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Role of coconut in reducing soil erosion in East & North East India

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Coconut covers about 1.07 lakhs ha (2015-16) area altogether in East and North-East India which includes Odisha, West Bengal, Assam and sparsely populated areas of Nagaland and Tripura. But unlike other fruit crops, the area under this plantation crop is difficult to calculate based on block plantation as in orchard. Rather the area is calculated based on the number of palms planted in homestead garden surrounding the house, or surrounding the main field like paddy, pulses etc. on bunds or surrounding the pond or around any other water body etc.

Since many years say around 100-200 years before people adopted this pattern of plantation for various reasons like the ability of root system of coconut to bind the soil particles and consequently prevent soil erosion due to run-off caused by heavy rain or wind.

The coconut palm has no tap root, but has a thick growth of string like root system emanating from the blunt bottom of the stem. The palm has a sound root system which anchors it solidly into the soil. Hence, it is not usually uprooted during strong winds.

Palm roots come out at all angles from the root initiation zone. Because palms tend to have heavy fronds and trunks, the numerous roots both as anchors and feeders sustain the growing plant. Even trees taller than 50-60 feet do not use a taproot system that is common in other tree species. The thin roots stretch away in search of moisture and nutrients. This character enables the soil particles in the root zone to bind closely in association with root and therefore, not easily breaks down against the force of water and wind.

In general, the number of roots produced by a fully grown palm ranges from 1500 to 8000 depending on soil texture and structure. It is different for the thin roots of the fibrous root system to push through heavy clayey soil. It prefers sandy or sandy loam soil which provide lot of air pockets and moisture for rapid root growth. The normal length of the roots is 5m in firm soil and 7 m in sandy soil. Coconut palm which grow to height of 20-25 m have roots which are only 8-10m.

As reviewed by Gomez and Prado (2007), coconut roots usually grow to a depth of close to 0.8m with 60-90% found in top 0.5m of soil. Under favourable conditions as many as 4000 to 7000 roots are found in the middle aged palm. About 74% roots do not go beyond 2m lateral distance and 80% is confined to 31 to 120 cm depth of soil. So this typical adventitious root system can hold larger amount of soil laterally

rather than many trees having tap root system. Surface area and volume of soil anchored is a huge bio-mass which helps to hold the tall coconut trees of 80-90ft height straight. Coconut root distribution in gravelly and sandy loam soil was studied, which showed that 75%-80% of roots of adult coconut palms were localised in a depth ranging from 20cm to 100cm. About 5% roots were located beyond the 100cm depth and 15-20% was confined to the top layer(0-20cm) of soil. However, root activity in the sandy loam soil was higher than gravelly soil due to the low compaction of the soil.

Coconut has no root hairs but it produces plenty of roots with a large quantity of rootlets. This factor enables coconut palm to hold larger biomass of soil. As a reference regarding anchorage and support of plant root system, it may be mentioned that Redwood trees(a gymnosperm) about 100m tall have stood erect for thousand years only because millions of individual fibrous roots dig into the ground, unlike tap root system.

How can coconut palm prevent soil erosion?

- Coconut palm reduce the effect of erosive forces using their root system and foliage. Beneficial impact of palm on areas with eroding soil can be increased by planting it in closer space than recommended. Efficacy can also be increased where planted with more than 8% slope with establishment of grasses which will enable the soil to be stabilised.

- Root system- Root extends out to the surrounding soil which hold the soil in place and improve drainage of soil. The roots prevent soil compaction and help water soak into the ground instead of flowing over its surface.

- Foliage- Foliage of the palm intercepts falling rain water and reduces the force it exerts when it hits the ground. Rainwater caught in a tree's foliage is channelled over the stem and down the trunk until it soaks into the soil. This process helps rainwater penetrate into the soil instead of washing over it and reduces the force that falling rain drops exert on the soil. ■

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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, MSca, N. K. Manjunatha , M. Indub, M. Ramesha , V. Venugopala, P. Sreedhara, N. Pavithrab, and Hongasandra R. Nagendraa ■

Health benefits of dietary intake of virgin coconut oil on neural-immune Network

To investigate the effects of dietary intake of virgin coconut oil on neuroendocrine-immune system and to promote the health benefits of VCO, CDB under the Technology Mission on Coconut programme has sanctioned a project to SRM Institute of Science and Technology, Tamil Nadu. This animal study is expected to provide information about the role of virgin coconut oil in modulating the aging process through cellular and molecular targets.

The VCO diet is proved to be hypolipidemic, enhance Th1 cytokines in the spleen and augment intracellular cell survival signaling pathways in the brain areas of young rats. It enhanced high density lipoprotein cholesterol (HDL-C) levels while lowering triglyceride (TG) levels, total cholesterol to HDL-C ratio, low density lipoprotein cholesterol (LDL-C) to HDL-C ratio and TG to HDL-C ratio in rat serum. The expression of molecular markers of cell survival pathways and antioxidant enzyme activities in the splenocytes were found to be enhanced with VCO diet. Similarly it is reported that, VCO diet facilitate in sustaining neuronal survival signals through upregulation of intracellular cell survival pathways in specific brain areas in thymus and mesenteric lymph nodes, VCO diet suppressed inflammatory markers, promoted intracellular signaling molecules, increased the expression of neuronal and growth factor markers suggesting that it enhances neuroendocrine-immune interactions in young rats.

VCO was proved to promote healthy aging by enhancing Th 1 immunity through the upregulation of cell survival signaling pathways in the spleen and enhancing the antioxidant mechanisms.

VCO diet enhanced both Concanavalin A and LPS-induced splenocyte proliferation in young, middle-aged and old female rats along with an enhancement in Th1 cytokine and NO production while it suppressed the proinflammatory cytokine production. There was also an increase in the activities of antioxidant enzymes and reduction in the extent of lipid peroxidation observed in spleen of VCO-fed group.

Virgin coconut oil diet enhanced cell-mediated immunity in lymphoid organs namely spleen, thymus and mesenteric lymph nodes and neuronal survival in brain through discrete intracellular signaling pathways. There were age-related alterations in the functions of neuroendocrine-immune system with profound changes occurring in female animals. Dietary VCO in middle-aged and old female rats altered immune parameters decelerating the age associated alterations in the functioning of neuroendocrine-immune network.

S. Thyaga Rajan is the Principal Investigator of the study.As per the findings of the project, the following future studies are suggested.

- The molecular mechanisms leading to deceleration of age-associated alterations in neuroendocrine immune system by VCO.
- The modulating capacity of sympathetic nervous system in influencing VCO-induced changes in the neuroendocrine-immune system both centrally and peripherally.
- The intracellular signaling mechanisms and interconnecting between theses systems involving upstream and downstream effects in mediating the actions of VCO on neuroendocrine-immune system in healthy men and women and in aging. ■

Shift from homestead to systematic planting

success story from Assam

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Shri. Umesh Bora, a 42 year old farmer is an educated youth from Lapatul village from Kamrup district of Assam. He started cultivation of vegetables mainly, cabbage, cauliflower and some leafy vegetables during 2010 in his 1.5 acre of land in the rabi season. During those period he could hardly make both ends meet with his little income of Rs. 25,000-30,000/ per annum from his garden. During the visit of Project Coordinator on Palms in 2012, he was advised to grow coconut in his farm and to follow suitable coconut based intercropping system developed by AICRP on Palms, Kahikuchi centre. With the help of the scientists of AICRP on Palms, this technology was transferred to his farm through FLD programmes. To start the FLD, he has planted 60 coconut seedlings of Kamrupa variety during 2013 supplied from the AICRP centre. Banana, turmeric, Assam lemon and vegetables (rabi & kharif) were also planted as intercrops in a systematic manner in his coconut plantation. At present, he has 150 bearing banana plants (var. Nendran), 50 Assam lemon plants, 125 pumpkins (var. Arjuna) and is growing turmeric (var. Megha), rabi and kharif vegetables every year under coconut plantation. Umesh is now earning a gross income of Rs. 2, 50,000/- annually with a net profit of Rs. 1, 75,000/- by selling the agricultural produces. His earning will be increased more in near future when he starts harvesting his coconut palms. He had participated in trainings on improved cultivation practices of coconut organized by the AICRP on Palms, Kahikuchi centre. His garden was visited and appreciated by the Director of Horticulture, Government of Assam. This transfer of technology has certainly its impact on the agriculture production as the farm productivity of the beneficiary has been increased by two to three folds besides increasing the annual income. This in turn would facilitate the farmer in providing better education facility to his children and also in acquiring more purchasing power.

Another young and energetic youth, Shri. Milan Boro(40) from Rajapanichanda village of Kamrup district, who was very interested in adopting the coconut based integrated cropping system model in his farm after visiting the model developed at AICRP on Palms, Kahikuchi centre. Hence, through FLD, the scientists tried to transfer the technology in his farm. In the year 2013, he planted 50 coconut seedlings (Var. Kamrupa and Tall x Tall coconut hybrid) in his 0.5 acre of land and the seedlings were supplied by the AICRP on Palms centre, Kahikuchi. Subsequently, he was supplied with turmeric rhizomes (var. Megha) which he has grown as an intercrop under coconut plantation. He got a bumper harvest of 65 quintal of fresh rhizomes from the plot under coconut cultivation and earned Rs. 97,500/- by selling the same in the local market. In the following year, he used to grow the same crop under his new coconut plantation and every year he got good harvest and

income. Besides getting a handsome income from turmeric cultivation, he earns additional income of Rs. 60,000-70,000/- also from his fishery and piggery unit. The Project Coordinator on Palms visited his farm and was pleased with his works. He had undergone training regularly on scientific coconut cultivation and a special training on farm machineries organized by AICRP on Palms and KVK, Kamrup, respectively. Now, he is getting good income by rendering his service in repairing farm machinery (power tiller, power pump etc.). As per records, now he earns nearly Rs. 2,00,000/- annually by selling various produces from his different units of the farm. Moreover, his profits from the farm will be more in near future when he will get the harvest from coconut palms.

