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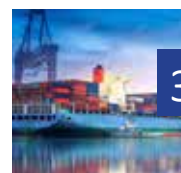
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Message from the Chairperson's desk

Dear readers,

The month of January started on a very positive note for the coconut industry especially for the Indian desiccated coconut manufacturers with the Government of India prohibiting the import of desiccated coconut below Rs.150 per kg. The order has come after the repeated efforts of Coconut Development Board since April 2019. The present order is expected to revamp the desiccated coconut industries which has been reeling under the verge of closure due to the large scale import of desiccated coconut.



Coconut Development Board is envisaging a comprehensive programme for the integrated development of coconut cultivation and industry in the country with the objective of sustainable productivity improvement in existing coconut holdings. Science and technology-based productivity improvement in coconut to double the present level of income and innovation-based income augmentation from unit area both individual, community and group level would be the future focus of the Board during the next Plan Period.

In the wake of the emerging consumer market preference for organically based products in the national and international markets, Coconut Development Board aims at converting the existing coconut gardens into organic holdings without major transformation in the existing cultivation practices in traditional coconut growing states. This would be an innovative programme of the Board during the next Plan Period. Efforts for expansion of more area under coconut in nontraditional areas will also be intensified. Continued thrust will be given for the production of quality planting material including assistance for hybridization. It is also proposed to extend assistance for organic certification of coconut. Establishment of industrial parks in selected states in collaboration with state governments would promote increase in processing and value addition in coconut.

I earnestly seek the wholehearted support of one and all in all the future endeavours of Coconut Development Board.

G Jayalakshmi IAS
Chairperson



Facilitating decentralized coconut nurseries for production and distribution of quality seedlings – Experiences from the pilot project in Kerala

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Coconut production in Kerala state, the land of coconut, is adversely affected by various constraints and its share to the total coconut production in the country is on the decline compared to other major coconut producing states. Low productivity of coconut in the state is mainly attributed to the predominance of senile and unproductive palms. Rejuvenation of coconut orchards by large scale removal of unproductive palms and replanting with quality seedlings of improved varieties is an important strategy suggested for making coconut farming profitable in the state. A substantial number of improved coconut varieties including tall, dwarf and hybrids having high yield potential and other desirable attributes have been released by coconut research institutions in the country. Central Plantation Crops Research Institute (ICAR-CPCRI) has so far released 21 coconut varieties which include 10 tall, five dwarf and six hybrid varieties. Lack of availability of quality seedlings is a major constraint experienced by coconut growers

Decentralised coconut nurseries can be established and managed by Farmer Producer Organisations to produce coconut seedlings by utilising mother palms of locally adapted coconut varieties available in farmers' gardens and seedlings can be made available locally with the active participation of coconut farmers.

to adopt improved coconut varieties. In Kerala state it is estimated that on an average about 30 lakh coconut seedlings are required every year. However, the coconut nursery infrastructure available with public sector agencies including State Department of Agriculture and Farmers' Welfare, ICAR-CPCRI, Kerala Agricultural University and Coconut Development Board and a few private nurseries put together are able to produce and distribute annually only about 10 lakh coconut seedlings in the state. There is a huge gap between demand and supply of coconut seedlings and many unscrupulous elements exploit the situation and cheat the coconut growers in the state by selling inferior quality seedlings which would adversely affect production and productivity of coconut in the long run.

Enhancing coconut seedling production- Long term strategies

Establishing new coconut seed gardens in suitable locations, improving infrastructure facilities in the existing coconut nurseries managed by public sector agencies for enhancing coconut seedling production, developing coconut mother palm blocks by planting seedlings of different varieties suitable for producing seednuts/seedlings of varieties recommended for the state in the coconut nurseries and farms under the State Department of Agriculture and Farmers' Welfare, promoting nucleus seed gardens in farmers' plots etc are suggested as long term strategies to enhance coconut seedling production.

Promoting decentralised coconut nurseries

Utilisation of superior coconut genetic resources available in farmers' gardens is the most important short term strategy to enhance seedling production to meet the demand for quality coconut seedlings. Superior coconut genetic resources available in farmers' gardens have been utilised for coconut seedling production including seedlings of hybrid varieties by the State Department of Agriculture and

Farmers' Welfare. The seed nuts procured from the selected mother palms in farmers' gardens in few localities in the state are raised in coconut nurseries under the Department in different locations and distributed to coconut growers in the state through the offices of the department. In this approach extent of participation of coconut growers in the seedling production programme is almost nil except for receiving the cost of seed nuts and the entire programme is managed by the personnel of the State Department of Agriculture.

Decentralised coconut nurseries can be established and managed by Farmer Producer Organisations to produce coconut seedlings by utilising mother palms of locally adapted coconut varieties available in farmers' gardens and seedlings can be made available locally with the active participation of coconut farmers. Technical support is needed to locate and identify mother palms, pollinate, collect seed nuts, raise nursery and select quality seedlings for supply to the coconut farmers.

A novel farmer participatory initiative to facilitate decentralised coconut nurseries

ICAR-CPCRI with the support of State Department of Agriculture and Farmers' Welfare, Government of Kerala, has been implementing a novel initiative to facilitate decentralised coconut nurseries in Kerala state since the year 2018. The initiative aims to provide technology support to identify mother palms, establish decentralised community nurseries and produce quality planting material in a farmer participatory mode and to make available locally, quality planting material of dwarf /semi tall/hybrid coconut varieties to benefit coconut growers.

The methodology for implementing the initiative includes identification of locally adapted genotypes (tall and dwarf) with desirable traits, production of seedlings of hybrids and improved dwarf varieties, establishment of community nurseries for seedling production in selected farmers plots in different localities, distribution of quality planting material at an affordable price, develop network of community nurseries and distribution channels to facilitate sustainable production of quality seedlings, continued technical support and guidance from ICAR-CPCRI and Department of Agriculture Development and Farmers' Welfare to facilitate production and supply of quality planting material. Expenditure on initial seed nut collection and seedling production is provided under the project.





The initiative is funded by the State Department of Agriculture under ‘Coconut Development Scheme 2017-18’. All the districts in Kerala except Wayanad and Idukki are covered under the initiative through two projects entitled “Technology support for coconut hybridization/ production of semi tall varieties programme” and “Production and distribution of quality planting material of dwarf/ semi tall varieties programme”. The project is being implemented with Principal Agricultural Officers (PAOs) as the Co-Principal Investigators and Deputy Directors of Agriculture (YP) as co-ordinators for respective districts for facilitating project interventions.

A state level project planning workshop was held at ICAR–CPCRI, Kasaragod on 26th February 2018. Farmers, representatives of farmer organizations, Scientists from ICAR-CPCRI, Officials from the State Department of Agriculture Development and Farmers Welfare and Project Staff attended the meeting. District level meetings were conducted in all districts during March 2018. Focused group discussions on the project implementation were held at grass root level in each of the districts in which project technical staff, officials of Department of Agriculture, coconut farmers and representatives of producer organisations in coconut sector participated.

Training programmes were conducted to empower the technical staff under the project and Coconut Producer Federations involved in the implementation of the project on various aspects of mother palm selection, hybrid production, seed nut collection, nursery management, seedling selection etc were conducted at different locations. Besides, capacity development programmes for the coconut climbers were also organised on hybridization techniques in coconut for the production of seedlings of hybrid varieties.

Subsequently, Coconut Producer Federations (the second tier in the three-tier FPO structure in coconut sector facilitated by CDB) in each district were

selected for managing the decentralised coconut nurseries. With the active participation of the stakeholders including coconut farmers, CPFs and extension personnel of Department of Agriculture various interventions such as selection of ideal locations for establishing the decentralised coconut nurseries, identification of mother palms in farmers’ plots, collection of seed nuts, establishing coconut nurseries and scientific management of nurseries were carried out in all the twelve districts.

So far 32 decentralised nurseries have been established. (Table: 1)

These decentralised coconut nurseries have started selling seedlings to coconut farmers. However, some of the nurseries are facing difficulties in marketing of seedlings. Hence, it is important that necessary support is provided to the decentralised coconut nurseries by developmental agencies like State Department of Agriculture and Local Self Governments to sustain their activities, especially marketing of seedlings. Continued technical support is also necessary to effectively carry out activities such as mother palm selection, nursery management, seedling selection, artificial pollination for hybrid seed nut production etc.

Way forward

The potential for utilising superior coconut genetic resources available in farmers’ gardens needs to be effectively utilised to enhance the availability of coconut seedlings. Farmer Producer Organisations in coconut sector are to be empowered to establish and manage decentralised coconut nurseries to produce coconut seedlings by utilising mother palms of locally adapted coconut varieties available in farmers’ gardens so that seedlings can be made available locally with the active participation of coconut farmers. This has been amply demonstrated under the project being implemented by ICAR-CPCRI with the support of State Department of Agriculture and Farmers’ Welfare, Government of Kerala. Trained manpower is essential to the success of planting material production in coconut. Skill upgradation of local climbers was part of the initiative. This has to be taken forward to larger scale to develop a team of skilled pollinators. Suitable support mechanism needs to be ensured for the sustenance of such decentralised initiatives besides the coordinated activities of various agencies involved in implementing interventions for sustainable coconut development. ■

