

INDIAN COCONUT JOURNAL
Date of Publication - 25/5/2023

Printed and Published by Mini Mathew on behalf of Coconut Development Board, Printed at M/s KBPS, Kakkanad, Kochi-30
and Published at Coconut Development Board, Govt. of India,
Ministry of Agriculture and Farmer's Welfare, Kera Bhavan, Kochi-11, Editor: Deepthi Nair S