The ICAR- All India Coordinated Research Project on Palms started functioning with the objective of conducting location specific research on mandate crops. For the purpose, the coordinating cell with its headquarters at ICAR-CPCRI, Kasaragod, coordinates research in 30 centres including 13 SAUs/SHUs, two CAUs and four ICAR institutes representing fourteen states and one union territory. In Assam, research on coconut crop improvement and crop production is being carried out through AICRP on palms centre functioning in Horticultural Research Station, Assam Agricultural University, Kahikuchi, Guwahati. The centre started functioning under AICRP on Palms from 1985.

Crop Improvement

Variety released: A high yielding coconut variety Kamrupa has been selected and released and recommended for cultivation in Assam. The variety recorded more than 100 nuts/palm/year, tolerant to low temperature and semi-waterlogged condition, tolerant to stem bleeding, red palm weevil, crown choking and grey leaf spot. Better nut quality with 253 ml of tender nut water, copra yield: 2.86 tonnes/ha and oil content: 64.5%. Adaptable to wide range of soil and highly accepted by the farmers.

Crop Production

Coconut based high density multispecies cropping system: A suitable model of coconut based high density multi-species cropping system has been established. The model comprised of coconut (16 adult palms) + black pepper (var. panniyur-1) + ginger (var. nadia) + Assam lemon + banana (var. chenichampa) + pineapple (var. Kew). The model was found to be profitable and highly sustainable with an annual income of Rs.3 to 4,5 lakh/- per ha.

Coconut based medicinal and aromatic cropping system: Out of the five medicinal and aromatic plants tried under coconut, the intercropping system of coconut + patchouli proved to be the best with net return of Rs. 1,78,089/ha and benefit cost ratio of 3.26 as against Rs. 52,750/ha and B:C ratio of 1.85 under coconut alone.

Intercropping of flower crops in coconut garden: The suitable flower crops identified under coconut are gerbera, tuberose, gladiolus and marigold at Kahikuchi which enhanced the net income to the tune of Rs. 2.00 to Rs. 4.00 lakhs/ha.

Nutritional requirement of high yielding/hybrid coconut: For the hybrid COD x WCT, a fertilizer dose of 500 g N: 500 g P_2O_5: 2000g K_2O has been proved to be the best by recording the highest yield of 114.8 nuts/palm/year and benefit cost ratio of 3.45.

- **By adopting integrated nutrient practice**: Application of 50% N by urea + 50% N by vermicompost, P_2O_5 = 500 g/palm/year and K_2O=2000 g/palm/year, the total nitrogen can be supplied through vermicompost (50 %) and organic fertilizer.

- **Fertilizer application through micro-irrigation technique for coconut:** Application of 75 % recommended dose of fertilizer through drip irrigation recorded the highest nut yield.

In Assam, coconut is being grown as a component crop in the homestead garden, however, efforts were made to plant in a systematic way in a block with Shri. Umesh Bora and Shri. Milan Boro as model farmers. ■

CDB's initiatives under Krishi Kalyan Abhiyan as part of Aspirational Districts Programme

Kumaravel S, Development Officer, CDB, Kochi

Under the 'Transformation of Aspirational Districts' programme launched by the Hon'ble Prime Minster in January 2018, Niti Ayog has put 115 backward districts in 28 States of India in terms of basic amenities, infrastructure facilities and standards of living aiming at quick and effective transformation of these districts. Convergence of Central & State Schemes; Collaboration of Central, State level 'Prabhari' Officers & District Collectors; and Competition among districts driven by a mass movement are the contours of the programme which ensures inclusive growth for all – 'Sabka Saath Sabka Vikas'.

With States as the main drivers, this programme focuses on the strength of each district, identifies low-hanging fruits for immediate improvement, measures progress, and ranks districts. The core areas focused are health & nutrition, education, agriculture & water Resources, Financial inclusion & skill development and Basic infrastructure. To measure progress of the districts, 49 key performance indicators have been chosen. Districts are prodded and encouraged to first catch-up with the best district within their State, and subsequently aspire to become one of the best in the country, by competing with, and learning from others in the spirit of competitive and cooperative federalism.

In line with the Hon'ble Prime Minister's vision of doubling farmers' income by the year 2022, the Ministry of Agriculture and Farmers Welfare has launched the Krishi Kalyan Abhiyaan from 01.06.2018 to 31.07.2018 to aid, assist and advice farmers on improving their farming techniques and raise the incomes of the farmers. The Abhiyaan is undertaken in 25 villages which are having more than 1000 population each in 111 Aspirational Districts identified in consultation with Ministry of Rural Development as per directions of NITI Ayog. In districts where number of villages (with more than 1000 population) is less than 25, all villages will be covered.

A short term Action Plan comprising specifically identified activities under various departments of the ministry viz., Department of Agriculture, Cooperation & Farmers Welfare, Animal Husbandry Dairying & Fisheries and Department of Agricultural Research & Education will be implemented to saturate these 25 villages in each of the 111 districts with these activities. The overall coordination and implementation in the 25 villages of a district will be done by Krishi Vigyan Kendra of that district. 111 officers form Ministry/ subordinate/attached/ autonomous organizations/PSUs etc. of Ministry have also been made in-charge of each district for

Table : 1

S. No	State	Districts	No. of seedlings	No. of beneficiary households
1	Andhra Pradesh	Vijayanagram	2,000	400
		Visakhapatnam	2,000	400
		YSR Cuddapah	2,000	400
2	Assam	Barpeta	2,500	500
		Darrang	2,500	500
		Dhubri	2,500	500
		Goalpara	2,500	500
3	Bihar	Araria	3,000	600
		Katihar	3,000	600
		Purnea	4,000	800
4	Chhattisgarh	Bastar	10,000	2,000
		Kondagaon	10,000	2,000
5	Karnataka	Raichur	8,000	1,600
		Yadgir	8,000	1,600
6	Kerala	Wayanad	8,000	1,600
7	Odisha	Gajapati	3,000	600
		Kalahandi	1,000	200
		Rayagada	1,000	200
8	Tamil Nadu	Ramanathapuram	5,000	1,000
		Virudhunagar	5,000	1,000
9	Tripura	Dhalai	2,000	400
G. TOTAL (9 States, 21 Dist.)			**87,000**	**17,400**

overall coordination and field level monitoring.

Various activities to promote best practices and enhance agriculture income are being undertaken under this plan such as:-

- Distribution of Soil Health Cards to all farmers
- 100% coverage of bovine vaccination for Foot and Mouth Disease (FMD) in each village
- 100% coverage of Sheep and Goat for eradication of Peste des Petits Ruminants (PPR)
- Distribution of Mini Kits of pulses and oilseeds
- Distribution of Horticulture/Agro Forestry/Bamboo plant @ 5 per family (location appropriate)
- Making 100 NADAP Pits in each village
- Artificial insemination saturation
- Demonstration programmes on Micro- irrigation
- Demonstrations of integrated cropping practice

Training programmes on bee keeping, mushroom cultivation

and kitchen garden also will be conducted at village level by ICAR/ KVKs, with preference to women participants and farmers.

The Coconut Development Board has proposed to distribute 87,000 coconut seedlings i.e., five seedlings to each landed household (17,400 families) homestead/ backyard gardening in 18 Aspirational Districts in 9 States as part of the Krishi Kalyan Abhiyan, for during the year 2018-19 is shown in Table: 1.

Making available coconuts, when started yielding, to the family members of the beneficiaries for domestic consumption, as tender coconut as well as matured coconut for culinary/ dessert/ dry fruit purpose on a long term basis; increased health benefits due to high nutritive value of tender coconut water, matured coconut on consumption; helping in savings in cost of coconuts purchased from outside for regular needs & sale of marketable surplus for increased income; utilisation of byproducts of coconut for domestic fuel/ leaf thatches/ organic manure for existing crops from coconut fronds, coconut husks, shell, etc. are some of the major benefits envisaged by this initiative of the Board under the Krishi Kalyan Abhiyan.

The distribution of coconut seedlings is proposed to be implemented directly by the Board's unit Offices in these States in association with the KVK and State Departments. In order to take regular care of the palms by the beneficiaries, awareness would be created on planting & maintenance of the palms.

A tentative budget allocation of Rs. 47.40 lakh is made by the Board during the year 2018-19 for the programme. The officers of the Board has initiated actions like field visits, coordination with KVKs and State Governments, making available the required quantities of coconut seedlings and distribution to the beneficiaries so that the programme is implemented in the scheduled time period of June-July 2018 and the benefits are reaped in time by the beneficiaries. ■

Workshop on Project Preparation and Implementation of CDB schemes in North East

The participants of the workshop

The field visit

Coconut Development Board, Regional Office, Guwahati organized a workshop on project preparation and implementation of CDB Schemes in North Eastern States on 24th May 2018 at Guwahati. The meeting was chaired by Shri. Saradindu Das, Chief Coconut Development Officer, Coconut Development Board. Shri Lunghar Obed, Director, Coconut Development Board, Regional Office, Guwahati in his welcome address appreciated the joint and concerted efforts of State Horticulture Departments of North Eastern States for participating in the Workshop. Shri Saradindu Das, Chief Coconut Development Officer urged the officers to focus more on quality of activities by proper planning and periodical monitoring. The action plan for 2018 -19 was discussed with the state representatives of all the NE States. CCDO informed that out of total fund of Rs.193 Crore allocated to CDB, 10% is allotted to the North East States. Director, CDB, R.O, Guwahati presented the achievements against target for various schemes for the year 2017-18. Smt. Resmi D. S, Assistant Director, CDB briefed about the guidelines for the Coconut Orchard Scheme for the year 2018-19. DHO, North Garo Hills, Meghalaya expressed her interest in initiating Coconut Orchard scheme in Garo Hills during 2018-19. Smt Mini Mathew, Publicity Officer, CDB presented the extension activities in North East States during the year 2017-18 and the action plan for extension activities for the year 2018-19. The programme concluded with vote of thanks by Smt. D.S. Resmi, Assistant Director, CDB. ■

Achievements in coconut research by AICRP on Palms

Maheswarappa, H. P. and Jilu V. Sajan
ICAR-AICRP on Palms, ICAR-CPCRI, Kasaragod

The All India Coordinated Research Project on Palms started functioning from 1972 with the objective of conducting location-specific research in the mandate crops. During 2017-18, cocoa has been included as mandate crop. At present the project has coconut, oil palm, arecanut, palmyrah and cocoa as mandate crops and it is implemented in 30 centres. Its headquarters is at ICAR-CPCRI, Kasaragod and 15 centres are conducting research on coconut, 8 on oil palm, 4 on arecanut, 4 on palmyrah and 7 on cocoa. The coordinating centres are located at 14 states and one union territory covering 13 SAUs/SHUs, two CAUs and four ICAR institutes.