Table 1: Decentralized coconut nurseries established under the project implemented by ICAR-CPCRI funded by Department of Agriculture Development and Farmers' Welfare, Govt. of Kerala			
Sl. No.	Farmers Producer Organization managing the coconut nursery	Location of the coconut nursery	Contact Number
KASARAGOD DISTRICT			
1.	Parappa Block Federation of Coconut Producers Societies, Parappa P.O., Kasaragod Kerala-671533. Reg. No. CPF/KSD/2015-16/016	Parappa, Parappa P.O., Kasaragod- 671533	9447474464
2.	Nileshwaram Nalikeru Uthpadaka Sangam, Nileshwar P.O., Kasaragod, Kerala – 671314. Reg. No. KSR/CA/357/2014	Karuvacheri, Nileshwara P.O., Kasaragod- 671314	9447711648
3.	Sowparnika Nalikeru Uthpadaka Sangham Beripadavu Ballur (Via) Uppala, Kasaragod, Kerala -671322. Reg. No. CPS/KSD/2012-13/217	Beripadavu, Beripadavu P.O., Bayar, Kasaragod-671322	9480055943
KANNUR DISTRICT			
4.	Kalpavruksha Coconut Federation, Aralam North, P.O., Keezhpally, Kannur, Kerala -670704. Reg. No. CPO/KNR/2014-15/015	Keezhpally, Aralam North P.O., Kannur-670704	9747272140, 9447872940
5.	Navajyothi Infarm Coconut Producers Society, Chemperi, P.O., Kannur, Kerala -670632. Reg. No. 113/2010	Chemperi, Chemperi, P.O., Kannur- 670632	9447458674
6.	Verginvalley Coconut Producers Federation, Kelakam P.O., Kannur, Kerala- 670674. Reg. No. CPF/KNR/2015-16/24, KNR/CA/794/2014	Adakkathode, Adakkathode P.O., via Kelakam, Kannur-670674	9495314874
KOZHIKODE DISTRICT			
7.	Korapuzha Coconut Producers Federation, Eranhikkal P.O., Kozhikode, Kerala – 673303. Reg. No. KKD/CA/357/2013	CPF/KKD/2013-14/018 Eranhikkal, Eranhikkal P.O., Kozhikode- 673303	9744467135
8.	Kunnamangalam Federation of Coconut Producers Society, Kunnamangalam P.O., Kozhikode Kerala-673571. Reg. No. KKD/CA/474/2013,	Pilasserri, Pilasserri P.O., Kozhikode-673571 CDB No. CPF/KKD/2012-13/014	9446354662
9.	Changaroath Federation of Coconut producers societies, Paleri Town P.O., Kozhikode Kerala-673508. Reg. No. CPF/KKD/2013-14/034	Changaroath, Paleri Town P.O., Kozhikode- 673508	9961487913,9495411805
MALAPPURAM DISTRICT			
10.	Purathur Kerakarshaka Federation of Coconut Producer's Society, Muttanoor P.O., Purathur, Tirur, Malappuram, Kerala- 676561. Reg. No. CDB/016/13-14	Mammante parambu, Millumpadi, Muttanoor P.O., Purathur, Tirur, Malappuram-676561	0494-2563366, 9747051504, 9605809945
11.	Kera Suraksha Federation of Coconut Producers Societies, Maranchery P.O., Malappuram, Kerala- 679581. Reg. No. 563/2012	Avindithira, Maranchery P.O., Maranchery, Malappuram- 679581	9995118821, 9846454779
12.	Vettom North Kera Karshaka Federation of Coconut Producers Societies, Pariyapuram, Pachattiri P.O., Tirur Malappuram Kerala -676105. Reg. No. CPF/MPM/2012-13/003	Kanoor, Pariyapuram, Vakkad P.O., Tirur, Malappuram- 676502	9072259775,9495511838
PALAKKAD DISTRICT			
13.	C P Challa Nalikeru Ulpadaka Sangam, C P Challa, Nattukal P.O., Palakkad, Kerala-678554. Reg. No. PKD/TC 64/2013	5 th mile, Nattukal P.O., Chittur, Palakkad-678554	9388410814
14.	Palakkad Block Federation of Coconut Producers Society, Velikkad P.O., Mundur, Palakkad, Kerala – 678592. Reg. No. PKD/CA/73/2014	Ezhakkad P.O., Mundur, Palakkad- 678600	9446800529, 7012745582
15.	Malleeswara Federation of Coconut Producers Societies, Kottathara P. O., Agali, Palakkad-678581. Reg. No. CPF/PKD/2016-17/027	Sambarkod, Agali P.O., Palakkad- 678581	9020654721
THRISSUR DISTRICT			
16.	Ollur Federation of Coconut Producer Societies, Surabhi Road, Kuttanellur P. O., Thrissur, Kerala-680014. Reg. No. TSR/TC/638/2014 PF/TCR/2014-15/02.	Illanthuruthi, Ollur, Thrissur	8848543385

17.	Arthat Kunnamkulam Federation of Coconut Producers Societies, Chittanjur P.O., Kunnamkulam, Thrissur, Kerala -680523. Reg. No. TSR/TC/583/2014 CDB Reg. No. CPF/TCR/2014-15/022	Ullisseri, Nhanangahat (P.O.), Thrissur- 679563	8593839677, 9847698006
ERNAKULAM DISTRICT			
18.	Mookkannoor Federation of Coconut Producers Societies, Mookkannoor P.O., Ernakulam, Kerala- 683577. Reg. No. CPF/EKM/2013-14/006	Mookkannoor, Mookkannoor P.O., Ernakulam-683577	9745813439
19.	Vadel Nalikerla Ulpadaka Sangam, Nayarambalam P. O., Ernakulam, Kerala – 682509. Reg. No. CDB-SPS/KL/EKM/2013-14/0143 (Societies Reg. No. EKM/TC/478/2013)	Njarakkal, Nayarambalam P.O., Ernakulam-682509	9446094383, 9656464383
KOTTAYAM DISTRICT			
20.	Kairali Nalikerla Ulpadaka Sangham, Perumpanachy P. O., Changanacherry, Kottayam, Kerala-686536. Reg. No: KTM/TC/534/2014	Perumpanachy, Perumpanachy P.O., Changanacherry, Kottayam-686536	9495664580
21.	Keragramam Apex Body, Thiruvurpu, Kottayam, Kerala-686020. Reg. No: KTM/TC/414/2017	Thiruvurpu, Kottayam	9249338916
22.	Kallara Nalikerla Ulpadaka Sangham, Kallara, South P.O., Kottayam-686611. Reg. No. KTM/TC/581/2015;CPF/KTM/2015-16/020	Kallara, South P.O., Kottayam	9446378893
ALAPPUZHA DISTRICT			
23.	Kerasree Thekkekara, Thekkekara P.O., Alappuzha Kerala-690107	Pallarimangalam, Thekkekara, Alappuzha	09539851155
24.	Bharanikkavu Panchayath Federation of Coconut Producers Society, Pallickal P.O., Alappuzha, Kerala-690503. Reg. No: ALP/TC/630/2012	Koical- Kattachira, Bharanikkavu, Alappuzha-690503	9495018884
PATHANAMTHITTA DISTRICT			
25.	Pannivelikkal Padasekhara Samithi, Melood P. O., Adoor, Pathanamthitta, Kerala -689501. Reg. No: PTM/TC/32/2018	Pannivelikkal, Melood P.O., Adoor, Pathanamthitta	9446467066
26.	Kadapra Naleekera Ulpadaka Sangham, Niranam P. O., Thiruvalla, Pathanamthitta Kerala -689621. Reg. No: CDB/KL/PTA/2013-14/005	Kadapra, Niranam P. O., Thiruvalla, Pathanamthitta	9496325869
KOLLAM DISTRICT			
27.	Oachira Farmers Extention Organisation (OFEO), P.O., Oachira, Kollam Kerala -690526. Reg. No. KLM./TC./95/2014	Neelikulam, Ward 12, Kulashekarapuram, 690518, Ochira, Kollam	9037533559
28.	Kallada Federation of Coconut Producers Societies, Padinjare Kallada, P.O., Kollam Kerala-691500. Reg. No. KLM/TC/1074/2012	Kallada nursery, Kadapanath, Peruvilakara P.O., 691500, West kallada, Sasthamcotta Block, Kollam	9544656589
29.	Harithalakshmi Karshaka Sangam, Medayilmukku P.O., Kollam-691001. Reg. No. KLM/EPM/KLM/05-01-2015-06	Perinad nursery, Alavila Puthanveedu, Vellimon West P.O., Vellimon-, 691511 Kollam District Puliayath mukku, Vadakevila P.O., Kollam	9895462314
THIRUVANANTHAPURAM DISTRICT			
31.	Valiyara Coconut Producers Society, Vellanad P.O., Trivandrum-695543. Reg. No. T 12/10	Valiyara Coconut Producers Society, Meppatamala, Valiyara, Vellanad, 695545, Trivandrum	9447111934
32.	Peoples Federation of Coconut Producers Societies, Kazhivoor P.O., Trivandrum, Kerala-695526. Reg. No. CDB/TVM/12-13/005	Kanjiramkulam, Karichal, Kazhivoor P.O., 695526, Trivandrum	9497163838

Doubling the farmers income through coconut farming by intercropping of turmeric: a profitable spice crop under coconut garden

P. P. Bhalerao^{1*} and H. P. Maheswarappa²

AICRP on Palms, Regional Horticultural Research Station, ASPEE College of Horticulture and Forestry, NAU, Navsari, Gujarat, ²ICAR- Central Plantation Crops Research Institute, Kasaragod, Kerala

Coconut (*Cocos nucifera* L.) is the major plantation crop of coastal India which is often remunerative under crop diversification. Coconut farming provides livelihood security to several millions of people across the world and the capacity of coconut in providing improved nutrition, employment and income generation are well known. The coconut palm exerts a profound influence on the rural economy of the many states where it is grown extensively and provides sustenance to

more than 10 million people in the country. The processing and related activities centered on the crop generate employment opportunities for over three million people in India. Since coconut growers are more exposed to economic risks due to fluctuating market price, biotic-abiotic stresses, only systematic coconut-based cropping and farming system make it an economically viable crop in small holdings.

Cropping/farming systems

Coconut interspaces provide

ample scope for mixed and intercropping and about 70-75% of the plantation area can be utilized for cropping systems. The pioneering effort of ICAR-CPCRI and All India Crop Research Project has resulted in the development of technologies for coconut based inter/mixed, multi-storied, multi-species cropping systems and these are being widely adopted by the farmers. The high-density multi-species cropping system and coconut-based mixed farming system, involving annuals/



biennials/perennials grown in different tiers by exploiting soil and air space more efficiently and integrating with poultry and animal husbandry, helps to maximize profits and can even buffer the price crash of the main crop. For maximizing economic returns, high value turmeric spice crop has been recommended in the palm-based cropping system. The net return per rupee invested from the cropping/farming system ranges from 1.7 to 2.7 and already proved by researchers that growing of turmeric crop in coconut improve the productivity of coconut. Many sustainable cropping system models incorporating various intercrops have been identified for coconut plantations that can provide more than 75% light intensity. Growing turmeric crops of higher market demand and requiring lesser light is a promising venture which can be effectively adopted in coconut plantations. Growing turmeric in the interspaces of coconut improved availability of soil moisture in coconut rhizosphere due to frequent irrigation which also resulted in reduced button shedding and increased fruit setting in such palms. Intercropping also encourages crop diversity, by providing habitat for a variety of insects and soil organisms that would not be present in a single-crop environment. This gives ample opportunity to grow turmeric as an intercrop in the coconut gardens. The recyclable biomass from coconut-based cropping system varies from 15-20 t/ha., which can be conveniently converted into vermicompost and can be recycled in the system, which will pave way for organic nutrition for

improving the health of the soil and for sustained productivity.

Turmeric

Turmeric (*Curcuma longa L.*) commonly known as Haldi is an annual herbaceous plant and belongs to Zingiberaceae family. India is a leading producer and exporter of turmeric in the world. It is cultivated throughout India covering an area of 2.08 lakh hectares with an annual production of 1029 million tonnes and productivity of 5.1 metric tonnes per hectare. In India, Andhra Pradesh, Maharashtra, Orissa, Tamil Nadu, Karnataka, Gujarat and Kerala are the important states which cultivate turmeric. Although coconut area of coastal states has potential scope for cultivating turmeric, it has not been done commercially but for few farms. Utilization of available inter space in coconut which is otherwise fallow by cultivating improved varieties of turmeric will fetch good profit to the coconut farmers.

Varieties

A number of cultivars are available in the country and are known mostly by the name of locality where they are cultivated. Some popular cultivars suitable for cultivation are : Suvarna, Suguna, CO-1, BSR-1, Sugandham, Roma, Suroma, Rajendra Sonia, Krishna, IISR Prabha, IISR Prathibha, Salem, Kesar, GNT-1, GNT-2 etc.

