

INSIDE

Neera for the revival of coconut economy	2
Coconut Neera - the hidden unexplored treasure	4
K Muralidharan and Deepthi Nair. S.	
'Keraamritham'- a health drink from coconut inflorescence sap	9
B. Jayaprakash Naik, P R Suresh, Meera Manjusha, P V Balachandran, Madhusubramonian and PC Balakrishnan	
Production of Neera and coconut sugar deserves encouragement	11
P.K.Thampan	
Coconut palms suitable for Neera tapping	15
Jnanadevan. R	
Bio Beverage - Coco Neera	17
R. Hali	
Indonesia and Philippines – a replicable model to grow sweeter with coconut ...	20
Deepthi Nair. S.	
Two Coconut Producer Companies established in Kerala	24
Production of Neera	25
Sunil A. Nair, Mejosh Jose, Regi J. Thomas, R.V. Nair	
Focus on commercialisation of technologies to capitalise the opportunities for neera	27
Jayashree.A	
Lakshadweep realizes the potential of Neera	30
Sasikumar C	
Neera Production through CPS,CPF and Producer Companies	32
Recommendations of Neera Committee	33
Health benefits of coconut nectar	34
Our great green umbrellas	35
G.S.Unnikrisnan Nair	



THEME

Neera - a treasure house of untapped potential

Black headed caterpillar spreads across Visakhapatnam	38
Tiptur coconut ravaged by pests and diseases	39
News	40

*Karnataka farmers visited Coconut Development Board Farm Review Meeting
Symposium on Neera
Expert Committee for revitalizing the Regional Commodity Exchanges visited CDB
Meeting of the leaders of Thrissur District CPF
Kozhikode district Coconut Producers Federation leaders workshop
Fruit Festival-2013
FoCT and CPS programme spreading across India
Krishi Fair 2013*

Monthly operations in coconut gardens...45

Market Review - April 2013 47

Neera for the revival of coconut economy

Dear Coconut Farmers,

The coconut farmers are in a very precarious situation for quite some time due to multiple issues beset with the sector. Frequent fluctuation and fall in price of coconut, severity of many pests and diseases, rocketing escalation of input cost, fragmentation of holdings etc. are a few to cite. Coconut plantations were subjected to utter negligence and resultantly coconut farming becomes a non-profitable enterprise. When monetary value and profitability are the criteria for nurturing crops, many other crops made inroads and coconut is getting substituted. In fact it is not a replacement of a tree but a replacement of a culture.

The need for reviving coconut sector has therefore become imperative and ways and means for a revival is on the agenda of all stakeholders and policy makers. Delinking coconut economy from the clutches of copra-coconut oil over dependency, coupled with developing and popularizing more value added products from coconut has been brought out as a viable strategy for regaining the lost glory of coconut. Coconut Development Board is instrumental in advocating this message. Neera is the latest addition in the array of value added products which holds the potential to revitalize the prospects of coconut farmers of India.

Neera is the sweet, oyster white coloured sap tapped from the 'spathe' of coconut. It is a delicious health drink, a rich source of sugars, minerals and vitamins. The most significant characteristic of the product is its low Glycemic Index (GI is 35), an indicator of the extent of sugar absorbed into the blood. Foods with GI less than 55 are classified as low GI foods. The global demand for low GI sugar are on the increase and hence Neera and coconut palm sugar as the natural product can fill up this gap.

A coconut palm yields on an average two litres of Neera per day, which may go even up to 4.5 to 5.0 litres based on the health and management of the palm. Neera is an unfermented drink which does not contain alcohol. But on fermentation neera becomes toddy. Therefore, neera production requires adherence of strict procedures and cautious handling. Neera is the raw material for many value added products like palm syrup, palm jaggery and palm sugar which are having high domestic and international demand owing to their high nutritional values.

In India, coconut is being cultivated by ten million families. Let us consider the case of Kerala where existing coconut palm population is around 1800 lakh. If a minimum of 1% of these palms are utilized for neera tapping, there will be 18 lakh palms for this purpose. A

Neera tapper can ideally tap around 15-20 palms per day. Based on this assumption, employment potential estimated is one lakh. Evidently this would be 10 lakh if we employ 10% of the total palms for Neera production. If farmers are allowed to produce Neera and its value added products, it can generate good daily return to the coconut farmer and the Neera tapper.