Achievements made in coconut research by AICRP on Palms during 2017-18

Genetic Resources and Crop Improvement

Under local germplasm collection of coconut, two collections were made from Sabour centre and five from Pilicode centre.

Abhaya Ganga: A dwarf x tall hybrid cross between Gangabondam Green Dwarf and Laccadive Ordinary Tall with average nut yield of 136 nuts/palm/year, copra output of 21.7 kg/palm/year, oil content of 72 % and oil yield of 15.5 kg/palm/year was released for cultivation in Andhra Pradesh.

Gauthami Ganga: A dwarf coconut variety which is a selection from Gangabondam Green Dwarf (GBGD) suited for tender nut purpose with average nut yield of 85-94 nuts/palm/year with TSS of 5.6 g/100 ml was released for cultivation in Andhra Pradesh.

Among the seven location specific Tall x Tall coconut hybrids and six Dwarf x Dwarf coconut hybrid combinations under evaluation at Ambajipeta centre, the cross LCOT x ECT recorded the highest yield (68 nuts/palm/year) followed by PHOT x ECT (65 nuts/palm/year) after seven years of planting. Among the Dwarf x Dwarf hybrid combinations, the highest yield (83 nuts/palm) was recorded in COD x MGD followed by CGD x MGD (74 nuts/palm) at the

Abhaya Ganga (GBGD x LCOT)

Gauthami Ganga

age of seven years. At Aliyarnagar centre, among the five Tall x Tall cross combinations planted during August 2011, the cross combination ADOT x ECT recorded the highest nut yield of 104.2 nuts/palm/year followed by ECT x LCT (76.7 nuts/palm/year).

Crop Production

At Aliyarnagar, coconut based cropping system with coconut + cocoa + banana + pineapple was established during 2008. Treatments of integrated nutrient management were imposed during 2012-13 and compared with the control plot of monocropping. Yield of coconut and intercrops in the cropping system were maximum in T1 followed by T2 and T3 treatments. Similarly, net returns (Rs. 3,29,600/ha) was the highest in T1 followed by T2 and T3 treatments. The Highest earthworm population and more microbial population counts were recorded in fully organic treatment (T3) treatment followed by T2 and T1. Mono cropping of coconut registered reduced earthworm, fungi and bacteria population. At Ambajipeta centre, application of 75 % RDF + 25 % through organic recycling with vermicompost followed by 50 % RDF + 50 % through organic recycling with vermicompost + vermiwash + bio fertilizer + *in situ* green manuring

recorded superior yields of 178.5 and 172.6 nuts/palm/year, respectively, compared to coconut monocropping (142.5 nuts/palm/year). Higher net income of Rs. 2,69,802 per ha was recorded in T1 followed T2 (Rs 2,48,208 per ha) and fully organic nutrient management treatment (Rs 1,41,242 per ha) whereas it was lower in coconut monocrop (Rs. 78.450). At Mondouri centre, coconut + black pepper + ginger+ colocasia cropping system recorded net return of Rs. 3,87,874/ ha as compared to mono cropping of coconut (Rs. 87,318/ ha). Performance of six cocoa clones viz. VTLCC – I, VTLCH – I, VTLCH – 2, VTLCH – 3, VTLCH – 4 and VTLC – 1, as intercrop in coconut at Ambajipeta centre is being evaluated and during the period 2017-18, clone VTLCH – 2 recorded the highest yield of 2.1 kg dry beans per tree. At Arsikere centre, coconut + dairy (5 milch animal) integrated farming system recorded a net return of Rs. 1,86,280/ acre as compared to mono cropping of coconut (Rs. 63,860/ acre).

Disease Management

Basal stem rot

Eight latest fungicides comprising single and combi-products in commercial formulation were tested against growth of Ganoderma sp. under *invitro* at various dosages viz., 100, 250, 500 ppm and at their respective recommended dosages in perennial crops. The result revealed that at recommended concentration, all fungicides had cent percent inhibition except Kresoxymethyl. The fungicides viz., Zineb 68 % + Hexaconazole 4 % WP and Fluxapyroxad 250 g/l + Pyraclostrobin 250 g/l SC at lowest concentration ie., at 100 ppm had cent

percent inhibition indicating their effectiveness even at lower concentration against the pathogen.

Stem bleeding

The new fungicide molecules with both single and combi-products were tested against mycelial growth of Thielaviopsis paradoxa under in *vitro*. Each fungicide was tested at four different concentrations namely 100, 250, 500 ppm and recommended concentration in perennial crops. The result revealed that, at recommended concentration except Thifluzamide 24 SC and Kresoxymethyl 44.3 % SC, all other fungicides showed varying inhibition of the pathogen. However, the fungicide carbendazim 25 % + Mancozeb 50 % WS had cent percent inhibition of the pathogen at its recommended concentration. The analysis of inhibitory action at lower concentration ie., 100 ppm revealed, the fungicide carbendazim 25 % + Mancozeb 50 % WS had cent percent inhibition of pathogen indicating its strong action against the test pathogen. Application of neem cake based formulation of Trichoderma harzianum cakes (one cake /bleeding patch/year) was found effective for the management of stem bleeding disease in coconut in Andhra Pradesh.

Leaf blight

Molecular characterization of Lasiodiplodia theobromae isolates was carried out at Aliyarnagar centre. Through PCR amplification of ITS region of L. theobromae isolates, an expected amplicon of 550 bp was obtained and the sequences were deposited in GenBank (Accession numbers; MG685854, MG685855 and MG 697234).

Bud rot

Talc based formulation of T. ressei @ 5 g/seedling of coconut at spindle region is found to be effective for the management of bud rot disease.

Pest Management

Incidence of invasive rugose spiralling whitefly, Aleurodicus rugioperculatus Martin

At Aliyarnagar centre, studies pertaining to host range, varietal preference and natural enemy fauna of RSW were carried out and IPM measures were devised to manage the pest. Several host plants viz., banana, bhendi, sapota, custard apple, citrus, nutmeg, hibiscus and guava were found to harbour different life stages of RSW. The IPM measures included installation of yellow sticky traps smeared with castor oil @ 10 traps/ acre for monitoring the RSW adult population, spraying water forcibly on the under surface of the leaves or spraying with neem based botanicals for inhibiting the growth and development of RSW, release of Chrysoperla @ 1000/ ha and distribution of coconut leaflets containing parasitized (by Encarsia guadeloupae) pupae. Releasing the parasitoids in infested gardens led to drastic decrease in population from more than 150 adults per leaflet to less than 25 adults per leaflet. Simultaneously parasitisation by Encarsia also

increased to more than 70 % (from an initial 10-20 %) within a span of six months. The IPM measures were propagandized through various awareness meetings and sensitization programmes. A total of 4000 farmers in Coimbatore and Tiruppur districts were provided with Encarsia parasitoids. Awareness among the coconut farmers through interactive meetings and awareness-cum-sensitization campaigns to about 1200 farmers led to minimal use of pesticides in the ecosystem and is keeping the RSW population under check.

At Ambajipeta centre, RSW was observed in East Godavari, West Godavari and Srikakulam districts of Andhra Pradesh. The specific parasitoid E. guadeloupae was obtained from AICRP on Palms

centre, Coconut Research Station, Aliyarnagar and released in RSW infested gardens. The parasitoid established successfully in the white fly affected gardens in Kalavalapalli and Chikkala villages of West Godavari district. Leaves containing the parasitized pupae were redistributed to other affected coconut and oil palm gardens. About 40-60 per cent parasitisation was observed in the parasitoid released gardens.

At Ratnagiri centre, RSW was observed in RCRS Bhatye and DBSKKV, Dapoli during the month of December 2017. Awareness campaigns against the RSW were organized in Konkan region of Maharashtra and wide publicity was given through newspapers, posters, TV Programme and Radio talks. The State Agriculture Department was also sensitized about the incidence of the new invasive pest. Recorded huge number of coccinellid predators in RSW infested gardens.

At Arsikere centre, surveys revealed the incidence of RSW in Mandya district and coastal regions of Karnataka (Mangaluru, Brahmavar and Udupi). The aphelenid parasitoid, E. guadeloupae, green lace wings and coccinellids were recorded in RSW infested gardens.

Management of rhinoceros beetle

CPCRI Botanical cake + paste @ 15 g each/palm were found to be effective in reducing spindle damage and leaf damage due to rhinoceros beetle in juvenile palms.