Improved package of practices for cultivation of turmeric under coconut garden

► 1. Land preparation and planting

The land is prepared with the receipt of early monsoon showers, wherein soil is brought to a fine tilth by giving about one deep ploughing. The ideal time of planting would be the month of May or upto last week of June. Immediately with the receipt of pre-monsoon showers, beds of 1.0 m width, 15 cm height and of convenient length are prepared with spacing of 50 cm between beds. Planting is also done by forming ridges and furrows.

► 2. Seed material

Whole or split mother and finger rhizomes are used for planting and well developed healthy and





disease free rhizomes are to be selected. The planting should be done on the beds with a spacing of 30 cm x 15 cm. The optimum spacing in furrows and ridges is 45-60 cm between the rows and 25 cm between the plants. A seed rate of 800-1000 kg of rhizomes is required for planting one hectare of turmeric under coconut garden.

► **3. Manuring and fertilizer application**

Farm Yard Manure (FYM) or compost @ 20-25 t/ha is applied by broadcasting and ploughed at the time of preparation of land or as basal dressing by spreading over the beds or in to the pits at the time of planting. Fertilizers @ 60 kg N, 60 kg P₂O₅ and 60kg K₂O per hectare are to be applied in split doses i. e. 60 kg P and K may be applied at the time of planting (basal) and 30 kg of N is apply at 30 DAS and remaining half dose of N may be applied at 60 DAS. The other organic manures like Neem cake or castor cake may also be applied @ 200

kg/ha at the time of planting. In such case, the dosage of FYM can be reduced. Integrated application of coir compost (@ 2.5 t/ha) combined with FYM, biofertilizer (Azospirillum) and half recommended dose of NPK is also recommended.

► **4. Mulching**

The crop is to be mulched immediately after germination with green leaves or sunhemp green manure or paddy straw @ 12-15 t/ha.

► **5. Weeding and irrigation**

Weeding has to be done thrice at 60, 90 and 120 days after planting depending upon weed intensity. In the case of irrigated crop, depending upon the weather and soil conditions, about 15 to 23 irrigations are to be given in clayey soils and 8-13 irrigations in black soil.

► **6. Harvesting and Yield**

Depending upon the variety, the crop becomes ready for harvest in 7-9 months after

Coconut garden offers tremendous scope for intercropping with turmeric, the shade loving crop, which possesses sustained demand. Agro climatic condition congenial for coconut-turmeric cultivation is vastly available in South.

planting during January-March. Early variety mature in 7-8 months, medium varieties in 8-9 months and late varieties after 9 months. Yellowing and drying of leaves are the signs of crop maturity. The land is ploughed and the rhizomes are collected by hand picking or the clumps are carefully lifted with a spade. The harvested rhizomes are cleared of mud and other extraneous matter adhering to them. The yield of turmeric depend on soil type, management practices etc. but the average yield of turmeric under coconut garden is about

10-12 t/ha in Gujarat coastal region.

7. Estimated income from turmeric as an intercrop in coconut

At AICRP on Palms centre, Navsari, turmeric was grown as intercrop in coconut garden. The expected yield of turmeric under coconut garden is about 10-12 t/ha, and as per the present price @ Rs. 15-20 per kg for turmeric, the minimum average additional gross income per hectare of turmeric is Rs. 1,50,000/- per year which is an additional income besides regular income from coconut. If the rhizomes and fingers (seed material) are processed to powder form and can be sold in market @ Rs. 150-200 per kg. The main crop i.e. coconut gives an gross income of Rs. 1,43,500 (@ 82 nuts per palm per year and @ Rs. 10 at the present price of coconut). In addition, turmeric adds valuable biomass like leaves which can be utilized

Economics of coconut- turmeric cropping system (Rs./ha)	
Cost of production	114000 [78000(Coconut)+66000(Turmeric)]
Gross income	218500 [143500(Coconut)+150000(Turmeric)]
Net income	149000 [65500 (Coconut)+84000 (Turmeric)]

for composting and recycling in the system thus reducing fertilizer costs.

Thus, coconut garden offers tremendous scope for intercropping with turmeric, the shade loving crop, which possesses sustained demand. Agro climatic condition congenial for coconut-turmeric cultivation is vastly available in South as well as few pockets of Saurashtra region of Gujarat state.

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Coconut Based Technologies for Commercialization

The CSIR-CFTRI, Mysore has developed the following coconut based technologies in collaboration with Coconut Development Board, Kochi which are available for transfer to the entrepreneurs/stakeholders are as follows:-

S.No	Name of Technology
1	Coconut Beverage from tender coconut
2	Tender coconut water concentrate with sugar
3	Value added products from Coconut - Instant Adjunct Mix, Instant Filling Mix, Coconut Rice Mix, Coconut Bites
4	Production of Blends of Coconut oil with other edible oils
5	Desiccated coconut
6	Spray dried coconut milk powder
7	Production of Coconut Spread based on Mature coconut water concentrate and coconut dietary fibre
8	Virgin coconut oil
9	Neera bottling
10	Improved process for preservation of Neera (Pet bottles)
11	Neera concentrate
12	For basket of two (Improved process for preservation of Neera (Pet bottles) + Neera concentrate)

For availing the benefits of these technologies, interested entrepreneurs/ stakeholders can participate in the interface/technology transfer meets to be conducted at CFTRI, Mysore. Interested parties may register their names with CDB at the earliest.

Address:- Coconut Development Board, Government of India, Ministry of Agriculture & Farmers Welfare, P.B. No.1021, Kera Bhavan, SRV Road (Near SRV High School), Kochi – 682 011, Ernakulam District, Kerala State, India. Phone:0484-2376265//2377266/2377267/2376553, Website: www.coconutboard.gov.in, Email : cdbtech@gmail.com,

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Cocoa and Coconut Live in Harmony

Jnanadevan.R

Dy. Director (Retd.), CDB, Kochi

The crop association involving coconut and cocoa proves an excellent combination to the agro ecological condition of 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 coconut.

The farmer's field in Divasputhoor village, near Kerala border in Coimbatore district, Tamilnadu, where Cocoa is grown and performs excellently well as an intercrop in coconut plantations. Shri. Krishna Kumar M.N, Door No.4/160 Myladumparaikalam, Divansapudur (PO) Anaimalai Taluque has 7.5 acres of 20-25 year old 630 coconut palms planted at a distance of 7.5m x 7.5m. In his coconut garden 1500 hybrid cocoa seedlings were planted during September 2017 with financial support under the cocoa new plantation development scheme under MIDH implemented by Directorate of Cashew and Cocoa Development (DCCD) through the Department of Horticulture and Plantation Crops, Tamil Nadu. Planting was done with proper technical guidance from the Department of Horticulture. Cocoa hybrid seedlings were also arranged by the Department of Horticulture through Mondelez India Foods Pvt. Ltd. Coimbatore. Pits of size 50cm x 50cm x 50cm were taken with a plant spacing of 3m x 3m in the middle of two rows of coconut palm. Besides in between each row of coconut plant one pit was taken. Altogether





1500 pits were taken in 7.5 acres of coconut garden for planting cocoa seedling. Before planting, pits were filled with top soil and compost mixture. Six month old seedlings showing vigorous growth were selected & planted in the center of the refilled pits after carefully removing the polythene bag without disturbing the ball of earth. 200 cocoa plants were planted in one acre of coconut garden and a total of 1500 seedlings were planted in 7.5 acres accordingly.

The seedlings were maintained with proper irrigation through drip and manures and fertilizers were provided as per recommendations of the Department of Horticulture. Proper shading and mulching in the initial years of establishment of cocoa seedlings was also taken up. The Ninety Five percentage of the seedlings planted during 2017-18 was established with vigorous growth and 5% seedlings showing stunted growth were gap filled in the second year with quality seedlings. The farmer is following regular application of organic manures and inorganic fertilizers to both the crops. He is preparing compost in his garden itself by utilizing the farm waste. By utilizing the farm waste, the farmer is preparing compost in his garden itself. The shell waste obtained after removing the beans is also utilized for preparing compost by addition of biofertilizers and cowdung. For converting 1 ton of cocoa pod waste he is adding 10 kg farm yard manure and of 10 kg each bio fertilizers viz; *Phosphobacteria*, *Pseudomonas* and *Trichoderma*. In addition to application 10 kg compost, he is providing inorganic fertilizers @500gm of Urea, 500gm of superphosphate and 450gm of muriate of potash per coconut plant per year. For coconut also he is applying manures and fertilizers regularly. For each palm he is applying goat manure @ 10 kg per palm and 1.00 kg urea 2.0 Kg. super phosphate and 3.00 Kg. muriate of potash per coconut tree per year. Officers of the department of Horticulture and technical executives of Mondelez India conducted through Technical Experts from Tamil Nadu Agricultural University

extended farm level training to educate him about coca crop management, disease management and post-harvest primary processing for getting good quality cocoa beans.

During the first year he had incurred expenses at the rate of Rs. 20,000/- per acre (table 1) for establishment and maintenance of cocoa seedlings. During the second year the expenditure was Rs. 10,000/- per acre for its maintenance. During the third year the expenditure was Rs. 15,000/- acre for maintenance of cocoa for meeting the cost of manures and fertilizers, labor charges for adopting various management practices. During the fourth year onwards he is anticipating expenditure of Rs.15,000/- per acre. The cocoa trees started yielding during the third year and on an average of 15 pods per tree were harvested in the first harvest. Primary processing, i.e. braking of pods, fermentation and drying of beans were carried with in his coconut farm at farmer level and dried beans is marketing through Mondelez India Foods Pvt. Ltd. On an average he got 500gms of dry beans per tree in the third year. He is expecting 1 kg dry beans per tree in the 4th year and 2kg in the 5th year onwards. He sold cocoa beans at Rs. 180/- per kg and got a gross income of Rs. 18,000/- per acre in the third year and expecting Rs. 36,000/- in fourth year and Rs. 72,000/- in the 5th year. As such net income from cocoa per acre in 5th year onwards is Rs. 57,000/- and total net income from 7.5 acres of coconut garden in the 5th year will be Rs. 4,27,500/-. There is well established marketing system in Anamalai block. Mondelez India (Pvt.) Ltd. and Campco purchases cocoa beans and provide market support to farmers at farm gate by paying remunerative price for the dry beans produced by the farmer.

Details of cost and income from cocoa intercrop in one acre of coconut during the first 5 years (Table 1)

Year	Cost	Cocoa yield (Dry beans) in Kgs	Gross income @ Rs. 180/- per kg	Net income
First year	20,000.00	Nil -		
Second year	10,000.00	Nil -		
Third year	15,000.00	100	18,000.00	3,000.00
Forth year	15,000.00	200	36,000.00	16,000.00
Fifth year	15,000.00	400	72,000.00	57,000.00
Total	75,000.00	700	1,26,000.00	76,000.00



Every year he is spending an amount of Rs.900/- per palm for the base crop coconut. Out of which an amount of Rs.300/- per palm is for meeting the cost manures and fertilizers and Rs.600/-for labour charges for adopting management practices. On an average he is harvesting 120 nuts per tree and he sold coconut in last harvest @rs.15/- per nut and got a gross income of Rs1800/-per coconut tree and a net income of Rs.900/- per tree.