The Abkari Act of Kerala (Act 10 of 1967) contains definitions which wrongly included the zero alcohol Neera into Toddy and thus as Liquor. Section 3(10) of the act say that **"Liquor includes spirits of wine, arrack, spirits, wine, toddy, beer and all liquid consisting or containing alcohol."** This statement emphasizes that any liquid which consists of or contains alcohol is liquor. Under Section 3(8) of the act **"Toddy means fermented or unfermented juice drawn from coconut, palmyra, date or any other kind of palm tree"**. This is a contradiction. Unfermented juice of coconut palm is included under toddy even when it does not contain alcohol. This definition of Neera defeats the intention of the law makers since it gives a wrong interpretation of a natural nutritious health drink.

It is pertinent that the Abkari Act came at a time when food processing technology was not advanced and there was no process for maintaining Neera in unfermented stage. Now with the advent of technologies it is high time that necessary changes are made in the Abkari Act which was conceived 111 years ago. Hence, amendments in the Abkari Act is the need of the hour. Otherwise neera has to be excluded from the definition of liquor and clear legislation need to be evolved for Neera as a nutritious health drink.

Neera production in Kerala can contribute substantially to the Gross State Domestic Production (GSDP). If 50% of the consumer price of Neera is offered to coconut farmer, 25% to Neera technician and remaining 25% towards processing, packaging and marketing costs, it can result in an all round increase in the incomes of all stakeholders. Neera can kick start a whole lot of food processing industries too. The export potential of coconut palm sugar made of Neera from Kerala could be double that of the software export from the state!

When 10% of the palms in the state is subject to tapping, the returns from Neera to the GSDP amounts to Rs. 54,000 crores (Market price of Neera is taken as Rs.100 per litre). The generation of rural employment through Neera technicians is around 10 lakhs. The total income to the work force of Neera technicians through production of Neera is around Rs.13,500 crores while the income of the coconut farmers is to the tune of

Rs.27,000 crores and around Rs.4,050 crores is generated as tax revenue to the state through the increased purchasing power of the farmers and technicians. This amount is more than the annual inflow of funds from the Middle East to Kerala which is roughly around Rs. 27,000 crores. The increase in GSDP through Neera could be roughly 17%. Processing of Neera to palm syrup, palm jaggery and coconut palm sugar will add more value to GSDP.

If similar provisions are made in other major coconut growing states, similar spurt in employment and income of farmers and workers is possible. Neera production is popular in the states of Maharashtra and Goa and in Union Territories of Lakshadweep and Andaman & Nicobar Islands. There is no legal ban on farmers to produce Neera in these states and UTs. The Department of Horticulture, Government of Karnataka has undertaken a pilot project for production and packing of Neera. Now the project is getting ready for commercialization and retail marketing.

Globally Neera and its value added products are manufactured by all the major coconut producing countries except India. The major players in the field are Indonesia, Philippines, Thailand, Malaysia, Srilanka and Vietnam. The major export destinations are USA, Canada, Norway, France, Middle East, South Korea, Japan, Australia and New Zealand. Export of Neera and palm sugar has shown a surging trend in Indonesia, Philippines and Thailand as a healthy natural product. In Philippines, projects on coconut sugar were initiated as early in 1995. Indonesia produced over 6 lakh MT of palm sugar in 2011. The production of palm sugar in Indonesia was estimated to reach 10 lakh MT in 2012.

While it is a matter of pride that India leads the world in production and productivity of coconut ahead of Indonesia and Philippines, it is disturbing that countries like Sri Lanka and Malaysia, which are far behind us in production have ventured into production of Neera and palm sugar. Codex Alimentarius Commission and Asia Pacific Coconut Community (APCC) have developed quality standards for Neera and its products. Countries like Philippines and Sri Lanka have their own standards for Neera and coconut palm sugar. Also Neera doesn't come under the purview of the Excise Act and Rules in any of the coconut producing countries other than India.

Defence Food Research Laboratory (DFRL) and Central Food Technological Research Institute (CFTRI) have evolved technologies to preserve Neera through thermal processing at a temperature of 95°C. The Regional Agricultural Research Station at Pilicode under the Kerala Agricultural University has also developed technology for the 'preservation of Neera' and the production of many non alcoholic value added products

like soft drinks. Toddy and neera are entirely different products and of different qualities. Neera is neither a substitute nor a competitor to toddy.