Annual Group Meeting of ICAR-AICRP

27th Annual Group Meeting of ICAR-AICRP on Palms was conducted from 24-26 May, 2018 at ICAR-IIOPR, Pedavegi. Dr. J. Dilip Babu, Director of Research, Dr. YSRHU, Venkataramannagudem, Andhra Pradesh was the Chief Guest of inaugural function. The inaugural function was presided over by Dr. W.S. Dhillon, ADG (Hort. Sci. I), ICAR, New Delhi. Dr. K. U. K. Nampoothiri, Former Director, ICAR-CPCRI, Kasaragod, Dr. P. Chowdappa, Director, ICAR-CPCRI, Kasaragod and Dr. D. Damodar Raddy, Director, ICAR-CTRI, Rajamahendravaram were the guests of honour. Dr. R. K. Mathur, Director, ICAR-IIOPR welcomed the gathering. Dr. H. P. Maheswarappa, Project Coordinator (Palms), ICAR-AICRP on Palms presented the Project coordinator's report. He briefed the achievements of different AICRP on Palms centres during 2017-18. . In his report, he explained the total budget outlay of Rs. 485 lakhs for the preceding year and expenditure

under various heads. Further, he also emphasized on the technology passed on to farming community, publications made from AICRP centres, and front line demonstrations being conducted at various centres. In addition to this, the attempts made in curtailing the menace of emerging pest on coconut, rugose spiralling whitefly in various parts of country were also briefed. Dr. Dilip Babu emphasized on the need of strong farming system based technologies to help the farmers for survival and increasing profitability. He highlighted status of horticulture sector in Andhra Pradesh and its contribution to the economy of the state. During the presidential address, Hon'ble Asst. Director General Dr. W. S. Dhillon has emphasized on the need for increasing the productivity which is possible through quality planting material production. He also discussed about the role of processing and value addition in increasing the profitability.

During the inaugural function eight extension folders were released from different AICRP on Palms centres in local languages on various aspects of the mandate crops. AICRP on Palms centre, Bhubaneswar has been awarded with Best AICRP centre award during 2017-18 based on the location specific research on coconut crop improvement and crop production. About 100 scientists from 30 AICRP centres, ICAR-CPCRI and ICAR-IIOPR attended the programme. Different technical sessions on crop improvement, crop production, crop protection, post harvest technology in palmyrah and transfer of technology were carried out for subsequent days to assess the progress of research during 2017-18 and to formulate new technical programme for 2018-19. Technologies emerged by continuous research in various AICRP on Palms centres were recommended for different mandate crops to benefit the farming community. The sessions concluded with plenary session on 26th May 2018. ■

DSP FARM Abhayapuri, catering to the need for quality coconut plating material

Bilich Dan Bara, Development Officer, DSP Farm, Abhayapuri, Assam

Coconut Development Board, DSP Farm Abhayapuri was established during the year 1986-87. The total land was divided into three blocks. Roads divide all the three blocks i.e. A, B and C. There are 2558, 883 and 376 coconut trees in A, B and C blocks respectively.

The farm is situated 3.5 Kms away from Abhayapuri Town and 200 Kms away from Guwahati City, Assam. It has around 40 hectares area. Out of the total 3817 coconut palms, 2570 are bearing palms. There are three water reservoirs in the Farm which are the major source of irrigation. Diesel pumpsets are used for the irrigation.

The DSP Farm ensures timely harvest of coconut seed nut collection and sowing on the vacant nursery after proper nursery bed preparation and regular certification and sale of coconut seedlings. Plant protection measures are adopted on need basis.

The Farm utilized all available source of irrigation especially from all three water reservoirs by using diesel pump sets to irrigate the palms and raising coconut nursery. The coconut production reached the highest level durig this year compared to the previous years.

A Committee visited different districts of Assam i.e. Baksa, Nalbari and Kamrup for selection of mother palms from where seednuts are to be collected for raising coconut seedlings at Commercial Nursery of Coconut Development Board, DSP Farm Abhayapuri. Seed nuts were procured from the selected trees from Baksa, Nalbari and Kamrup district. ■

Block-wise/variety- wise coconut plant population (2017-18)

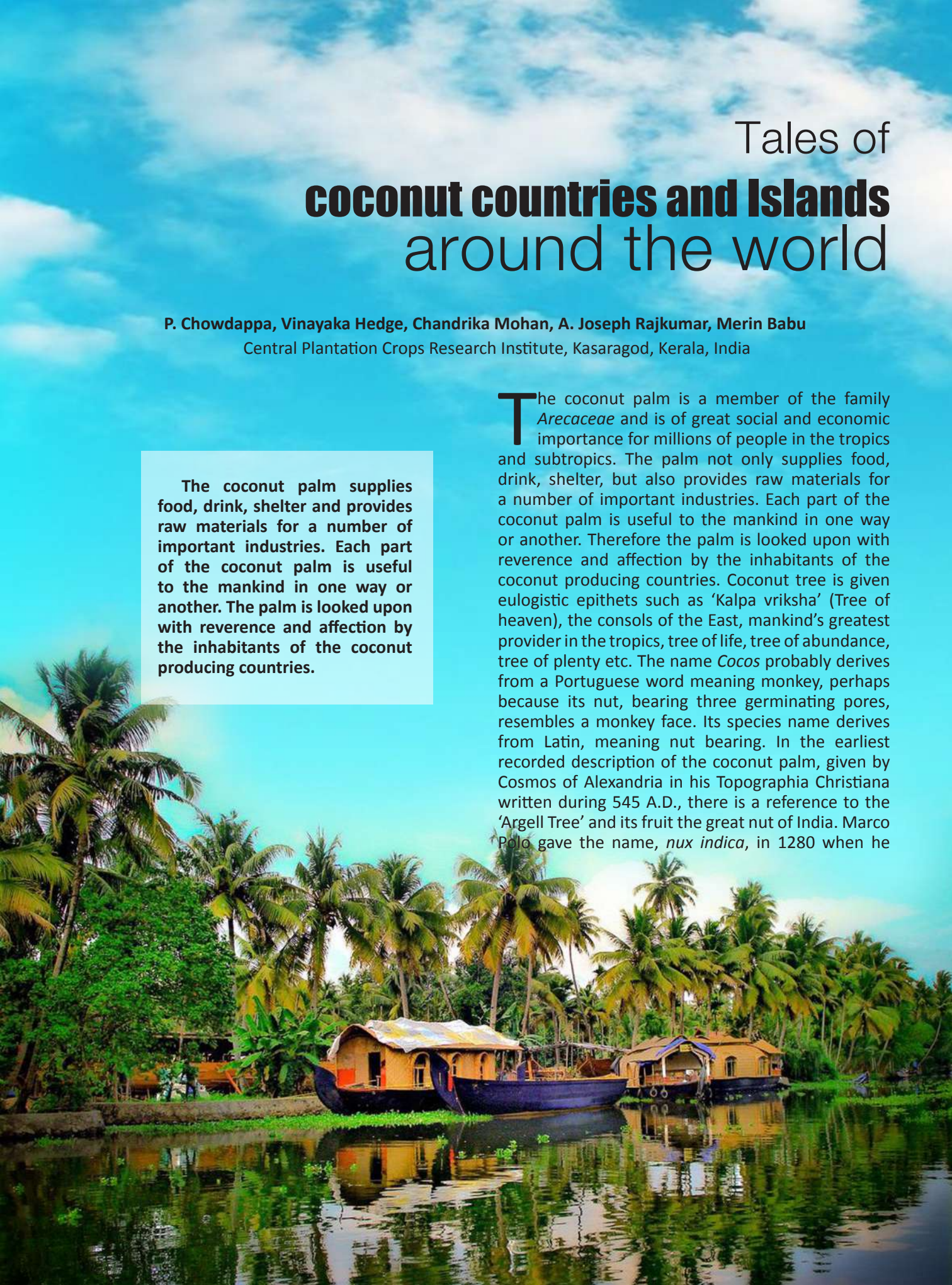
Block	Tall	Dwarf	Hybrid	Exotic	Total
A	1295	1059	(D x T) 204	-	2558
B	496	-	(T x D) 387	-	883
C	148	-	-	228	376
Total	1939	1059	228	591	3817

Tales of
coconut countries and Islands
around the world

P. Chowdappa, Vinayaka Hedge, Chandrika Mohan, A. Joseph Rajkumar, Merin Babu
Central Plantation Crops Research Institute, Kasaragod, Kerala, India

The coconut palm supplies food, drink, shelter and provides raw materials for a number of important industries. Each part of the coconut palm is useful to the mankind in one way or another. The palm is looked upon with reverence and affection by the inhabitants of the coconut producing countries.

The coconut palm is a member of the family *Arecaceae* and is of great social and economic importance for millions of people in the tropics and subtropics. The palm not only supplies food, drink, shelter, but also provides raw materials for a number of important industries. Each part of the coconut palm is useful to the mankind in one way or another. Therefore the palm is looked upon with reverence and affection by the inhabitants of the coconut producing countries. Coconut tree is given eulogistic epithets such as 'Kalpa vriksha' (Tree of heaven), the consols of the East, mankind's greatest provider in the tropics, tree of life, tree of abundance, tree of plenty etc. The name *Cocos* probably derives from a Portuguese word meaning monkey, perhaps because its nut, bearing three germinating pores, resembles a monkey face. Its species name derives from Latin, meaning nut bearing. In the earliest recorded description of the coconut palm, given by Cosmos of Alexandria in his Topographia Christiana written during 545 A.D., there is a reference to the 'Argell Tree' and its fruit the great nut of India. Marco Polo gave the name, *nux indica*, in 1280 when he



was in Sumartra. Later, the Arabs called the coconut 'jawz hindī'. Both names translate to "Indian nut" and when they arrived in England, they retained the "coco" name and "nut" was added. Almost all names of coconut in Indian languages are related, e. g., nariyal (Hindi), nariyel (Urdu), narial (Punjabi), nariyel (Gujarati), naral (Marathi), narokel (Bengali), narikelamu (Telugu), also nargil (Mongolian), tengai in Tamil and nalikeram / Thengu in malayalam. Certain places even countries are known by coconut because of coconut cultivation or due to existence of coconut palms in these regions.