Cocoa is fetching good prize during the last 10 years and it has become a crop that can generate decent income for farmers. The estimated demand of chocolate industries in India is about 65,100 MT dry beans, whereas the present production is 23,981 MT which is only 37% of the demand. The processing sector depend on import to meet the demand. Hence introduction of this crop in potential areas is essential to reduce import. If cocoa cultivation is taken up in 5% of irrigated coconut gardens on cluster basis, the production will surpas the demand. Hence more thrust is to be given for promotion of this crop as intercrop in coconut, arecanut and oilpalm garden under the centrally sponsored programme Mission for Integrated Development of Horticulture. (MIDH)

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 base crop (coconut). Due to inter cropping coconut also received regular attention, better care and management. Mr. Krishnakumar is of the view that cocoa is an ideal intercrop in coconut garden and it provides shade to the coconut basin and always maintain a cool environment in coconut garden. Besides, cocoa leaves improves health of soil by addition organic manure. Thus coconut production is maintained at higher level. He is harvesting at an average of 120 nuts/ palm. Palms giving more than 200 nuts/ ha. is also available in this garden. This piece of land exists as a living model to show the harmonious association of coconut and cocoa in a complimentary manner which is worthy for emulation by others. ■

Cost and income from Cocoa from 7.5 acres Coconut garden	
Total cost - Rs. 5,62,500/-	Cocoa population : 200 per acre
Total income - Rs. 9,45,000/-	Spacing 3m x 3m
Net profit - Rs. 3,82,500/-	Method of planting : Pit method
Variety: : cocoa hybrid (foresterro)	
Cost of cultivation per cocoa plant (first year)	
Cost of seedling	- Rs. 6/-
Cost of organic manure & Bio fertilizer	- Rs. 24/-
Labor charges	- Rs. 70/-
Total	- Rs. 100/- per plant
Cost of cultivation per cocoa plant (second year)	
Cost of organic manure & Fertilizer (Including cost of seedlings for gap filling)	- Rs. 30/-
Labor charges	- Rs. 20/-
Total	- Rs. 50/- per plant
Cost of cultivation per cocoa plant (third year)	
Cost of organic manure & Fertilizer	- Rs. 50/-
Labor charges	- Rs. 25/-
Total	- Rs. 75/- per plant
Source: : Shri. Krishnakumar M.N Door No.4/160, Myladumparaikalam, Divansapudur (PO) AnaimalaiTaluque, M NpalayamAnamalai, Coimbatore Phone 9865411115	
Note: first to third year actual expenditure incurred by the farmer, fourth and fifth year estimated expenditure and income.	

Government of India amends the Import Policy of Desiccated Coconut

Government of India has amended the Import Policy of desiccated coconut by fixing minimum import price of below Rs.150 per kg. The present order is expected to revamp the desiccated coconut industry which has been reeling under the verge of closure due to the large scale import of desiccated coconut.



India is a major producer of coconut globally and Desiccated Coconut (DC) of HS Code 08011100 has evolved as a major value added product, giving employment to more than 1,00,000 people majority of them are women. Desiccated coconut is widely used in the country for preparation of sweets, biscuits, confectionery, curry preparation etc. There are about 150 DC units in the country and most of them are spread across three southern states viz. Karnataka, Tamil Nadu and Kerala. The DC industry in the country is the biggest industry in coconut sector after coconut oil industry. The DC industry was in growth trajectory till recently as a result of up gradation of processing capabilities of factories in India. However, as a result of high domestic price of coconut and unbridled import of DC into the country, the DC industry in the country is in doldrums.

Large quantity of DC is still being imported from Sri Lanka through all major ports in the country. DC is also being imported at very low rates in the guise of animal feed, defatted DC, Coconut oil cake and copra oil cake. It is reported that the DC thus imported is being mixed up with local brands, hampering the quality of DC powder available in the domestic market which affects the local manufacturers and their genuine quality product. The unbridled import of DC into the country has also resulted in depressing the domestic price of coconut and thereby putting millions of small and marginal coconut farmers in hardship.

If the import of DC into the country is allowed indiscriminately, the domestic DC industry is likely to collapse, which will render thousands of people jobless. Further, DC being a major industry in the coconut sector, its crisis will trigger price crash of coconut.

The Board had provided the export-import details of DC during the previous years and had suggested for introduction of a Minimum Import Price of Rs. 150/- per kg for DC and also requested for regular

To be published in the Gazette of India Extraordinary Part-II, Section-3, Sub-Section (ii)

Government of India
Ministry of Commerce & Industry
Department of Commerce
Directorate General of Foreign Trade

Notification No. 40/2015-2020
New Delhi, Dated: 27 January, 2020

Subject: Amendment in import policy and incorporation of Policy condition under HS code 0801 11 00 of Chapter 8 of ITC (HS), 2017, Schedule – I (Import Policy).

S.O. (E): In exercise of powers conferred by Section 3 of FT (D&R) Act, 1992, read with paragraph 1.02 and 2.01 of the Foreign Trade Policy, 2015-2020, as amended from time to time, the Central Government hereby amends import policy of desiccated coconut under HS code 0801 11 00 of Chapter 8 of ITC (HS), 2017, Schedule – I (Import Policy) and incorporates policy condition as under:

Exim code	Item description	Existing import policy	Revised import policy	Policy condition
0801 11 00	Desiccated coconuts	Free	Prohibited	However, import is free if CIF value is Rs. 150/- and above per Kilogram

Effect of the Notification: Import of desiccated coconut with CIF value of Rs.150/- and above per Kilogram is 'Free' and import below CIF value of Rs.150/- per Kilogram is 'Prohibited'.

This issues with the approval of Minister of Commerce & Industry.

(Amit Yadav)
Director General of Foreign Trade &
Ex- officio Addl. Secretary to the Government of India

(F.No. 01/53/162/1109/AM-07/F-2/115/PC-2)Bj/Pt.-III/e -4037)

checking of cargo to ensure compliance of quality standards.

It may also be noted that in response to the Boards letter dated 15th July 2019, Ministry of Commerce had replied that various steps have been initiated regarding the DC issue viz., safeguard measures in trade through Directorate General of Trade Remedies, possibility for Minimum Import Price, enforcement of standards at time of imports through FSSAI and preventing mis-declaration through Central Board for Indirect Taxes and Customs. ■

Tender Coconut Varieties

for the benefit of coconut growers

V. Niral, Principal Scientist, Crop Improvement Division, ICAR-CPCRI, Kasaragod

Ranjini, T.N., Scientist, Crop Improvement Division, ICAR-CPCRI, Kasaragod

The Coconut palm (*Cocos nucifera* L.) in India is referred to as 'Kalpavriksha' which means "tree which gives all that is necessary for living". This palm continues to have hundreds of uses as a source of nutritious food, refreshing drink, oil (used in cooking, pharmaceuticals, industrial applications and biofuels), fibre of commercial value, charcoal, construction material and a variety of miscellaneous products for domestic and industrial use.

Global coconut production is widely dispersed in most of the tropical regions over an area of 12.47 million hectares. In India, coconut is grown in an area of 2.07 million hectares, across 18 states and three Union Territories. India ranks among the top three coconut producing countries in the world, with an annual production of 23,351 million nuts and productivity of 10,614 nuts/ha (Coconut Development Board, 2015-16). Traditional areas of coconut cultivation, accounting for 90% of the total area under coconut, are in the states of Kerala, Tamil Nadu, Karnataka and Andhra Pradesh. Island territories like Lakshadweep Islands and Andaman

and Nicobar islands have coconut as the major crop. Coconut cultivation has also spread to the non-traditional tracts like Bihar, Chhattisgarh, Gujarat, West Bengal and North Eastern states.

In recent years, coconut is being increasingly considered as a health food with tender coconut water, virgin coconut oil and inflorescence sap being promoted for consumption in addition to copra and oil. Tender coconut water is becoming increasingly popular as a refreshing health drink. Tender coconut water refers to the liquid endosperm obtained from 6-8 months old tender coconuts, the period before the solid endosperm or white kernel forms. It is a natural isotonic beverage with the same level of electrolytic balance as we have in our blood. Hence, during World War I and II, tender coconut water has been used as an intra-veinal fluid (IV fluid) for medical emergencies. In Ayurveda, tender nut water is believed to increase semen levels, promote digestion and clear the urinary path. Tender coconut water contains sugars, minerals and minor amounts of nitrogenous compounds (proteins/amino acids).





Improved varieties for dual purpose - copra and tender nut					
Variety	Important traits	Vol. of tender nut water (ml nut-1)	Copra yield (t ha-1 year-1)	Recommendation for cultivation	Agency responsible for release
Tall					
Kera Chandra	High yield	450	3.68	Kerala, Karnataka, Konkan region, Andhra Pradesh, West Bengal	ICAR-CPCRI, Kasaragod
Kalpa Pratibha	High yield	448	4.12	Kerala, Andhra Pradesh, Tamil Nadu, Maharashtra	ICAR-CP-CRI, Kasaragod
Kalpa Haritha	Green fruits, Less eriophyid mite damage	440	3.72	Kerala, Karnataka	ICAR-CP-CRI, Kasaragod
Kalpa Shatabdi	High yield, Lesser incidence of rhinoceros beetle	612	5.01	Kerala, Karnataka, Tamil Nadu	ICAR-CP-CRI, Kasaragod
Kalyani Coconut 1	High yield	274	3.84	West Bengal	Bidhan Chandra Krishi Viswavidyalaya (BCKV), West Bengal
Dwarf/Semi-Tall					
Kalparaksha	Semi-tall, High yield, green fruits	290	2.11	Kerala	ICAR-CP-CRI, Kasaragod
Kera Madhura	Semi-tall, high yield, green fruits	287	4.80	Kerala	Kerala Agricultural University, Kerala
Gouthami Ganga	Dwarf, Green fruits	467	1.80	Andhra Pradesh	AICRP on plams, Ambajipeta, Andhra Pradesh
Kalpasree	Dwarf, green fruits	240	1.51	Kerala	ICAR-CPCRI, Kasaragod
CARI-C1 (Annapurna)	Dwarf, high copra content, green fruits	470	2.23	Andaman & Nicobar Islands	ICAR-Central Island Agricultural Research Institute (CIARI), Port Blair

The primary nutrient in coconut water is potassium. This makes it a high electrolyte beverage and helps to maintain blood volume, heart health, prevent dehydration and stress. In recent years, health benefits of coconut water continued to be fine tuned, as many marketers call it “nature's sports drink” and a “life enhancer”. Worldwide awareness and popularity towards tender coconut water as a refreshing health drink, has resulted in many aerated drink manufactures venturing into this field. The global coconut market is expected to grow at a compound rate of 26.75% until 2020. Presently, Brazil is the world's largest market for packaged coconut water, accounting for 67% of juice volume sales in 2010 and reportedly growing at the expense of orange juice. The tender nut water products are also gaining rapid popularity in both traditional and nontraditional areas, thus opening new vistas for coconut entrepreneurs to capture the widening tender nut market.