Formation of Coconut Producers Societies (CPS) was initiated by the Board with an objective to mobilize coconut farmers and to establish grass root level farmer institutions for undertaking production, processing and marketing of coconut. At present 3,536 CPS and 125 CPFs are registered with the Board. Two Coconut Producer Companies are already registered, and many are in the offing, which is perceived to be a milestone to transform the entire coconut sector. Neera production, processing and packaging can be undertaken under the auspices of Federations of CPS registered with CDB. License for Neera production can be issued to Federations of CPS registered with CDB. Neera collected by the Federations through the member CPS can be brought to a primary processing centre which is localized within the district. Further processing can be undertaken at the level of Federations or Farmer Producer Companies.

CDB has advocated development of a set of skilled workers called 'Neera technicians' for tapping Neera. Thus a new breed of "green collar jobs" can be created. Marketing of Neera and its value added products can be undertaken through the innovative marketing strategy developed by the Board in 63 JnNURM cities.

Neera production will undoubtedly help to contribute to the GDP and also the rural economy of the country. It can generate rural employment and provide better remuneration to coconut farmers and the Neera technicians. A community based planned production of Neera and products like palm jaggery and palm sugar under the auspices of Coconut Producer Federations can bring into the market different value added products from Neera and establish niche markets for each product. The coconut farmers through their collectives shall request the respective state Governments to initiate amendments in the Abkari Acts prevailing in their states to facilitate Neera production by farmers.

Board is hoping that coconut farmers across the country will realize the potential of Neera, which is not a mere coconut product but a treasure house that can bring beneficial changes in the financial status of coconut farmers. I request all stakeholders to realize this potential and to work unitedly for making this happen during this year itself.

With regards,



T. K. Jose

Chairman

Coconut Neera - the hidden unexplored treasure

K. Muralidharan and Deepthi Nair. S.

Director and Marketing Officer, Coconut Development Board, Kochi

Neera is dominating the pages of the fourth estate for some time now. The talk on Neera started in recent times due to the price crash in the coconut sector which started in the fog end of 2011 and has crippled the coconut farmers of the entire country. Around 10 million households depend on coconut economy and the setback in the sector has affected the income of the state drastically. Prospects for reviving the coconut sector were explored and Neera surfaced.

Lots of speculations and scepticism dominate the minds of the general public regarding Neera. Neera on fermentation becomes toddy. Coconut farmers who have been giving their palms for tapping are well versed with the health benefits of Neera from time immemorial and are known to consume the same in the unfermented form. It is even given to kids and pregnant women. Traditional knowledge on Neera prevailed even before technology developed for Neera processing.

What is Neera?

Neera is the sweet, oyster white coloured sap tapped from the immature inflorescence of coconut. It is a delicious health drink and a rich source of natural sugars, minerals and vitamins. It contains substantial amounts of iron, phosphorus and ascorbic acid. The immature inflorescence which is about to burst is the stage at which Neera tapping is done. It takes 12



to 15 days for the sap to exude from the inflorescence tip. Tapping is done usually for a period of six months only. A coconut palm can

yield, on an average two litres of Neera per day, which may go even up to 4.5 litres per day based on the health of the palm and management of the garden.

Table 1 – Nutritional Composition of Neera

Total solids (g/100 ml)	15.2-19.7
pH	3.9-4.7
Specific gravity	1.058-1.077
Total sugars (g/100 ml)	14.40
Original reducing sugars (g/100 ml)	5.58
Total reducing sugars (g/100 ml)	9.85
Total ash (g/100 ml)	0.11-0.41
Citric acid (g/100 ml)	0.50
Alcohol in %	nil
Iron (g/100 ml)	0.15
Phosphorus (g/100 ml)	7.59
Ascorbic acid (mg/100 ml)	16-30
Total protein (g/100 ml)	0.23-0.32

Neera tapping requires adherence to strict procedures right from the collection of the first drop. This is because the sap on extruding comes into contact with air and the process of fermentation is initiated. Technologies have been developed by institutions like Kerala Agricultural University, Central Food Technological Research Institute and Defence Food Research Laboratory for arresting the fermentation process. The collected Neera is then subjected to filtration, refrigeration, centrifuging, processing and packaging. The processed product has a shelf life up to one year. Apart from this, value added products like palm syrup, palm jaggery and palm sugar are produced from Neera.