Kerala

The word 'Keralam' is derived from the Sanskrit word 'Kera' which means coconut and the Dravidian word 'Alam' which means place or land. A popular belief about coconut is that it represents Deva vriksha or 'tree of heaven' brought down by Lord Parasurama for the prosperity of the people of Malabar Coast. This strip of land is known as Kerala which literally means the land of coconut. In Kerala approximately 3.5 million family's livelihood is coconut. Coconut is an integral part of the Kerala culture. From food to religious ceremonies, the coconut finds its mention in every place in the state. They also feature in the local cuisine of the state. Coconut trees form a crucial part of the lifestyle, economy and geography of Kerala. Coconut trees in Kerala contribute a lot to the overall economy in India.

Anju thengu

Anchuthengu, formerly known as Anjengo, is a coastal town near Kadakkavoor in Thiruvananthapuram District of Kerala. This old Portuguese settlement lies between Kollam and Thiruvananthapuram. Literally the word 'Anjuthengu' means 'five coconut palms.' The whole land is cultivated with coconut trees.

The place possesses great archeological and historical importance. In 17th century, the English East India Company selected Anjengo to set up their first trade settlement in Kerala. Queen of Attingal granted the place to the British for trading. They established a factory and a fort here with the permission of the queen. Many ancient churches, an old light house, a 100 year old convent and school, tombs of Dutch and British and the Anjengo Fort are the major points of attraction here. The churches are built in accordance with the principles of the Portuguese architectural style. The fort played an important role in the war of Mysore in 18th century.

Ayiram thengu

Ayiram thengu is a coastal area located in Kollam district of Kerala. The meaning of "Ayiram thengu" in Malayalam is thousand coconut palms.

Thengapattinam

Thengapattinam is a beautiful town located on the shores of Arabian Sea in the southern part of Kanyakumari district in Tamil Nadu. Thengapattanam is surrounded by natural boundaries on all sides - the Arabian Sea, the Kuzhithurai River and a Mountain ridge. And then, there is the star attraction, the estuary, where the river joins the sea.Coconut trees are found abundant here, and the place gets its name from coconut trees. 'Thenga' means coconut in Tamil and 'Patanam' means town. Thengapattanam - as the name suggests, is replete with coconut trees, was an important town during the days of Chera Kings, when trade relations ex isted with the Middle East and the Arab world. Chilappathikaram, the Tamil epic refers thengapattanam as the capital of "thenga nadu" – one of the 48 countries of lemuria, otherwise known as 'kumari kandam', where the Dravidian civilizations (known as the 'cradle of civilizations') flourished. The world renowned historical research traveler 'dalami' refers this place as a 'harbour town' in his book written in AD 100. It is believed that Karunan Thadangal, the king of 'thenga nadu' ruled from Thengapattanam.

Coconut Island (Hawaii Island)

Coconut Island (Mokuola) is a small island is located in Hilo Bay and can be accessed from Liliuokalani Gardens via a pedestrian footbridge. Its Hawaiian name is Mokuola (meaning "island of life" or "healing") since it was site of an ancient temple dedicated to healing, but today it is more commonly known as Coconut Island. The island is owned by the state and is the facility for the Hawaii Institute of Marine Biology, part of the University of Hawaii. It is the only laboratory built on a coral reef.

Coconut Island (Poruma Island)

Coconut Island (Poruma Island, Puruma in the local language) is an island 130km northeast of Thursday Island, Queensland, Australia in the Great North East Channel near Cumberland Passage, Torres Strait. This island is one of the Torres Strait Islands. The population of the island is about 180 inhabitants. The ancestors of Coconut Island built their houses out of grass, coconut leaves and trees

that floated down from the Fly River jungles of Papua New Guinea.

East Side (Coconut Coast), Kauai

Kauai's East Side is sometimes referred to as the Coconut Coast for the groves of coconut palms that grow in its resort areas. The most populated district on the island, about 16,000 of the island's 62,000 residents reside in the Wailua/Kapaa area.

Coconut Grove

Coconut Grove is the oldest continuously inhabited neighborhood of Miami, Florida in Miami Dade County, United States. The neighborhood is roughly bound by North Prospect Drive to the south, LeJeune Road to the west, South Dixie Highway and Rickenbacker Causeway to the north, and Biscayne Bay to the east. The neighborhood's name has been sometimes spelled "Cocoanut Grove" but the definitive spelling "Coconut Grove" was established when the city was incorporated in 1919.The fate of Coconut Grove, which is today home to Miami's City Hall, was largely linked to the U.S. Navy, Coast Guard and Pan American World Airways.

Coconut Creek: Coconut Creek is a city in Broward County, Florida (United States), nestled between Miami- Dade and Palm Beach counties. It is nicknamed Butterfly Capital of the World, because it is home to the world's largest butterfly aviary, Butterfly World, with over 80 species and 5,000 individual butterflies. The city took its name from the coconut trees that were planted in the area by early developers. Robert E. Bateman, one ofthe developers, named CoconutCreek after combining the namesof Miami-Dade County's villageof Indian Creek and the Miami neighborhood of Coconut Grove. The city is a well-planned communitywith a unique environmentalconsciousness touting anabundance of trees, waterways,attractive landscaped roads, beautifulparks, and butterfly gardensthroughout the neighborhoods.This is due to the city's progressive planning approach to creatinga unique life-style for residents and businesses. Coconut Creek is the first in the state of Florida and eleventh in the country to be certified as a"Community Wildlife Habitat".

Cocos Island: Cocos Island (Spanish: Isla delCoco) is an uninhabited island (except for a permanent rangerstation) located off the shore of Costa Rica. It is one of 13 districts of Puntarenas Canton of the province of Puntarenas. It is one of the National Parks of Costa Rica.

It is located in the Pacific Ocean, approximately 550 km from the Pacific shore of Costa Rica. With an area of approximately 23.85 km² and a perimeter of around 23.3 km, this island is more or less rectangular in shape. Cocos Island was declared a Costa Rican National Park by means of Executive Decree in 1978. Cocos Island National Park was designated a World Heritage Site by UNESCO in 1997. In 2002, the World Heritage Site designation was extended to include an expanded marine zone of 1,997 km². In addition, it

is included in the list of "Wetlands of International Importance". Cocos Island was short-listed as a candidate to be one of the New Seven Wonders of Nature by the New Seven Wonders of the World Foundation. As of June 2009, it is ranking second in the islands category. The famous oceanographer Jacques Cousteau visited the island several times and in 1994 called it "the most beautiful island in the world". Cocos Island is home to dense and exuberant tropical moist forests. It is the only oceanic island in the eastern Pacific region with such rain forests and their characteristic types of flora and fauna. Purple Coral Tree (*Erythrina fusca*), Coconut Palm (*Cocos nucifera*), and Pond-apple (*Annona glabra*) are the predominant trees, with an understory of ferns, shrubs of the Rubiaceae and Solanaceae families, sedges and grasses, and herbaceous plants of the Leguminosae and Malvaceae families. The general vegetation of Cocos Island has greatly changed since the island was first named and described by Europeans. Captain Wafer, during his visit in 1685 described the extensive coconut groves extending inland into the interior of the island. It is very unlikely that these groves developed naturally, and it seems evident that pre-European man must once have cleared considerable areas in the ravine bottoms and interior plateaus and ridges, utilizing the clearings for coconut plantations of substantial extent. It has been posited that these plantations were used to provide fresh liquid and food for pre- Columbian voyages (balsa rafts using guara navigation) between Guatemala and northwestern South America. After the Spanish conquest and its consequences, these voyages ended and the tropical jungle recovered the land that had been laboriously cleared by early human hands.

Cocos (Keeling) Islands

The Territory of the Cocos (Keeling) Islands, also called Cocos Islands and Keeling Islands, is a territory of Australia, located in the Indian Ocean, southwest of Christmas Island and approximately midway between Australia and Sri Lanka. Cocos (Keeling) Island is located on almost exactly the opposite side of the globe from Cocos Island, Costa Rica. The territory consists of two atolls and 27 coral islands, of which two, West Island and Home Island, are inhabited with a total population of approximately 600. The Cocos (Keeling) Islands consist of two flat, low-lying coral atolls with an area of 14.2 square kilometres, 26 kilometres of coastline, a highest elevation of 5 metres (16 ft) and thickly covered with coconut palms and other vegetation. The climate is pleasant, moderated by the southeast trade winds for about nine months of the year and with moderate rainfall.

Coco Islands

Coco Islands are a pair of strategically important islands located in the eastern Indian Ocean, politically administ red by Union of Myanmar under Yangon Region. They are allegedly leased to the People's Republic of China since 1994. Geographically, they are a part of the Andaman Islands archipelago and separated from the North Andaman Island (India) by the 20 kilometres wide Coco Channel. The Bay of Bengal lies to the west and the Andaman Sea to the east of the islands. The Burmese mainland is 300 kilometres to the north.

The Coco Islands consist of the main Great Coco Island and the smaller Little Coco Island, separated by the Alexandra Channel. Table Island, a third small island located near the Great Coco Island, previously housed a lighthouse but is presently uninhabited. They are located on an ancient trade route between India, Burma and Southeast Asia, and there were numerous visits by traders, seafarers and pirates. In 1858, a large prison was built at Port Blair on South Andaman Island, main y to house the thousands of 'mutineers' sent there after the 1857 Indian rebellion, and the Coco Islands were used as a source of food for the struggling penal colony, mainly by providing coconuts. There are several myths and beliefs on coconut indicating the importance of coconut in everyday life. Even, until the early 1900's, a whole coconut was the accepted form of currency in the Nicobar Islands, just north of Sumatra in the Indian Ocean. In the South Pacific, pieces of coconut shell carved into coin-like spheres served as currency. There is a saying that "There are as many uses for the coconut as there are days in the year."