In order to meet the market driven demands for the tender coconut, ICAR-Central Plantation Crops Research Institute is continuously evaluating coconut germplasm, accessions as well as experimental hybrids at the institute for the quantity and quality of tender nut water towards developing

Improved hybrid varieties for dual purpose - copra and tender nut						
Hybrid Variety	Source population of parents	Important traits	Vol. of tender nut water (ml nut-1)	Copra yield (t ha-1 year-1)	Area recommended	Agency responsible for release
Chandra Sankara	COD x WCT	High yield	347	4.27	Kerala, Karnataka, Tamil Nadu	ICAR-CPCRI, Kasaragod
Chandra Laksha	LCT x COD	High yield, tolerant to moisture stress	339	3.76	Kerala, Karnataka	ICAR-CPCRI, Kasaragod
Kalpa Samrudhi	MYD x WCT	Tolerant to moisture stress, higher nutrient use efficiency	346	4.5	Kerala, Assam	ICAR- CPCRI, Kasaragod
Kalpa Sreshta	MYD x TPT	High yield	368	6.28	Kerala, Karnataka	ICAR-CPCRI, Kasaragod

improved varieties for tender nut purpose, including dual purpose varieties suitable for tender nut as well as copra production for release and cultivation in different agro ecological regions in the country. The varieties developed in the country under the National Agricultural Research System is listed in the given tables.

ICAR-CPCRI, ICAR-CIARI, various SAUs, State Department of Horticulture and the centres under AICRP on Palms as well as the Coconut Development Board – DSP farms supply seeds/seedlings of improved varieties/hybrids to farmers, NGOs, developmental agencies and research organizations also facilitate higher crop productivity and net returns. Farmers/ farmer’s organizations and developmental



Chandra Sankara



Coconut farmers need to be motivated to plant improved varieties suitable for tender nut purpose including dwarf as well as dual purpose varieties and hybrids. Under irrigation and proper management practices, farmers can expect higher yield from hybrid coconut varieties compared to tall varieties.

Improved dwarf varieties for tender nut and ornamental purpose

Variety	Important traits	Vol. of tender nut water (ml nut-1)	Copra yield (t ha-1 year-1)	Recommended states/regions	Agency responsible for release
Chowghat Orange Dwarf	Orange fruits, less eriophyid mite damage	351	2.78	All coconut growing regions	ICAR- CPCRI, Kasaragod
Kalpa Jyothi	Yellow fruits, relatively tolerant to water deficit stress	380	2.83	Kerala, Karnataka, Assam	ICAR-CPCRI, Kasaragod
Kalpa Surya	Orange fruits	400	4.00	Kerala, Karnataka, Tamil Nadu	ICAR- CPCRI, Kasaragod
CARI-C2 (Surya)	Ornamental purpose, orange fruits	154	1.31	Andaman & Nicobar Islands	ICAR- CIARI, Port Blair
CARI-C3 (Omkar)	Ornamental purpose, yellow fruits	117	1.45	Andaman & Nicobar Islands	ICAR- CIARI, Port Blair
CARI-C4 (Chandan)	Ornamental purpose, orange fruits	198	1.74	Andaman & Nicobar Islands	ICAR- CIARI, Port Blair



Chandra Sankara



Kalpa Jyothy

agencies also encourage to establish seed gardens to promote supply of improved varieties and ensure higher productivity and remuneration to coconut growers.

To combat, the loss in remuneration due to lesser market price for mature coconuts and to

tap the opportunity among the rising popularity of tender coconut water as a refreshing health drink, it is advised to establish gardens with tender nut varieties, dual purpose varieties for meeting the domestic demand for tender coconut water as well as to promote product diversification to avoid the ill effects of coconut price fall due to excess availability of copra in the market. Additionally, tender nuts are harvested at 6-8 months of maturity, so that it saves nutritional requirements for another 4-6 months of fruit development for production of copra and helps in the better fruit set and development in subsequent inflorescences, which in turn results in higher nut yield/palm. In Pollachi and Coimbatore districts of Tamil Nadu, wherein farmers have planted tender nut varieties in fairly large tracts of land to meet the local demand for tender coconut and also exploring avenues for tapping the export market. Now, this trend is drifting towards other states too namely, Kerala, Karnataka, Andhra Pradesh, Maharashtra and West Bengal. Hence, coconut farmers need to be motivated to plant improved varieties suitable for tender nut purpose including dwarf as well as dual purpose varieties and hybrids. Under irrigation and proper management practices, farmers can expect higher yield from hybrid coconut varieties compared to tall varieties. It is also advisable to plant these improved varieties not just for establishment of new plantations but also in the senile gardens where replanting and rejuvenation is recommended. This will help to boost the overall profitability of the coconut farming and promote coconut cultivation in the country. ■

The Goodness of Fresh Coconut

Regular consumption of fresh coconut has no significant harmful effect on fatty acid composition and does not change lipid-related cardiovascular risk factors.

Everybody is familiar today with the term lipid profile. Lipid profile shows the total amount of triglycerides and cholesterol, as well as the distribution between ‘good cholesterol’ - HDL, and the ‘bad cholesterol’ - LDL in our blood at any given point of time. Another aspect of lipids that is now gaining popularity are the terms ‘saturated’ and ‘unsaturated’ fatty acids. Dietary fats have been rather superficially divided into bad (saturated) and good (unsaturated) fatty acid containing foods. However it is increasingly becoming clear that this simplified definition of good and bad fatty acids is wrong, and that many saturated fatty acids could actually be good fats – with coconut fat being the key sources.

Fresh coconut, though rich in Saturated Fatty Acids (SFAs) in comparison to a combination of groundnut and groundnut oil when used over a period of 90 days, recorded no significant harmful effect on erythrocyte fatty acid composition and did not change lipid-related cardiovascular risk factors. Regular consumption of 100 g of coconut, containing

SFAs, was not found to have any harmful effect on plasma lipids and erythrocyte fatty acid composition.

A study was undertaken by Swami Vivekananda Yoga Anusandhana Samsthana, Department of Yoga and Life Sciences, Bengaluru, India with the financial assistance of CDB to compare the effects of increased SFA provided by fresh coconut versus monounsaturated fatty acid (MUFA) intake (provided by a combination of groundnuts and groundnut oil) on plasma lipids and erythrocyte fatty acid (EFA) composition in healthy adults.

Fifty-eight healthy volunteers, randomized into two groups, were provided standardized diet along with 100 g fresh coconut or groundnuts and groundnut oil combination for 90 days in a Yoga University. Fasting blood samples were collected before and after the intervention period for the measurement of plasma lipids and EFA profile.

Consumption of saturated fat is believed to increase the risk of coronary artery disease mainly because of its effects on increasing plasma total



cholesterol levels. As early as the 1950s, Keys *et al.* and later Dietschy and Hegsted *et al.* worked out equations that showed how dietary fatty acids influenced plasma cholesterol levels. These equations suggested that saturated fatty acids increased total cholesterol levels, whereas polyunsaturated fatty acids (PUFAs) decreased it and monounsaturated fats (MUFAs) were largely considered as neutral. These studies were the basis of dietary recommendations that advised reduced consumption of all types of SFAs.

Nearly one third of the world's population depends on coconut to some degree for their food. Indian diets are relatively low in fat; however, inclusion of fresh/dry coconut in the daily diet is a common practice in many parts of the country. Studies on the effect of coconut oil consumption on plasma lipids are contradictory, with some studies showing deleterious effects and others showing neutral effects. However, there are almost no studies conducted on the health effects of fresh coconut consumption. Fresh coconuts contain 40%–50% moisture and, in addition to SFAs, they are rich in fiber and protein and a number of vitamins, minerals, and electrolytes. Furthermore, the coconut SFA composition is unique in that it consists of over 50% of medium-chain SFAs (MCSFAs), whose properties and metabolism appear to differ from longer chain SFAs commonly found in animal products. MCSFAs are rapidly oxidized in the liver to Acetyl coenzyme A (acetyl CoA) and do not enter or alter the lipid pool in the liver, thus remaining neutral with respect to regulation of total cholesterol or low-density lipoprotein (LDL) levels.

This study was therefore undertaken to study the effects of daily consumption of fresh coconut on plasma lipids and erythrocyte fatty acid composition in healthy young men and women.

The study was carried out on 58 healthy adults who were recruited following advertisement of the study at Swami Vivekananda Yoga Anusandhana Samstha University. The subjects were randomized into coconut group and groundnut group. All subjects received a balanced diet based on yogic principles of food (sativic, rajasic, and tamasic) blended with modern medical nutrition (calorie requirements, composition of a balanced meal) and consumed this standard meal plus intervention for a period of 90 days. In addition to the standard meal, coconut group consumed 100 g (444 kcal) of fresh coconut per day and the other group consumed 45 g (256 kcal) of groundnuts and 22 g (198 kcal) of groundnut

oil per day. A combination of groundnut and oil was used to make the two study interventions isocaloric and to ensure similar macronutrient compositions. Subjects were trained and requested to abstain from consuming anything other than the food and snacks provided by the project kitchen, set up exclusively for the study.

In this carefully controlled diet study, impact of SFAs from fresh coconut in comparison to MUFAs from a groundnut and groundnut oil combination on some well-accepted indices of cardiovascular disease (CVD) risk was analysed. The most important finding of the present study was that despite much higher intakes of SFAs in the coconut group, the effects on plasma TC and triglycerides were minimal. There was a significant increase in LDL levels in the coconut group, which is in line with a number of studies with coconut oil supplementation. This has been generally attributed to either increased LDL synthesis or reduced LDL clearance. On the other hand, a number of studies have reported beneficial effects of virgin coconut oil on LDL and have attributed it to the presence of high levels of polyphenols such as caffeic acid, which play a key role in scavenging free radicals. In the current study, despite the use of fresh coconut rich in polyphenols, an increase in LDL levels was observed. However, it was also seen that there was no significant increase in TC levels, suggesting that this increase in LDL was well within physiologic variability in the current study population of normal men and women. Groundnut was used as the control in this study because it is a rich source of MUFA and is more commonly consumed than olive oil in India. We have enough evidence from several epidemiologic studies that dietary MUFAs have a positive impact on CVD risk factors by promoting a healthy blood lipid profile, improving blood pressure, and decreasing inflammation and oxidative stress. MUFAs are reported to improve insulin sensitivity. In the present study, there was a significant decrease in total cholesterol levels in the groundnut group; however, this appeared to be mainly due to a decrease in HDL levels. In contrast, the coconut group showed a significant increase in HDL levels, which could be attributed to the high MCSFA content of the diet.

Decrease in body weight, decrease in blood sugar levels in coconut group and increase in haemoglobin levels in both the groups were observed. Blood pressure did not change in coconut group and diastolic blood pressure increased in ground nut group.