Palm syrup : Boiling the sap under moderate to low heat yields a golden brown sticky liquid with high mineral content which is called palm syrup. It is free from total fats and cholesterol with a sucrose content of 50% and a glycemic index of 35. It can be used for healthy food preparations, as topping on wide variety of appetizers, desserts or beverages. It is also used in Ayurveda and other systems of medicine.

Palm jaggery : Further boiling and crystallization of the sap in moulds yields palm jaggery. It is used as a

Table 2 - Nutritional composition of coconut palm jaggery (in 100 g.)

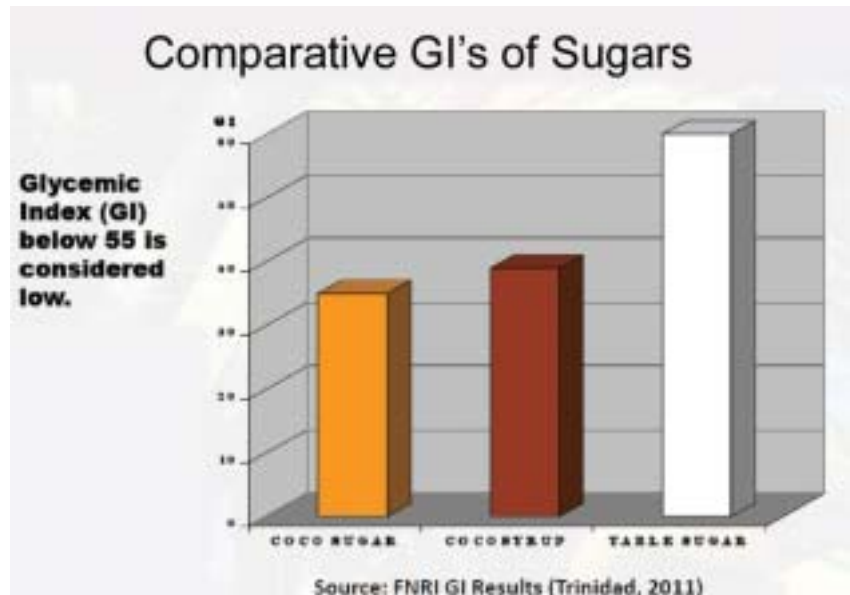
Component	Quantity in mg
Thiamine	21.00
Riboflavin	432.00
Nicotonic Acid	5.24
Ascorbic Acid	11.00

sweetening agent for the preparation of desserts, dishes and is superior to cane jaggery.

Palm sugar : Boiling the sap and preparation of granular palm sugar is the value added product of the future with immense potential from Neera. The application of this palm sugar is enormous owing to the high nutrient content and low glycemic

Table 3 - Nutritional composition of coconut palm sugar (in 100 g)

Component	Quantity
Moisture	0.06 %
Protein	432 mg
Minerals	5.24 mg
Carbohydrate	11.0 mg
Calcium	18.9 mg
Phosphorous	1.9 mg
Iron	5.2 mg



index. Low GI food finds applications in proper control of Diabetes mellitus and in lowering cholesterol levels. The GI of table sugar is nearly 60 while that of palm sugar is only 35. Generally GI below 55 is considered low. It is also good for weight maintenance preventing over weight and obesity. The product has increased demand in the domestic and international markets. It is a good substitute for commercial sweeteners available in the market.

Potential of Neera products

We are living in an era where consumers are more conscious of health and quality. If cost was the deciding factor for purchase in the 20th century; aspirations, health and quality decide the purchasing decisions today. With healthy nutrient rich products like Neera and palm sugar, developing and establishing a market space, both in domestic and export market offers immense potential. The global



demand for low calorie reduced sugar and sugar free products is increasing day by day with the increasing health awareness in the food market. The increase in the number of people with obesity, diabetes and dental caries is also alarming and Neera and coconut palm sugar can provide a healthy viable option. Neera and its products are also rich in minerals and vitamins.