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Coconut Oil Helps Combat Stress & is Heart Friendly

Two peer-reviewed studies published recently (March of 2018) continue the trend of showing coconut oil's health benefits and debunking the official USDA government nutrition dogma that saturated fats are bad for one's health.

The first study, published in the journal Food & Function, shows evidence that coconut oil helps combat stress and anxiety. The second study, published in the British Medical Journal, compared diets consuming mainly coconut oil, olive oil, or butter, and concluded that coconut oil significantly lowered C reactive protein, a marker of inflammation, and had positive blood lipid profiles in those consuming coconut oil as their main dietary oil.

The first study is titled, "Can coconut oil and treadmill exercise during the critical period of brain development ameliorate stress-related effects on anxiety-like behavior and episodic-like memory in young rats?" This study was devised to observe the synergistic effect of virgin coconut oil (VCO) and exercise on young rats. The rats were very young, ranging from 15 to 45 days after birth. During that time the test rats were fed VCO daily and exercised 30 minutes per day on treadmills with speed being gradually increased weekly.

After their feeding and exercise, both control (non-VCO – treadmill rats) and test rats (the VCO treadmill group) were compared to rats within the same age group that were not exercised or fed VCO, the control group. For a few days after the exercise and coconut oil, both the test and control rats were restrained for a few days. Then they were all evaluated with open field testing for signs of anxiety behavior, locomotor activity, and their ability to identify objects and locations. The researchers concluded that coconut oil and exercise during lactation can ameliorate the effects of stress on anxiety-like behavior and episodic-like memory in young rats.

The second study, Coconut Oil, Olive Oil, and Butter's Effect on Blood Lipids was requested and funded by the BBC TV producers of "Trust me, I'm a doctor." BBC wanted to do an episode featuring a coconut oil study as a response to the growing public awareness of coconut oil's health virtues. This study was published in the BMJ (British Medical Journal) in March 2018 with the title, "Randomised trial of coconut oil, olive oil or butter on blood lipids and other cardiovascular risk factors in healthy men and women."

The BBC, via its website, recruited 160 volunteers for the study, of which 96 became participants. The remaining 96 men and women selected to participate were screened out on the basis of being 50–75 years of age, without a known cancer history, cardiovascular disease or diabetes, and not on statin drugs. The mean age was 60, and slightly over 60 percent were women. The participants were divided into three groups of around 30 or so. Each individual in the three groups was given a month's supply of one of these fats: Virgin coconut oil (VCO); extra virgin olive oil; unsalted butter. They were all required to consume 50 grams daily of the fat

assigned to its group or consort. Olive is essentially a monounsaturated fat while both coconut oil and butter are considered saturated fats, with one major difference that the study did not mention: Coconut oil is mostly comprised of medium chain fatty acids or triglycerides (MCTs) while butter contains long chain fatty acids. Coconut oil's MCTs are easily converted into ketones, which provide metabolic cellular energy. The participants were expected to substitute the fats portioned to them in lieu of the fats they normally used and were given recipe ideas for using the particular fat assigned. After four weeks on their assigned fats, 91 returned for a final analysis for comparison to baseline readings to determine changes in blood lipid profile, weight, fat distribution and metabolic markers.

Those who reported over 75 percent compliance to the protocol with their assigned fat consumption were put into one group to form a ratio with that group against the total number of participants and adjust their statistical analysis accordingly. The study revealed that that coconut oil and olive oil consumers for the four weeks had lower LDL (low-density lipoproteins), considered the "bad cholesterol," readings than butter, which had higher ratios of total cholesterol/HDL (high-density lipoproteins) or "good cholesterol." The higher the ratio the higher the risk of coronary disease, according to mainstream medical and nutritional guidelines.

There were no significant differences in changes in weight, BMI [body mass index], central adiposity [belly fat] fasting blood glucose, systolic or diastolic blood pressure among any of the three intervention groups. Coconut oil also significantly lowered C reactive protein [a marker of inflammation] in comparison with olive oil but not compared with butter. The researchers concluded that coconut and olive oil consumers in the study both had favorably lower levels of LDL than butter. But coconut oil is a saturated fat while olive oil is a monounsaturated fat, yet the two saturated fats, butter, and coconut oil, have different effects on blood lipids. Thus, metabolic effects and health outcomes may vary more according to lipid profiles than the mere crude distinction between saturated and unsaturated fats.

Remaining within the context of the good cholesterol / bad cholesterol labels that are accepted officially is proving to be archaic compared to recent revelations that break down different aspects of LDL. The BMJ Coconut Oil Study states that Coconut oil also significantly lowered C reactive protein [a marker of inflammation]in comparison with olive oil, but not compared with butter

This should be the main takeaway insight from this study, especially since its duration was so short. Considering that inflammation is the physiological source of most if not all of the autoimmune or chronic diseases, that insight alone should promote the value of coconut oil greatly. There are two types of LDL: Small and dense or large and fluffy. The smaller low-density lipoproteins can burrow into an inner arterial wall (endothelium) sometimes to create inflammation. But those smaller more dense LDL particles are usually from sugar and high fructose corn syrup, not saturated or healthy unsaturated fats.

Evidence that's largely denied in mainstream medicine and nutrition shows that refined sugar and high fructose corn syrup are the culprits for obesity and heart disease by upsetting glucose metabolism and insulin sensitivity and creating arterial inflammation. Sugar and refined carbs are the major sources of inflammation, obesity, diabetes, and heart disease. Not natural dietary fats. On the other hand, processed or hydrogenated fats are processed with high heats. They're "cooked" before you can use it for cooking. They are the most widely used fats commercially, especially in processed foods and fast food restaurants.

What matters is whether the cholesterol and fat residing in those LDL particles have been oxidized. Cholesterol has nothing to do with heart disease, except if it's oxidized. The high temperatures used in commercial frying cause inherently unstable polyunsaturated oils to oxidize, and that these oxidized fatty acids become a destructive part of LDL particles. Even when not oxidized by frying, soybean and corn oils can oxidize inside the body. The BMJ study hedged and remained within the framework of established saturated fats dogma, but the study clearly supported the health virtues of coconut oil and other saturated fats.

Source: https://healthimpactnews.com/2018/ ■

The role of industrialization in improving the welfare of coconut farmers

an Indonesian experience

Tay Enoku, Vice President Director, Sambu Group, Indonesia.

Coconut's growth cycle is relatively longer than its competing crops. Consequently, it typically is not compatible with mainstream business cycle that is shorter in nature. To synchronize the two cycles, proper management strategies and practices need to be ensured from harvesting to shipping processed goods out. The significance of the management strategies and practices become more pronounced when the nature of the processing is that of integrated one. In this context, the undertaking becomes a giant balancing act as different products are consumed by different markets and at different rhythms and cycles.

Such that sustainable coconut processing must be understood through ecosystem perspective. To try to understand the role of industrialization of coconut processing in less than ecosystemic manner is not only limiting progress but also to the detriment of the coconut farmers. Ecosystemic perspective is the only way to ensure that industrialization will be achieved in a sustainable manner. Assuming the ecosystemic perspective requires taking into account the significance of all valuable stakeholders. This also concerns the determination of who should be included and excluded from the ecosystem itself as well as how should the included parties behave to ensure sustainability of the ecosystem. Unlike some other competing crops, the majority of coconut plantations belong to the smallholder farmers. Increasing the ownership of coconut plantations

by private sector will not necessary make positive contribution to the sustainability of the ecosystem itself. Advanced multilaterel developments would be required to overcome this particular obstacle. Sustainable industrialization that aims to improve the welfare of coconut farmers must take into coconut economic realities at macro level, especially that of inflation. Inflation influences coconut farmers' cost of living which in turn, influences the price at which they would be willing to accept to continue their coconut plantations. Continued disharmony between regulatory, processing technology and business infrastructures would compromise the sustainability and consistency of coconut industry's growth. From sovereignty perspective, it will also determine that who the ultimate beneficiary will be. Fundementally, the disharmony primarily caused by misalignment between the different stakeholders' time horizons.

Sustainable and consistent industrialization of coconut processing that aims to improve the welfare of coconut farmers need to be understood and implemented by using longer time horizon. Using longer time horizon means prioritizing long term objectives over short term ones. Developments that jeopardizes those long term objectives are detrimental to the welfare of coconut farmers whether directly of indirectly. Sustainable improvement of coconut farmers' welfare must equally take into account environmental, social and economic perspectives. Environmental degradation would render the plantation infertile, so would lack of climate change mitigation implementations. Socially ignorant practices and policies would intensify the existing disharmonious relationship within the ecosystem. Not ensuring economic sustainability of all stakeholders would impair the industrialization of coconut processing.

To counter the above cautionary observations, there are plenty of reasons to be optimistic about the development of coconut industry, which are primarily driven by the increasing number of health conscious consumers. Empowered by the development of information technology, consumers of today and tomorrow are able to access facts and information in making smarter choices and decisions. This has been so when it comes to the selection of coconut -based products in place of less healthy alternatives. Sustainable industrialization of coconut processing coupled with sustainable farming practices would allow the stakeholders in both parties to maximize the benefits from this developing trend. Fundamentally, there is no and must not be dichotomy between the coconut processing industry and the coconut farmers as they are essentially "in the same boat" in the long run. Models that are not supporting the self-enforcement of benefits between the coconut farmers and the coconut processing industries will not be sustainable. Such model must clearly and equally benefit the farmers, the government and the industry. Such model should also ensure that capita proceeds be optimally pumped back into the supply chain to incentivize coconut farmers to sustain their plantation instead of switching to competing crops. Such economic strategy would support the social and environmental needs of the coconut farmers. Most importantly, the implemented governance infrastructure must support such model.