Thus the study proves the general perception of coconuts being bad for heart as wrong. Consumption of saturated fatty acid rich fresh coconut had no significant deleterious effect on any cardiovascular parameters in normal adults. On the contrary, there were many beneficial effects not only to the heart but more. There was an increase in the HDL levels (anti-atherogenic) and anti-inflammatory precursor DGLA (Dihomo gamma linolenic acid). Added to this was a decrease in body weight, decrease in blood sugar levels and increase in haemoglobin levels. This suggests that coconut consumption may not have any deleterious effects on cardiovascular risk in normal adults but can have multiple benefits.

The Journal of American college of nutrition has published a research article on this study and responded saying “that intended objective of the authors to study the effects of daily consumption fresh coconut on plasma lipids and erythrocyte fatty acid composition is very interesting and the emerging conclusion is equally important for the role of nutrition in lifestyle management. The vein of re-positioning the negative publicity that coconut

saturated fats have endured is timely”.

Recent advances in nutritional science now allow assessment of critical questions about the health effects of SFAs. The findings of the study contradict the perspective that dietary saturated fat *per se* is harmful and emphasize the importance of considering the source of dietary SFAs. This is one of the first studies on fresh coconut that supports the beneficial effects of coconut.

The study on Effect of a Diet enriched with fresh Coconut Saturated Fats on Plasma Lipids and Erythrocyte Fatty Acid Composition in normal adults is sponsored by CDB under the scheme Technology Mission on Coconut.

Courtesy: CDB Study Report and Journal of the American College of Nutrition. Effect of a Diet Enriched with Fresh Coconut Saturated Fats on Plasma Lipids and Erythrocyte Fatty Acid Composition in Normal Adults: Rokkam Shankar Nagashree, MSc, N. K. Manjunatha, M. Indub, M. Ramesha, V. Venugopala, P. Sreedhara, N. Pavithrab, and Hongasandra R. Nagendraa ■

Advertisement Tariff of Coconut Journals

Indian Coconut Journal (English monthly), Indian Naliker Journal (Malayalam monthly), Bharatiya Nariyal Patrika (Hindi quarterly), Bharatiya Thengu Patrike (Kannada quarterly) and Indhia Thennai Idazh (Tamil quarterly) are the periodicals of the Coconut Development Board. These journals regularly feature popular articles on scientific cultivation and other aspects of coconut industry. The journals are subscribed by farmers, researchers, policy makers, industrialists, traders, libraries, etc.



Position	Indian Coconut Journal (English monthly) (Rs.)	Indian Naliker Journal (Malayalam monthly) (Rs.)	Indhia Thennai Idhazh (Tamil quarterly) (Rs.)	Bharatiya Nariyal Patrika (Marathi Bi-annual) (Rs.)	Bharatiya Kobbari Patrika (Telugu Bi-annual) (Rs.)	Bharatiya Thengu Patrike (Kannada quarterly) (Rs.)	Bharatiya Nariyal Patrika (Hindi quarterly) (Rs.)
Full page - B & W	No B&W pages	No B&W pages	5000	5000	5000	5000	No B&W pages
Full page - Colour	20000	20000	10000	10000	10000	10000	5000
Half page - B & W	No B&W pages	No B&W pages	3000	3000	3000	3000	No B&W pages
Quarter page - B & W	No B&W pages	No B&W pages	1500	1500	1500	1500	No B&W pages
Back inner cover - Colour	25000	25000	10000	10000	10000	10000	8000
Back cover - (Colour)	30000	30000	15000	15000	15000	15000	10000

Special package : A rebate of 10% will be allowed on advertisements inserted in any two editions of the journal at a time and 12% discount if inserted in three or more editions at a time. 15% discount will be given to bonafide advertising agents.

Almond Coconut Muffins



Ingredients

All Purpose Flour-250 g
 White Sugar-180 g
 Baking Powder-10 g
 Salt-3 g
 Coconut Thick Milk Cream-130 g
 Butter, Melted-180 g
 Eggs-3
 Almond Extract-3 ml
 Flaked Coconut-75 g
 Sliced Almonds-45 g

Preparation

Preheat oven to 190°C. Grease 12 muffin cups. Combine flour with baking powder and salt together in a bowl. Mix sugar and eggs together in a separate bowl, until the sugar dissolve well and rub, butter flour. Stir the sugar egg mixture into flour mixture just until the batter is moistened. Then add coconut milk. Fold coconut chips into batter. Fill the prepared muffin cups 2/3-full with batter and top with sliced almonds. Bake in the preheated oven 18 to 20 minutes until a toothpick inserted in the center comes out clean. Cool muffins for 5 minutes in the tin before transferring to a wire rack.

Pineapple Coconut

Summer Smoothie

Ingredients

Tender Coconut Water& Flesh -1 Cup
 Banana for a thicker consistency (for better result use chilled banana)- 1
 Pineapple Roughly Chopped (for better result use chilled)- 1 1/2 Cups
 Dash of Ground Ginger

Preparation

Add all ingredients into the blender and make puree until smooth and creamy. Pour into glasses or bowls and serve immediately. Garnish with slice of pineapple.





VAIGA -2020

The fourth edition of VAIGA -2020 (Value Addition for Income Generation In Agriculture), an international workshop on Agro Processing and Value Addition on the theme sustainable growth through agripreneurship was held at Thekkinkad Ground, Thrissur, Kerala from 4th to 7th January 2019.

The workshop was inaugurated by Hon'ble Kerala Governor Shri. Arif Mohammed Khan. In his inaugural address, the Hon'ble Governor said that efforts to enhance farmers' income have to become the top priority of policymakers. Farmers, farm scientists and entrepreneurs from across the country participated in the exhibition of agriculture. VAIGA aimed at exploring possibility of processing and value addition of agriculture products.

"We need to ensure that ordinary farmers get modern knowledge about value addition. What we need is a committed army of agripreneurs, who would use the available technologies to start business ventures that would fruitfully utilise the opportunities for value addition in agriculture," the Governor said. He said value addition in agriculture required more capital investment, infrastructure,

marketing efforts, proper guidelines, training, governmental support and close monitoring. "Agricultural enterprises should get privileges at par with any other modern industry. Let us extend the concept of 'ease of doing business' to agricultural businesses too," he added.



Union Minister of State for Agriculture and Farmers' Welfare, Shri Parshottam Rupala inaugurated the 'Start-Up Mission Initiative' session in the VAIGA international workshop. Speaking on the occasion, Rupala said, "Agricultural produce need to project confidence in quality and promote branding to gain foothold in world markets. He told that farmer producer companies can easily storm the markets as good quality products always have good acceptance in world markets, but, is

also competitive at the same time".

He also added that the farmer producer companies have a major role to play in value addition of products as agri business is a field in which educated youth and farmers can confidently walk in as the world now demands organically grown and produced products. Farmers need to utilize this opportunity as per the



demand. He cited example of Sikkim. The products from this state are of high acceptance and Sikkim was declared as an organic state which helped its farmers to cash in on this branding and gain higher income.

The Minister also informed that in 1951, 50% GDP was met from agriculture but today agriculture accounts for only 16% of the GDP. As the population has increased from 50 crores to 130 crore, agricultural growth is the need of the day. He also mentioned that production has increased but the farmers' income is yet to increase and for the perfect solution strong measures have to be brought in like value addition of products. In his address, Agriculture Minister, Kerala Shri. V.S. Sunil Kumar who presided over said that in the job opportunity sector, agri-business is of paramount importance.

LSG Minister Kerala, Shri. A C Moideen, Education Minister Kerala, Shri. C Raveendranath, Chief Whip and Ollur MLA Shri. K Rajan, Worshipful Mayor Smt. Ajitha Vijayan, district panchayat president Smt. Mary Thomas, and Additional Chief Secretary Shri. Devandra Kumar Singh were present during the occasion. Over 300 stalls of various agricultural organisations, government departments, farmer producers companies etc, participated in the expo.

Coconut Development Board displayed various value added coconut products like coconut oil, virgin coconut oil, packaged tender coconut water etc in the exhibition. Handicraft and utility items made from coconut shell and wood were also displayed which attracted the visitors. Publications of the Board, leaflets and brochures were distributed to the visitors. M/s. Green Valley coconut Oil, M/s. Sip O Nut, M/s. Palakkad Coconut Producer Company and M/s. Viswakarma Handicrafts displayed their products and services in the Board's stall.

VAIGA was organised by Government of Kerala



Board's stall in VAIGA 2020

with the support of Government of India, Central and State Government research institutions, public sector undertakings and other organizations in the field of agricultural development.

VAIGA showcased the most modern trends and techniques in value addition, processing and income enhancing opportunities for agripreneurs. As part of VAIGA 2020, international workshop was organised on the theme "Sustainable Agricultural Development through Agripreneurship".

Along with the international workshop an international exhibition of success stories in the field of value addition technologies, machineries for value addition, stalls of various research institutions of Central and State Governments, various public sector undertakings, model co-operatives etc were organized wherein farmers could interact with the experts.

VAIGA has made positive impact in the agribusiness ecosystem of Kerala by moulding and developing thousands of agripreneurs using the most modern innovative technologies for value addition. ■

Chairperson CDB visited CPCRI Kayamkulam



Smt. G. Jayalakshmi, IAS, Chairperson, Coconut Development Board along with Mr. Saradindu Das, Chief Coconut Development Officer and Mr. Pramod P. Kurian, Assistant Director visited ICAR-CPCRI, Regional Station, Kayamkulam on 27th December 2019. Dr. S. Kalavathi, Acting Head, CPCRI, Regional Station, Kayamkulam made a brief presentation on the salient achievements of the Regional Station. Chairperson CDB interacted with Scientists of ICAR-CPCRI, Regional Station on various aspects of integrated management of coconut including recent advancement in bio-control techniques and progress with regard to tissue culture multiplication of coconut. The team also visited tissue culture lab, bio-control lab and experimental fields of ICAR-CPCRI, Regional Station, Kayamkulam. A ceremonial planting was also done in the main campus.

Exposure Visit

Coconut Development Board, Regional Office, Guwahati conducted two days exposure visit programme for Meghalaya state farmers to CPCRI, Kahikuchi and HRS, AAU, Kahikuchi. Dr. Alpana Das, Sr. Scientist, CPCRI, Kahikuchi took class on scientific method of coconut cultivation and plant protection. The team visited Horticulture Research Station, AAU, Kahikuchi and DSP Farm, Abhayapuri. Smt Fariza S Shahid, Field Officer, DSP Farm, Abhayapuri welcomed the farmers and briefed on how to maintain the coconut palm and how to protect the coconut palms from various pest and diseases. Farmers were also briefed on mother palm selection. Smt Fariza S Shahid, Field Officer, DSP Farm, Abhayapuri proposed vote of thanks to the farmers for visiting the DSP Farm.



Workshops on Scientific coconut cultivation technologies and value addition in coconut



Coconut Development Board, Regional Office, Guwahati organized a Block Level Workshop on scientific coconut cultivation technologies and value addition in coconut on 08th January 2020 at Kumolia Community Hall in collaboration with District Agricultural Office, Biswanath. Around 60 farmers from Biswanath District participated in the programme.