As such by permitting tapping of Neera and production of value added products from Neera will generate daily returns to the coconut farmer and the Neera tapper. Daily income will increase the standard of living of the stakeholders. Moreover the potential for employment generation in the sector is so huge that in a situation when job opportunities in the Middle East are dwindling with people returning after being turned out from the Middle east, Neera tapping offers huge potential.

Apprehensions about Neera

Many apprehensions are in vogue in the minds of the Government, policy makers, trade union leaders, general public etc on Neera. A major apprehension spelt out during discussions was that allowing Neera tapping by coconut farmers will lead to alcoholic addiction among the farmers and the public. When Neera doesnot contain any alcohol, there is no question of Neera causing alcoholic addiction. Moreover, Neera can be scientifically processed and packed maintaining its zero alcohol content. The nutritional and health attributes of Neera make it an excellent health drink. Consumption of Neera is in no way going to lead to alcoholic addiction.

Coconut Development Board is spearheading the formation of farmer collectives called Coconut Producer Societies (CPS) in the different districts and the integration of the collectives to form federations. These federations and Coconut Producers' Companies can form the base for permitting tapping of Neera processing, branding and marketing.

The way about in Neera processing

Neera tapping is to be done in a transparent manner under controlled conditions. An ideal legal and administrative frame work needs to be developed before implementing the same. This doesn't imply that all 18 lakh coconut palms are going to be tapped from the same day. Neera is a potential product with many health benefitting properties. Coconut cultivating countries all over the world are making use of this potential to make various value added products from Neera. The price situation in coconut is pathetic due to drastic price fall. The 10 million farmers engaged in coconut cultivation have to be saved from this distress. When we have a potential product like Neera, why not relook into the possibilities in

Neera tapping and devise a support system for the same. This is the base of the voices that advocate Neera tapping. Neera tapping and production, processing and packaging be undertaken under the auspices of collectives of coconut farmers.

Green collar jobs - Neera technicians

Neera tapping is a skilled job as the skill of the tapper has impact on the quantum of Neera produced. CDB has advocated for the development of a skilled task force called Neera technician for tapping of Neera. Thus a green collar job is developed where the person can stay at home with his family, do tapping and earn incomes higher than those obtained by the majority of NRI in the Middle East. Trainings of 45 days duration can be given to the Neera technicians since yield of sap depend on the skill of the tapper. Value of Neera tapped could be shared between the farmer and the Neera technician in a fixed proportion so that both the stakeholders are benefited and the sector emerges in a sustained manner.

Neera and the Abkari Act

Neera is a non alcoholic mineral

Under the Abkari act, the definitions are:

⌚ **3(8) Toddy means fermented or unfermented juice drawn from a coconut, palmyra, date or any other kind of palm tree.**

⌚ **3(10) Liquor includes spirits of wine, arrack, spirits, wine, toddy, beer and all liquid consisting or containing alcohol.**

This statement emphasises that any liquid which consists or contains alcohol is liquor.

⌚ **3 (12) Country liquor means toddy or arrack.**

This itself is a **contradiction since unfermented juice of coconut is included under toddy** even when it does not contain or consists of alcohol.

rich and nutritious health drink extracted by tapping the immature inflorescence of the coconut palm. Though non alcoholic, it is coming under the purview of Abkari act. Neera has to be **released from the ambit of the Abkari act.**



Restricting tapping of Neera through inclusion under Abkari act and restricting the fundamental right of a farmers is **totally unconstitutional, illogical and unjustifiable.** Any farmer growing any agricultural crop has the freedom to harvest it in the form which fetches more revenue to him, like mango harvested at ripe stage, rubber sold as latex or sheets. The same freedom should be extended to coconut farmers also.

Coconut farmers are going through a crisis related to price fall and **diversification to other value added products** from coconut is the only way out. Under these circumstances, Neera being a high potential product, the farmers should be allowed to exploit the prospects of this product for the benefit of the sector.

In order to remove the anomalies and bring about justice amendment in Abkari Act of the states by excluding Neera from its provisions is the need of the hour.