Considering the relatively longer growth cycle of coconut trees, any mishaps of governance related the sustainable industrialization would not typically result in immediate feedback. Nevertheless, the delayed cost of such mishaps is still great. The higher opportunity cost value that is impacted by the mishaps, the higher would be the cost. Ideally, the model that should be supported by stakeholders must be based on a comprehensive understanding about the variety of possible cause-and effects relationships that make up the model itself. Neglecting any of the important cause-and effect relationship will result in suboptimal model, which in turn, will undermine the sustainability of the industrialization process itself. In turn, this will undermine the industry's ability to improve the welfare of the coconut farmers in sustainable and consistent manner.

From economic perspective, sustainability and consistency can be achieved by adding as much value as possible to the coconuts itself as the input feed of the industry. Equally important, the industry must also function as the conduit through which the value can be transferred to the farmers to incentivize them to sustain their coconut plantations. Lastly, the governance in place can either enhance or inhibit industry's function to do so. Considering the current demand-supply gap for coconut products, the production of coconut products will very likely improve in the future. So would exports. The only remaining question is which country will end up being the top exporter of coconut products and which will end up being the top importer of coconut products. Expectedly, the one with most coherent efficiency and governance will most likely win the coconut race. ***Courtesy:*** *Cocoinfo international, Volume 24, No. 2* ■

SKOCH Summit Award

Dr. B.N. S. Murthy, Horticulture Commissioner of India and Chairman, CDB receiving 52nd State of Governance SKOCH summit award for Soil Health Card and HORTNET projects of Ministry of Agriculture, Cooperation and Farmers Welfare, Government of India.

9th Krishi Fair 2018

Coconut Development Board, State Centre, Pitapally, Odisha participated in 9th Krishi Fair 2018 from 3rd to 7th June,2018 at Puri organised by Shree Shrikshetra Soochana, Puri, Odisha. Shri. Pradip Maharathi, Hon'ble Minister for Agriculture and Farmers' Empowerment, Fisheries & Animal Resources Development, Govt. of Odisha inaugurated the programme. Hon'ble Minister of Revenue and Disaster Management, Odisha and Shri Dibakar Patra, Zilla Parishad Chairman of Puri along with other dignitaries visited the exhibition stalls.

Coconut Development Board displayed coconut seedlings of different varieties, coconut palm climbing machine, different variety coconuts, various coconut based value added products like virgin coconut oil, virgin coconut capsule, desiccated coconut, coconut milk, coconut jam, squash, coconut oil, coconut milk powder, handicrafts items and informative posters on the goodness of coconut and its products, Board's schemes, activities etc. The Chief Guest and other dignitaries were received at the Board's stall by Dr. Rajat Kumar Pal, Deputy Director. Queries of the visitors on availability of coconut seedlings, CPS formation, coconut related industries etc. were answered by CDB officials.

Many central and state govt. organisations, Nationalised Banks, NGOs, SHGs, Fertiliser Companies, Agricultural Machinery Manufactures, Publishers, Organic Farming related enterprisers & seed companies participated in the exhibition.

The valedictory session was conducted on 7th June, 2018. Km. Draupadi Murmu Hon'ble Governor of Jharkhand awarded certificates and mementos to the participating organisations and appreciated the interest of agricultural organisations to disseminate knowledge and new findings through exhibitions and fair. Thousands of visitors attended the Krishi Fair. Puri being a major coconut growing district of Odisha, participation in Krishi Fair 2018 helped to create awareness about coconut cultivation technology and activities and schemes of the Board.

Tender coconut Lasagna

INGREDIENTS

• 1 tablespoon olive oil • 1 medium onion, chopped • 4 teaspoons curry powder • 3 garlic cloves, minced • 1 can (6 ounces) tomato paste • 14 ounces each coconut milk • Tender coconut • 1/2 cup chopped fresh cilantro, divided • 1 package (10 ounces) frozen chopped spinach, thawed and squeezed dry •1/2 teaspoon salt • 1/4 teaspoon pepper • 2 cups shredded part-skim mozzarella cheese • Flour 4 tbsp • Butter 4tbsp

METHOD OF PREPARATION

Preheat oven to 350°. In a large pan, heat oil over medium-high heat. Add onion; cook and stir until it is softened. Add curry powder and garlic and cook for one minute more. Stir in tomato paste and bring to a boil. Reduce heat and simmer for few minutes. Season with salt and pepper.

Meanwhile melt butter in a pan and add flour. Sauté well until it becomes golden color. Pour coconut milk and mix well .In a serving dish, spread one-fourth of the second mixture into a dish. Layer tender coconut slice, put spinach and again tender coconut, tomato sauce and then mozzarella cheese on the top. Bake it approximately for 40-45 minutes until it becomes golden color. Cool for10 minutes. Garnish with cilantro before serving.

Recipe prepared by Royjoseph Pothen, Executive chef , Flora Airport Hotel, Kochi

Tender coconut Pizza

INGREDIENTS

• ½ cup warm water • 1 tsp sugar • 1 tsp dry yeast • 2 cups refined flour • salt to taste • 3 tbsp olive oil • water as required, to knead for toppings: • 3 tbsp pizza sauce • 100 gm tender coconut small cube • 3 tbsp onion, roughly chopped • ½ cup mozzarella cheese, grated • ½ tsp oregano / Italian seasonings

INSTRUCTIONS (1 CUP =255 ML)

- In a large mixing bowl take warm water, sugar and dry yeast and make a quick mix.
- Keep it for 5 minutes.
- Add refined flour , salt and olive oil.
- Knead the dough adding water as required.
- Tuck the dough and make a ball and place in a large mixing bowl.
- Cover the rest and keep in a warm place for about 2 hours.
- Punch the dough with fist to release down the air.

VEG PIZZA BAKING RECIPE:

- Place the dough on dusted pizza plate or tray.
- Flatten the dough by stretching with both hands. Leaving a cm or more and create a dent.
- Prick with center of dough with the help of fork.
- Spread pizza sauce generously leaving the sides slightly.
- Top with topping of choice.
- Spread grated cheese and sprinkle italian seasonings.
- Bake at 500 degrees fahrenheit for about 12 - 15 minutes.
- Finally, slice and serve pizza hot.

Monthly operations in the coconut gardens- July

Andaman & Nicobar Islands: Open basins around palms of a radius of 2m from the base of the palm. Apply 25 to 50 kg of cattle manure or compost and 10-20 kg of ash per tree and cover the basins with soil. Remove the weeds in the nursery.

Andhra Pradesh : Continue manure application if not done during June. Plant seedlings in the main field. As a prophylactic measure against the infestation of rhinoceros beetle, fill the youngest three leaf axils with a mixture of 250g powdered marotti/ neem cake with equal volume of sand or place naphthalene balls(12g/palm) and cover them with sand thrice a year. If the attack of the mite is noticed, spray neem oil - garlic – soap emulsion 2 percent (20 ml neem oil + 20 g garlic emulsion + 5 g soap in 1 litre water) or commercial botanical pesticides containing azadirachtin 0.004 per cent @ 4ml per litre on bunches, especially on the perianth region of buttons and affected nuts or root feed neem formulations containing azadirachtin 5 per cent @ 7.5 ml with equal quantity of water.

Assam : Do not allow rain water to accumulate in the pits of transplanted seedlings. Clean the crowns of the palms. If stem bleeding disease is noticed, (1) remove the affected tissues of the stem and apply 5 percent calixin on the wound. When this is dry apply warm coal tar (2) root feed the affected palm with 5 ml calixin in 100 ml water per palm at quarterly intervals (3) apply 5 kg neem cake per palm per year along with the organic manure during the post monsoon period (4) regulate field regime by providing proper drainage during rains and irrigating the palms during summer. If bud rot disease is noticed, remove and clean the infected tissues and apply Bordeaux paste on the affected portion. The treated portion should be given a protective covering to prevent washing out of the paste during rains. Spray the neighbouring plants with one percent bordeaux mixture. Adopt plant protection measurers when the weather is clear. Remove the weeds from the nursery.

Bihar / Madhya Pradesh/ Chhattisgarh : Provide proper drainage. Do not allow rain water to accumulate for a long time in the pits. Transplant selected good quality seedlings in the already prepared and half filled pits. Drench the basins of transplanted seedlings with 0.05 percent chlorpyriphos twice at 20 to 25 days interval against the attack of termites. Apply 2 kg bone meal or single superphosphate in the pit before planting. Open the basins around the palm of a radius of 2m upto a depth of 15-20 cm, and apply manures and fertilizers and cover with soil.

During this month apply 30-50 kg farmyard manure/compost per palm in the basin before the application of fertilizers. In irrigated and well maintained gardens apply the fertilizers @ 275g of urea, 500g single super phosphate and 500g muriate of potash. In rain fed gardens apply the first dose (1/3 of the recommended dose) of fertilizers i.e. 250g urea, 350g single superphosphate and 400 g muriate of potash, per adult palm and cover with soil. The gaps caused by the death of seedlings (previous year's planting) should be filled up, preferably with polybag seedlings. Similarly, remove all unhealthy and defective seedlings and replant with healthy seedlings. Check the palms for bud rot. If bud rot is

found, remove the affected parts and apply bordeaux paste. Spray the neighbouring palms/ seedlings with 1 per cent bordeaux mixture.

Karnataka : Open circular basins around the palm, of a radius of 2m. Take appropriate control measures if attacks of rhinoceros beetle and red palm weevil are noticed. Keep the garden free of weeds. Give a prophylactic spray with 1 per cent bordeaux mixture if not given during the last month. Seedlings can be planted during this month. If the attack of the mite is noticed, spray neem oil - garlic – soap emulsion 2 percent (20 ml neem oil + 20g garlic emulsion + 5g soap in 1 litre water) or commercial botanical pesticides containing azadirachtin 0.004 per cent @ 4ml per litre on bunches, especially on the perianth region of buttons and affected nuts or root feed neem formulations containing azadirachtin 5 per cent @ 7.5 ml with equal quantity of water.