Shri Phanindra Saikia, ADO, Ghahigaon in his key note address spoke on the prospects of scientific coconut cultivation for the upliftment of the livelihood of farmers. He also spoke about the various uses of coconut and encouraged the farmers to cultivate coconut. He emphasized multistoried cropping system as well as intercropping of coconut.

Shri Mridul Talukdar, Horticulture Assistant, CDB explained about the scope of value addition and marketing of coconut and its products and also described about the activities of Coconut Development Board including Area Expansion Programme.

Shri Manash Pratim Das, ADO, Biswanath Circle explained about scientific coconut cultivation technologies. He also briefed about coconut diseases and pest management.

Pradip Talukdar, ADO, Pavoil Circle, Biswanath spoke on processing and value addition of coconut. He also mentioned in his speech about the various food items that can be prepared with coconut. After the training programme demonstration of plantation of coconut seedling was done in the presence of farmers.

Coconut Development Board, Regional Office, Guwahati organised another Block Level Farmers



Awareness cum Practical Training Programme on Scientific Coconut Cultivation Technologies and Value Addition on 9th January 2020 at Gohpur in collaboration with Sub Divisional Agricultural Office, Gohpur, Biswanath. Shri Prahlad Pegu, Argri. Inspector, Sub divisional agricultural office, Gohpur, Biswanath welcomed the guests and 50 farmers participated in the programme.

Shri Jayanta Saikia, Agril Dev. Officer, Kalabari Circle SDAO, Gohpur briefed on scientific coconut cultivation technologies and water management and soil conservation methods.

Shri Kaustabha Kt. Pandit, SDAO, Gohpur, Biswanath explained about processing and value addition of coconut. He also mentioned in his speech about the various food items that can be prepared from coconut.

During the interaction with farmers, various queries on coconut plantation, plant protection etc. were raised which were duly replied by the experts.

AGRO +F&B PRO-2019



Coconut Development Board, State Centre, Thane participated in 17th edition of Agro + F & B Pro-2019 from 03rd to 05th December -2019 at Goregaon Mumbai, Maharashtra. The exhibition was inaugurated by Shri. RameswarTeliji, Union Minister of State for Food Processing Industries, Govt. of India and H. E. Mrs. Rosette Mosi Nyamale, Ambassador of The Democratic Republic of The Congo to India in presence of Shri. Gurbaxish Kohli, President, Federation of Hotels & Restaurants Association, Shri. Joseph Dias, Mg. Director, Chamber of Import, Export & Health, Mr. MF Ezuan, Trade Commissioner of Malaysia and other VIPs.

Over 400 brands from India, Congo, Malaysia and other countries were displayed in the show. The mega event drew of 9,000 business and trade visitors, besides thousands of general visitors.

Coconut Development Board arranged display of various value added coconut products like Packed Tender Coconut water, Coconut oil, Coconut Milk Powder, Virgin Coconut oil and well informative

charts and posters etc. Board's publications, journals, leaflets and brochures were also distributed in the stall.

Coconut Development Board, participated in the exhibition for getting distributors, entrepreneurs and retailers for coconut products in the region. Shri.Kapish Gupta representative of Keratech (P) Ltd. Kerala, Manufacturer of Virgin Coconut Oil, Desiccated Coconut Powder, Virgin plus tablets, Coconut Cream etc and Shri. Vardharajan of M/s. Madura Agro Process Pvt.Ltd. Coimbatore, Tamil Nadu, manufacture of Coconut Water, Coconut Sugar, Coconut Chips etc. displayed their products and services in the Board's stall.

VIPs, officials of various National companies and NGOs, business communities including all age groups visited CDB stall. Coconut Development Board was awarded Best of India Business Award-2019 in the category of best commodity board by honourable Shri.RameshwarTeli, Minister of State for Food Processing Industries, Government of India.

Field Visit



CDB, Patna organised a field visit programme in DSP Farm, Singheswar, Madhepura for the farmers from Araria district on 5th January 2020. Shri Rajeev Bhushan Prasad, Director, CDB, RO,Patna welcomed the farmers and were briefed about the methods of preparing nursery, scientific method of planting, management of weeds, diseases, irrigation, manure, harvesting etc. Shri Pankaj Kumar, TO (contract), CDB, RO, Patna explained about maintaining cleanliness in the nursery and harvesting of nuts. The field visit was concluded with the vote of thanks by Shri Paramanad Rishidev, President, Haripur Panchayat, Farbeeaganj Block, Araria District. Thirty farmers participated in this programme.

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Cultivation Practices for Coconut -February

Collection and storage of seed nuts

From the identified mother palms seed nuts should be carefully harvested and properly stored to prevent drying of nut water. Wherever the ground surface is hard, harvested bunch should be lowered to the ground using a rope.

Nursery management

Irrigation has to be continued. Weeding has to be done wherever necessary. If termite infestation is noted in the nursery drenching with chlorpyrifos (2ml chlorpyrifos in one litre of water) should be done. Spraying of water on the lower surface of leaves of seedlings can be done against spiralling white fly attack.

Shading

Shade has to be provided for the newly planted seedlings, if not already provided.

Irrigation

Irrigation has to be continued in coconut gardens. If basin irrigation method is adopted, provide irrigation once in four days @ 200 litres per palm. Drip irrigation is the ideal method of irrigation for coconut. The number of dripping points should be six for sandy soils and four for other soil types.

Depending on the evaporation rate, quantity of water to be provided through drip irrigation system can be decided in different coconut growing tracts. In Kerala 30-35 litres and in Tamil Nadu and Karnataka 35-45 litres of water is sufficient per palm per day through drip irrigation system during January.

Moisture conservation

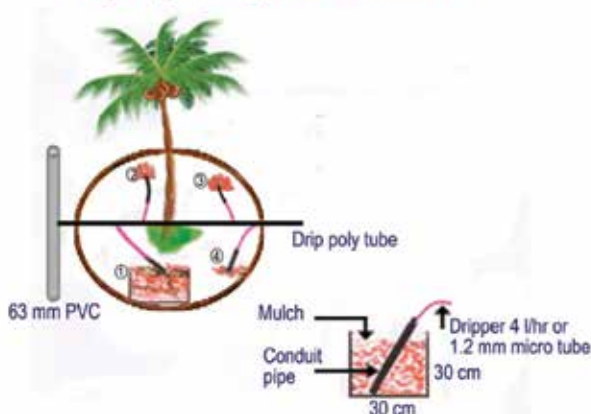
Mulching and other soil and moisture conservation practices should be adopted if not done earlier.



Plant protection

With the temperature shooting up high even in January 2020, it is all likely that the month of February 2020 is going to be very dry. Nights remain still cooler, humidity percentage slowly comes down and the evaporation level increases. The areas adjoining river and brackish water as well as midland regions favours emergence of sucking pests like rugose spiralling whitefly and other whiteflies during this period. Several coconut gardens in Kerala, Tamil Nadu, Andhra Pradesh, Karnataka and Lakshadweep Islands (Kavaratti and Minicoy) are heavily infested with rugose spiralling whitefly or nesting whiteflies or occurring in synergy. There will be a shift in the parasitism level favouring the pest population to flare up especially on juvenile palms and coconut nursery. The sooty mould scavenger beetle population recedes after the withdrawal of rainfall. Strict domestic quarantine in the transport

Drip irrigation layout and installation





Leaf and inflorescence damage



Shielding by fish net



Metarhizium infected grub

of coconut seedlings or ornamental palms should be ensured. The sustenance of key pests like black headed caterpillar and slug caterpillars in endemic zones are to be understood keenly and management strategies evolved accordingly. The dry pathogens like leaf rot disease and basal stem rot disease could increase in the endemic regions as well.

► *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.

Management

- Prophylactic treatment of top most three leaf axils with either botanical cake [Neem cake /marotti cake / pongam cake (250 g)] admixed with equal volume of sand or placement of 12 g naphthalene balls covered with sand.
- Routine palm scrutiny during morning hours 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 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 10¹¹ /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 infortunatum* in to 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.

► *Rugose Spiralling Whitefly (Aleurodicus rugioperculatus)*

This period could also witness the establishment of the invasive rugose spiralling whitefly (*Aleurodicus rugioperculatus*) in new areas as well as re-emergence in already reported areas. The pest population is increasing very high due to favourable weather factors of high day temperature and fall in relative humidity. Presence of whitefly colonies on the under surface of palm leaflets and appearance of black coloured sooty mould deposits on the upper surface of palm leaflets are characteristic visual symptoms of pest attack. In severe cases, advancement in senescence and drying of old leaflets was observed. Leaflets, petioles and nuts were also attacked by the whitefly pest and a wide array of host plants including banana, bird of paradise, *Heliconia* sp. were also reported. Continuous feeding by whiteflies cause health deterioration in palms for which agronomic care is very critical.



Rugose spiralling whitefly



Parasitized pupa



Encarsia guadeloupae



Sooty mould scavenger beetle

Management

- In juvenile palms, spraying of water with jet speed could dislodge the whitefly and reduce the feeding as well as breeding potential of the pest.
- Ensure good nutrition based on soil-test recommendations and adequate watering to improve the health of juvenile and adult palms. Agronomic health managements of palms is very crucial including planting of intercrops wherever possible to diversify volatile cues and improve microclimate disavouring flare up of whitefly.
- No insecticide should be used as this causes resurgence of the pest and complete kill of the natural aphelinid parasitoid, *Encarsia guadeloupae*. A pesticide holiday approach is advocated for the build up of the parasitoid.
- Installation of yellow sticky traps and conservatory biological control using *E. guadeloupae* could reduce the pest incidence by 70% and enhance parasitism by 80%.
- Habitat preservation of the sooty mould scavenger beetle, *Leiochrinus nilgiranus* could eat away all the sooty moulds deposited on palm leaflets and cleanse them reviving the photosynthetic efficiency of palms.
- A close scrutiny should be made for the presence of other whiteflies including the nesting whiteflies on coconut system.

► **Nesting whiteflies (*Paraleyrodes bondari* and *Paraleyrodesminei*)**

In addition to the rugose spiralling whitefly, two more nesting whiteflies (*Paraleyrodes bondari*

and *Paraleyrodes minei*) are found associated with palm leaflets. Nesting whiteflies are smaller in size (1.1 mm) than rugose spiralling whitefly (2.5 mm). The nymphs are flatter with fibreglass like strands emerging from dorsum whereas the nymphs of rugose spiralling whitefly are convex in shape. Adult nesting whiteflies construct bird's nest like brooding chamber and sustains in the chamber. *P. bondari* had X-shaped oblique black marking on wings with two minute projections on rod shaped male genitalia whereas *P. minei* is devoid of black markings on wings and possesses cock-head like genitalia. Nesting whiteflies compete with rugose spiralling whitefly and reduce the aggressiveness of rugose spiralling whitefly in many cases.