The fact that the juice may ferment to produce alcohol also goes unwarranted. **Fermentation and production of alcohol occurs in any fruit juice or liquids with starch content.**

CDB stand on Neera

Neera is a non alcoholic mineral rich and nutritious health drink extracted by tapping the immature inflorescence of the coconut palm. Neera should be brought out of the Abkari act since it is unfermented inflorescence sap. Inclusion of a non alcoholic drink like Neera under the Abkari act is not justifiable. Neera, which is non alcoholic is included under the definition of toddy in the Abkari act. Toddy is a fermented drink with 7 to 9% alcohol content and is classified as liquor. Neera cannot be classified under Toddy or liquor. Neera doesn't come under the purview of the Excise act in any of the coconut producing countries. Neera which was classified under toddy in the erstwhile British Act

was later excluded since it was non alcoholic. It is high time that necessary changes are made in the Abkari act which was conceived as early as 1902. The technological advances made in the processing and packing of Neera ensures that it is maintained a zero alcohol drink. Hence amendments in the Abkari act is the need of the hour.

If still included in Abkari act, separate definition be made for Neera in Abkari act as a separate head with distinct legislation for Neera tapping processing and packaging. **Scientifically processed and packed Neera can be promoted as a nutritionally healthy drink.** Consumption of Neera will not lead to alcoholic addiction as perceived by the public. Awareness programmes on Neera to be conducted throughout the states. Promotion of Neera should be undertaken among the common man also since there is perception that Neera contains alcohol.



"The juice of coconut tree can be transformed into a sugar as soft as honey. Nature created this product such that it could not be processed in factories. Palm sugar can only be produced in palm tree habitats Local populations can easily turn nectar into coconut blossom sugar. It is a way to solve the world's poverty. It is also an antidote against misery."

Mohandas K Gandhi 3.5. 1939

Mahatma Gandhi largely experimented with food; it was important to him. His personal diet was vegetarian and consisted of 1 litre goats milk, 150g wheat and rice, 75 g leafy vegetables, 125g other vegetables, 25g lettuce 40g ghee and 40-50g coconut blossom sugar."

These are the wordings inscribed on palm sugar products of different brands produced in countries like Indonesia and Phillipines for promoting their brands. We, in India, simply overlooked the potential of this wonderful product.

Neera and Toddy should be maintained as separate entities. Marketing of processed and packed Neera should not come under the purview of Abkari act. CDB strongly advocates that Neera tapping and production, processing and packaging be undertaken under the auspices of Federations of Coconut Producers' Societies registered with Coconut Development Board. The non availability of palms for tapping is mainly because the coconut farmers are paid a meagre amount as lease which is not economically beneficial for them. Ensuring a remunerative revenue for the coconut farmer for tapping of the palms will ensure availability of good, yielding, healthy palms for tapping, which in turn will result in increased yields. The scarcity of skilled labour for tapping is also a limiting factor.

CDB will facilitate submission of detailed project proposals for Neera production, processing and packaging and value addition to produce other products by selected federated CPS based on the technology from KAU/ CSIR. CDB would facilitate formation of CPS and integrating them to form

federations and Producer Companies and selection of eligible CPS/ Federations for Neera tapping. CDB can facilitate the development of the skilled task force which is termed as **Neera technician** in association with KAU. CDB can facilitate technological

support for the preservation and packing of Neera through KAU or Department of Horticulture, Karnataka to the entrepreneurial ventures of the Federations and Producer Companies. CDB can extend financial support to the enterprises of CPS/ Federations/ Producer Companies through the scheme Technology Mission on Coconut where financial assistance can be provided @ 25% in addition to the support for processing units announced by Government of Kerala. The process of tapping of



Neera till the processing and packaging can come under the purview of the act for preventing any misus. But processing into other products like syrup, jaggery and sugar would be as per FSSAI norms.

The processing of Neera should be done under the strict supervision of officials of technology providers for a definite period till the sector and the process stabilizes. Tapped Neera as such, should not be transported outside the district where it is produced thus preventing chances for misuse. Value of Neera tapped should be shared between the farmer and the Neera technician in a fixed proportion so that both the stakeholders are benefited and the sector emerges in a sustained manner.

It is time we wake up and act together to pioneer ventures in Neera production and processing which will take this crop, the Kalpavriksha, to newer heights.