Kerala/Lakshadweep : Open basins around the palms, of a radius of 2 m and fill them with green manure cuttings or green leaves @ 25kg per palm or bulky organic manures like cowdung, compost, etc.@ 50kg per adult palm and close the basins partially, if not done in June. Clean the pits in which seedlings have been planted. Search the crowns of trees for rhinoceros beetle, red palm weevil and also for bud rot disease. Take steps to check them. Clean the crown of the palm. If the attack of the mite is noticed, spray neem oil - garlic - soap emulsion 2 percent (20 ml neem oil + 20g garlic emulsion + 5g soap in 1 litre water) or commercial botanical pesticides containing azadirachtin 0.004 per cent @ 4ml per litre on bunches, especially on the perianth region of buttons and affected nuts or root feed neem formulations containing azadirachtin 5 per cent @ 7.5 ml with equal quantity of water. Remove the weeds from the nursery.

Maharashtra/ Goa/ Gujarat : Bury husk in trenches between palms with concave side up. A prophylactic spray with 1 per cent bordeaux mixture may be given against fungal diseases.

Orissa : As a prophylactic measure against the infestation of rhinoceros beetle, fill the youngest three leaf axils with a mixture of 250g powdered marotti/ neem cake with equal volume of sand or place naphthalene balls(12g/palm) and cover them with sand thrice a year. Hook out the rhinoceros beetles. Manure vegetables and other crops. Give a prophylactic spray with 1 per cent bordeaux mixture against fungal diseases.

Tamil Nadu/ Puducherry : Open basins around the palms. Keep the garden free of weeds. Give the palms a prophylactic spray with one per cent bordeaux mixture to prevent bud rot and other fungal diseases. Apply the first dose of fertilizers i.e. 300g urea, 500g single superphosphate and 500 g muriate of potash per adult palm if not applied during last month. Search for rhinoceros beetle on the crowns of the palms with the beetle hook and kill the beetles. As a prophylactic measure against the infestation of rhinoceros beetle, fill the youngest three leaf axils with a mixture of 250g powdered marotti/ neem cake with equal volume of sand or place naphthalene balls (12g/ palm) and cover them with sand thrice a year. Planting of seedlings in the main field can be done during this month. Search palms affected by Thanjavur wilt and take appropriate management practices. If the attack of the mite is noticed, spray neem oil - garlic - soap emulsion 2 percent (20 ml neem oil + 20g garlic emulsion + 5g soap in 1 litre water) or commercial botanical pesticides containing azadirachtin 0.004 per cent @ 4ml per litre on bunches, especially on the perianth region of buttons and affected nuts or root feed neem formulations containing azadirachtin 5 per cent @ 7.5 ml with equal quantity of water.

Tripura : Basin around the palm should be cleaned by removing the weeds. Green manure crops sown in May if any, should be ploughed and incorporated during the month. As a prophylactic measure against the infestation of rhinoceros beetle, fill the youngest three leaf axils with a mixture of 250g powdered marotti/ neem cake with equal volume of sand or place naphthalene balls(12g/ palm) and cover them with sand thrice a year. Collected seed nuts may be sown in seed beds without delay by taking advantage of the rain.

West Bengal : Apply green manure at the rate of 25 kg per palm. Keep the garden free of weeds. Start planting of seedlings in the main field. A prophylactic spray of 1 percent bordeaux mixture against fungal diseases may be given. ■

Market review – May 2018

Domestic price

Coconut Oil

During May 2018 the price of coconut oil opened at Rs.19900 per quintal at Kochi, Rs.20000 per quintal at Alappuzha market and Rs.20950 per quintal at Kozhikode market. During the month, price of coconut oil at all the three markets expressed a declining trend.

The price of coconut oil closed at Rs.19300 per quintal at Kochi and Alappuzha market and Rs.19800 per quintal at Kozhikode market with a net loss of Rs.600 at Kochi market, Rs.700 at Alappuzha market and Rs.1150 per quintal at Kozhikode market.

The price of coconut oil at Kangayam market in Tamilnadu, which opened at Rs.17800 per quintal, expressed a downward trend and closed at Rs.17200 per quintal with a net loss of Rs.600 per quintal.

Table1: Weekly price of coconut oil at major markets Rs/Quintal)

	Kochi	Alappuzha	Kozhikode	Kangayam
01.05.2018	19900	20000	20950	17800
06.05.2018	19900	19900	20800	17667
13.05.2018	19800	19800	20800	17467
20.05.2018	19400	19400	20000	17333
27.05.2018	19400	19400	20000	17333
31.05.2018	19300	19300	19800	17200

Milling copra

During the month, the price of milling copra opened at Rs.13265 per quintal at Kochi, Rs.13050 per quintal at Alappuzha market and Rs.13550 per quintal at Kozhikode market. During the month, price of milling copra at all three markets expressed a downward trend.

The prices closed at Rs.12820 at Kochi, Rs.12700 at Alappuzha and Rs.12650 at Kozhikode markets with a net loss of Rs.445 per quintal at Kochi, Rs. 350 per quintal at Alappuzha market and Rs.900 per quintal at Kozhikode market.

At Kangayam market in Tamilnadu, the prices opened at Rs. 12400 per quintal and closed at Rs.11600 per quintal with a net loss of Rs.800 per quintal.

Table2: Weekly price of Milling Copra at major markets (Rs/Quintal)

	Kochi	Alappuzha (Rasi Copra)	Kozhikode	Kan-gayam
01.05.2018	13265	13050	13550	12400
06.05.2018	13265	13000	13450	12400
13.05.2018	13170	12950	13400	12300
20.05.2018	12885	12750	12700	12000
27.05.2018	12885	12750	12750	11800
31.05.2018	12820	12700	12650	11600

Edible copra

The price of Rajapur copra at Kozhikode market which opened at Rs.18200 per quintal expressed an overall upward trend during the month and closed at Rs.19000 per quintal with a net gain of Rs.800 per quintal.

Table3 :Weekly price of edible copra at Kozhikode market (Rs/Quintal)	
01.05.2018	18200
06.05.2018	18900
13.05.2018	18100
20.05.2018	18300
27.05.2018	18600
31.05.2018	19000

Ball copra

The price of ball copra at Tiptur market which opened at Rs.14500 per quintal expressed an upward trend during the month and closed at Rs.16000 per quintal with a gain of Rs.1500 per quintal.

Table 4 : Weekly price of Ball copra at major markets in Karnataka (Rs/Quintal)	
	Tiptur
01.05.2018	14500
06.05.2018	16000
13.05.2018	15700
20.05.2018	15800
27.05.2018	16100
31.05.2018	16000

Dry coconut

At Kozhikode market, the price of dry coconut opened at Rs.9550 per quintal. The price expressed an upward trend till the first fortnight and thereafter declined. The price closed at Rs.9450 with a net loss of Rs.100 per quintal.

Table5 : Weekly price of Dry Coconut at Kozhikode market (Rs/Quintal)	
01.05.2018	9550
06.05.2018	9650
13.05.2018	9750
20.05.2018	9550
27.05.2018	9550
31.05.2018	9450

Coconut

At Nedumangad market the price of partially dehusked coconut opened at Rs.19000 and closed at Rs. 18000 per thousand nuts with a net loss of Rs.1000 per thousand nuts. At Pollachi market in Tamil Nadu, the price of coconut opened at Rs.16000 per thousand nuts and closed at Rs.15000 per thousand nuts with a net loss of Rs.1000 per thousand nuts.

At Bangalore APMC, the price of partially dehusked coconut opened at Rs. 29000 and closed at Rs. 28500 with a loss of Rs. 500 per thousand nuts during the month. At Mangalore APMC market the price of partially dehusked coconut of grade-I quality opened at Rs.23000 and closed at Rs.20000 per thousand nuts.

Table 6: Weekly price of coconut at major markets (Rs /1000 coconuts)				
	Neduman-gad	Pollachi	Banglore	Mangalore (Grade-1)
01.05.2018	19000	16000	29000	23000
06.05.2018	19000	16000	29000	23000
13.05.2018	19000	15000	29000	23000
20.05.2018	19000	15000	29000	23000
27.05.2018	18000	15000	28500	20000
31.05.2018	18000	15000	28500	20000

International price

Coconut oil

The international price and domestic price of coconut oil in Philippines, Indonesia and India expressed a downward trend during the month. The price of coconut oil quoted at different international/ domestic markets is given below.

Table 8: 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	India*
05.05.2018	1076	1053	1055	2617
12.05.2018	1068	1018	1015	2588
19.05.2018	1038	998	998	2568
26.05.2018	1013	973	986	2568

* Kangayam

Coconut

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

Table 11: Weekly price of dehusked coconut with water

Date	Domestic Price (US$/MT)			
	Philippines	Indonesia	Srilanka	India*
05.05.2018	170	187	369	521
12.05.2018	163	186	373	508
19.05.2018	161	166	359	498
26.05.2018	160	159	357	499

*Pollachi market

Copra

The domestic price of copra at Philippines, Srilanka and India expressed a declining trend during the month whereas the price of copra in Indonesia expressed a mixed trend. The price of copra quoted at different domestic markets is given below.

Table 9: Weekly price of copra in major copra producing countries

	Domestic Price(US$/MT)			
	Philippines	Indonesia	Srilanka	India*
05.05.2018	667	488	1656	1837
12.05.2018	640	516	1656	1822
19.05.2018	632	512	1656	1778
26.05.2018	611	516	1376	1748

* Kangayam