Management

- In juvenile palms, spraying of water with jet speed could dislodge the whitefly and reduce the feeding as well as breeding potential of the pest.
- Ensure good nutrition and adequate watering to improve the health of juvenile and adult palms
- Effective nitidulid predators belonging to *Cybocephalus* sp. were observed on the palm system and pesticide holiday is advised for conservation of biological control.



P Bondari



P Minei

► **Black headed caterpillar, *Opisina arenosella***

The coconut black headed caterpillar, *Opisina arenosella*, is a major pest distributed in almost all coconut growing tracts across the country especially along the water bodies during winter, however, a recent outbreak during May-June in certain tracts of Kasaragod district is reported. The infested portions get dried and form conspicuous grey patches on the upper surface of the lower fronds. Severe pest damage results in complete drying of middle to inner whorl of fronds leaving a burnt appearance. Presence of black headed caterpillars, webbing of leaflets and occurrence of dried faecal matter on the leaflets are the characteristic features of pest incidence. In the absence of natural enemies in the



Pest-infested field

Black headed caterpillar

Goniozus nephantidis

new area of emergence, the outbreak becomes faster and expands at high speed. Damage results in tremendous reduction in photosynthetic area, decline in rate of production of spikes, increased premature nut fall and retarded growth. Extensive feeding of caterpillars causes a crop loss of 45.4% in terms of nut yield in addition to rendering the fronds unsuitable for thatching and other purposes. Farmers need not panic and this approach is one of the classical examples of successful augmentative biological control suppressed by natural enemies.

Management

- Regular monitoring of palm fronds for pest occurrence in endemic zones.
- Removal and destruction of 2-3 older and dried leaves harbouring various stages of the pest. The leaflets could be burnt to reduce the caterpillar/pupal population.
- Domestic quarantine should be strengthened by not transporting coconut fronds from pest-infested zone to pest free zone.
- Augmentative release of the larval parasitoids viz., *Goniozus nephantidis* (20 parasitoids per palm) and *Bracon brevicornis* (30 parasitoids per palm) if the pest stages is at third-instar larvae and above. The pre-pupal parasitoid (*Elasmus nephantidis*) and pupal parasitoid (*Brachymeri nosatoi*) are equally effective in pest suppression and are released at the rates of 49% and 32%, respectively for every 100 pre-pupae and pupae estimated.
- Before releasing, the parasitoids are adequately fed with honey and exposed to host odours (gallery volatiles) for enhancing host searching ability.
- Ensure adequate irrigation and recommended application of nutrients for improvement of palm health.

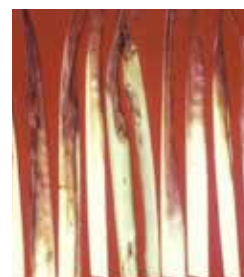
Leaf rot disease (*Colletotrichum gloeosporioides*, *Exserohilum rostratum*)

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 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



Leaf rot disease affected palm



Leaflets

Management

- Need based pruning and destruction of affected spear leaf and other adjacent leaves in the terminal region
- Spot application of hexaconazole 2 ml in 300 ml water on the affected spear leaf region
- Soil test based nutrition for improving the health of the palm and ensure adequate irrigation

Basal stem rot disease (*Ganoderma spp.*)

It is a destructive disease observed in all coconut growing regions and found very severe in soils with higher pH and moisture stress condition. The pathogen invades the root system during early stages of infection that are not visibly noticed. Very severe in areas of Thanjavur, Tamil Nadu parts of East Godavari, Andhra Pradesh and Arsikara, Karanataka. The outer whorl of leaves turn yellowish, then gradually become brown and droop from their point of attachment and hang vertically downwards to form a skirt around the trunk apex. In course of



Basal stem rot disease



Bracket fungus

time, the apex of the trunk shows tapering with the advancement of the disease, and bleeding symptoms may appear on the bole region. At the base of the stem a characteristic reddish brown discoloration develops, accompanied by the exudation of a brown viscous gummy substance. These brownish patches may extend up to one metre from ground level and at times bark peeling was also observed. Sometimes fruiting bodies (basidiocarp) of the pathogen develop from the affected trunk.

Management

- Avoid burning of trash and palm residues near the trunk to avoid trunk/root injury
- Removal of dead palms and palms in advanced stage of the disease as well as destruction of the boles and root bits of the diseased palms to remove disease inoculums.

- Isolation of neighboring healthy palms, by digging isolation trenches (60 cm deep and 30 cm wide) around the affected palm (1.2 m away from the base of the trunk).

- Application of neem cake (5 kg) fortified with Trichoderma harzianum(CPTD 28)talc formulation (50 g)per palm per year at six monthly intervals reduced the disease intensity.

- Root feeding of hexaconazole @ 2% (100 ml solution per palm) and soil drenching with 0.2 % hexaconazole or with 40 l of 1% Bordeaux mixture in the coconut basin are recommended

Correct and timely diagnosis of insect and mite pests as well as disease causing pathogens would be the key factors for the implementation of effective management solutions. Delayed detection would take a longer time for recovery from pest invasion. Hence, a close scrutiny of palms through effective scouting and timely diagnosis would form the basis in doubling income through increased production. Palm health management is very important to tackle pests and diseases in coconut. ■

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



Courtesy : Readers Digest , January 2020



ADD COCONUT OIL TO COFFEE

5 WHEN YOU add a teaspoon of virgin coconut oil to your coffee, you convert this simple beverage into a fat-burning elixir. Coconut oil contains medium-chain fatty acids (MCFAs) that boost the body's metabolism and stimulate effective fat burn. Also, replace white sugar with brown or coconut sugar.

Market Review – December 2019

Domestic Price

Coconut Oil

During the month of December 2019 the price of coconut oil opened at Rs. 16250 per quintal at Kochi, Rs. 16150 per quintal at Alappuzha market and Rs. 17300 per quintal at Kozhikode market. During the month, price of coconut oil at Alappuzha, Kozhikode and Kochi markets was almost steady.

The price of coconut oil closed at Rs. 16200 per quintal at Kochi, Rs. 16200 per quintal at Alappuzha market and Rs. 17400 per quintal at Kozhikode market with a net gain of Rs.50, Rs.100 per quintal at Alappuzha and Kozhikode markets and a net loss of Rs.50 per quintal at Kochi market respectively.

The price of coconut oil at Kangayam market in Tamilnadu, which opened at Rs. 13000 per quintal, expressed a mixed trend during the month and closed at Rs.12800 per quintal with a net loss of Rs. 200 per quintal.

Weekly price of coconut oil at major markets Rs/Quintal)				
	Kochi	Alappuzha	Kozhikode	Kangayam
02.12.2019	16250	16150	17300	13000
09.12.2019	16050	16150	NR	12667
16.12.2019	16150	16150	17400	12667
23.12.2019	16300	16400	17400	12933
30.12.2019	16200	16200	17400	12800

Milling copra

During the month, the price of milling copra opened at Rs.10550 per quintal at Kochi, Rs.10400 per quintal at Alappuzha market and Rs.10600 per quintal at Kozhikode market. The price of Copra at all three markets in Kerala expressed a mixed trend during the month.

The prices closed at Rs.10500 at Kochi, Rs.10400 at Alappuzha market and Rs.10600 at Kozhikode market. Kochi market closed with a net loss of Rs.50, per quintal. Alappuzha and Kozhikode markets closed at same price during the month respectively.

At Kangayam market in Tamilnadu, the prices opened at Rs. 9000 per quintal and closed at Rs.9300 per quintal with a net gain of Rs.300 per quintal.

Weekly price of Milling Copra at major markets (Rs/Quintal)				
	Kochi	Alappuzha (Rasi Copra)	Kozhikode	Kangayam
02.12.2019	10550	10400	10600	9000
09.12.2019	10350	10400	NR	9000
16.12.2019	10450	10400	10600	9200
23.12.2019	10600	10600	10650	9300
30.12.2019	10500	10400	10600	9300

Edible copra

The price of Rajpur copra at Kozhikode market opened at Rs. 13200 per quintal expressed an erratic trend during the month and closed at Rs.13300 per quintal with a net gain of Rs.100 per quintal.

Weekly price of edible copra at Kozhikode market (Rs/Quintal)	
02.12.2019	13200
09.12.2019	NR
16.12.2019	13400
23.12.2019	13250
30.12.2019	13300

Ball copra

The price of ball copra at Tiptur market which opened at Rs.11500 per quintal expressed a mixed trend and closed at the same price per quintal.

Weekly price of Ball copra at major markets in Karnataka (Rs/Quintal)	
02.12.2019	11500
09.12.2019	11200
16.12.2019	11800
23.12.2019	11500
30.12.2019	11500

Dry coconut

At Kozhikode market, the price of dry coconut opened at Rs.9850 per quintal expressed an upward trend during the month. The prices closed at Rs.10250 per quintal with a net gain of Rs.400 per quintal.

Weekly price of Dry Coconut at Kozhikode market (Rs/Quintal)	
02.12.2019	9850
09.12.2019	NR
16.12.2019	10050
23.12.2019	10250
30.12.2019	10250

Coconut

At Nedumangad market the price of partially dehusked coconut opened at Rs.16000 per thousand nuts and closed at the same price throughout the month.

At Pollachi market in Tamil Nadu, the price of coconut opened at Rs.13000 per thousand nuts and closed at Rs.14000 with a net gain of Rs. 1000 per thousand nuts during the month. At Bengaluru market, the price of partially dehusked coconut opened at Rs.23000 and closed at Rs.16500 with a net loss of Rs. 6500 per thousand nuts during the month. At Mangalore market the price of partially dehusked coconut opened at Rs.22000 per thousand nuts and closed at Rs.24000 per thousand nuts during the month.

Weekly price of coconut at major markets (Rs /1000 coconuts)				
	Neduman-gad	Pollachi	Banglore	Mangalore (Grade -1)
02.12.2019	16000	13000	23000	22000
09.12.2019	16000	NR	23000	22000
16.12.2019	16000	14000	16500	24000
23.12.2019	16000	14000	16500	24000
30.12.2019	16000	14000	16500	24000

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*
07.12.2019	140	162	211	NR
14.12.2019	144	163	220	431
21.12.2019	147	171	227	445
28.12.2019	146	173	227	445

*Pollachi market

Coconut Oil

The domestic price of coconut oil in Philippines, Indonesia, and Sri Lanka expressed an upward trend during the month. In India, the price of coconut oil opened at US \$.1808 and closed at the same price during the month.

The price of coconut oil quoted 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
07.12.2019	960	935	937	1903	1808
14.12.2019	970	934	939	1963	1789
21.12.2019	1029	980	978	1958	1836
28.12.2019	1088	NQ	1089	1996	1808

* Kangayam

Copra

The domestic price of copra at Philippines, Srilanka, India and Indonesia expressed an upward trend during the month. The price of copra quoted at different domestic markets is given below.

Weekly International price of copra in major copra producing countries				
Date	Domestic Price (US\$/MT)			
	Philippines	Indonesia	Srilanka	India*
07.12.2019	537	555	949	1299
14.12.2019	569	571	1150	1299
21.12.2019	607	593	1147	1314
28.12.2019	NQ	595	1145	1314

* Kangayam