'Keraamritham' - a health drink from coconut inflorescence sap

B. Jayaprakash Naik¹, P R Suresh², Meera Manjusha³, P V Balachandran⁴
Madhusubramonian⁵ and PC Balakrishnan⁶

¹Associate Director of Research Coconut Mission, ²Professor, College of Agriculture, Padannakkad, Nileshwar,

³Asst. Professor, RARS, Pilicode, ⁴Director of Extension Education, Kerala Agricultural University, Mannuthy, Thrissur, ⁵COH, Vellanikkara, Assistant Professor and ⁶Rtd. Associate Director (Coconut Mission),

Kerala Agricultural University.

Kerala Agricultural University has developed methods for extraction of sap and its collection without fermentation and further preservation of it as 'Keraamritham' - an alcohol free product from coconut inflorescence (neera), and also preparation of Palm jaggery (Kerachakkara) and palm honey.

Coconut is one of the most important crops of Kerala. It is used mainly for culinary purpose (30%) and for copra 70% (ie., 85% for oil & 15% for ball copra). Only 2% of the nuts are used as tender nuts. However, given the high cost of cultivation and low price that the primary produce fetches, the popularity of coconut is on the decline. Arresting this fall requires methods to make the crop more remunerative. Value addition and product diversification remain the most viable but least explored areas as the coconut is concerned. Amidst various possibilities like nut, copra, oil etc, the coconut inflorescence sap offer itself as an unexplored yet promising candidate for product diversification in several counts like regularity of production, less time in realizing income, reduced impact of pest and diseases like eryiophid mite, mahali etc.

Coconut Inflorescence sap is a sweet juice exuding from the unopened inflorescence - the spathe of coconut palms by selective



cutting of it. The process is called tapping and it is a traditional practice of almost all coconut growing places specially the islands. The origin of this practice is very old and supposed to be as old a coconut cultivation. In communities living in islands the people were using it for preparation of sugars

and beverages. The spathe before opening is selected for the extraction of sap called neera. At present the juice extracted is collected in earthen vessels and allowed to natural fermentation by yeast and juice transform to "Toddy" a non distilled alcoholic beverage of specific odour and taste. If the fermentation processes are arrested the juice obtained is very sweet and nutritious and it can be used as non alcoholic beverage and can be used for preparation of palm sugar or palm jaggery/palmgur. The practice of jaggery making is also common in many places and in most of the practices they collect the sap in a mild solution of slaked lime prepared from oyster shells which is also a natural material abundantly available in coastal places. This is also a traditional knowledge of local communities.

But the jaggery made using such local technology many a times has bad physical properties and keeping quality. More over the residue of slaked lime remaining in the produce reduce its palatability and consumer acceptance.

Keraamritham: Technologies have been standardised for arresting fermentation of neera and its

preservation as alcohol free product (*Keraamritham*) under refrigerated condition with a keeping quality of more than three months was developed. It is a superior and delicious health drink with qualities and taste better than tender coconut water. There are ample scopes for large scale production of this by adopting the improved packing and preservation technologies. The advantage of *Keraamritham* (neera) over tender coconut water is that one can market product of almost uniform taste and quality which being the major hurdle in tender coconut water packing. More over daily availability of raw material can be

Nutritional qualities of 'Keraamritham'

Nutrients		Minerals	
Total sugar	15 -18 %	K	90.5ppm
Vitamin c	1.3mg/100ml	Ca	60.0ppm
pH	6.8	P	15.0ppm
Acidity	10.0m eq/l	Fe	45.0ppm
Phenols	8.0mg/100ml	Na	9.5ppm

ensured in this.

Nutritionally '*Keraamritham*' is superior to tender coconut water. The available total soluble sugars, vitamins and minerals are low in tender nut water, say the total sugars: 3.3%, minerals like potash : 53.2ppm, Calcium: 5.78ppm, Phosphorus: 11.8ppm, Iron: 1.54ppm.

Kerachakkara (Palm jaggery/gur):

The process for preparation of '*Kerachakkara*', the good quality Palm jaggery/gur with desirable physical properties, from the coconut inflorescence sap is also developed.

Processing Capacity	1000 litre per day
Total palms (Covering 25% of palms from 15ha land area)	750 palms
Land area	10 cents for the processing centre
Building cost and electrification etc	35.00 lakhs
Equipments (Refrigerated storage (room size), freezer, Refrigerated Centrifuge, Boiler, Autoclave, Carbonation unit, Vacuum sealing/ bottling machine, and automated frying pans, moulds etc., for production of palm jaggery and packing machines etc.)	52.00 lakhs
Mobile unit with refrigeration facility	10.00 lakhs (for collection from 5 km radius)
Other miscellaneous costs:	3.00 lakhs
Total cost	Rs 100.00lakhs

Economics:

Considering a tapper could tap 12 palms daily and each palm yield on an average 1.5 litres of sap per palm per day, the

total inflorescence sap would be 18 litres per day from 12 palms tapped by one person. From this, processing 9 litres as final product can be obtained after processing. This can be made into 60 bottles of 150 ml each. Being a health drink, one bottle could be sold at Rs.20/- . The total income per day will be Rs.1200/- and it is Rs.36,000/- per month. Farmer can realise one third

of this amount as profit and the remaining 2/3 as tapping cost, processing, establishment and marketing charges.

A palm can be tapped for six months at a stretch in an year and allowed for the next six months for normal tender nut or coconut production as a health restoration measure for the palm. Hence usually 20 to 30% of the palms in farmers garden can be used for tapping at a time. This will help the farmers in getting higher income from coconut garden by utilizing their palms for both value added products like *Keraamritham* (neera), *Kerachakkara* (jaggery), tender nuts, and traditional coconut, copra and oil production.

In this situation of high cost of cultivation and low price that the primary produce fetches, the sustainability of coconut farming sector is only through value addition, product diversification, improving farm level processing and increasing byproduct utilization.



Production of Neera and coconut sugar deserves encouragement

P.K.Thampan

*President, Peekay Tree Crops Development Foundation,
MIG-141, Gandhi Nagar, Kochi. E-mail: pkthampan@yahoo.com*



Along the coastal belts of India where coconut farming is concentrated, the farmers, in general are small and marginal. They do not derive adequate income from the small holdings to support the basic family needs nor have opportunities for other income generating activities in their rural surroundings. The farmers who depend exclusively on coconut culture are mostly underemployed for want of coconut-based processing at the farm-household and community levels. Cost effective and labour intensive processing activities assume importance in such a situation for which the coconut palm offers

many possibilities. One activity that could be organized in the coconut growing belts for enhancing the income and employment of those who are directly or indirectly associated with coconut culture is the production and marketing of sweet toddy or neera as a health drink and a source of sugar.

Production and Marketing of Neera as a Health Drink

The fresh coconut sap or sweet toddy or neera obtained by tapping the unopened spadix of the coconut palm is an excellent beverage and a rich source of sugar. In households neera finds application in the preparation of a variety of

breakfast cakes and snacks. Being a good source of baker's yeast it is preferred in such preparations as it imparts good flavor and fluffy consistency to the cooked food. Unfermented sweet toddy or neera could be promoted as a health drink. It contains around 16 percent carbohydrates, with sucrose as the main constituent and small amounts of glucose, fructose, inositol and raffinose. It has a neutral pH, 16 amino acids with glutamic acid, threonine and aspartic acid forming the major constituents and small amounts of vitamins. The constituents of neera in g/100 ml are moisture-84.42; ether extractives-0.04; carbohydrates-15.16; protein-0.12 and ash-0.26.

Table-1

Size group of gardens (ha)	Average size (ha)	Share of Tapping and other activities on income (%)	Share of coconut on income (%)	Average gross income per holding (Rs.)	Average gross income per ha (Rs.)	Average net income per ha (Rs.)
0.1&below	0.054	83	17	7,945	1,47,145	1,36,219
Above 0.1 & upto 0.4	0.213	69	31	36,394	1,71,134	1,38,600
Above 0.4	2.190	92	8	6,05,961	2,76,274	1,39,757
Total / Average	1.171	91	9	3,15,488	2,69,356	1,39,661

In the Ayurvedic medical system neera is considered beneficial to pregnant women and emaciated children. Consumption of neera by pregnant women three or four days in a week is believed to impart good colour to the baby. Likewise, daily consumption of small dose of neera is recommended for healthy growth of emaciated children. Techniques for preventing spontaneous fermentation of neera are now available. Among the south Asian countries Sri Lanka is in the forefront by making available canned sweet toddy in the domestic and external markets.

Tapping for neera to be used as a health drink and also as a source of coconut sugar is a viable source of income and employment for the coconut farmers. Although it is encouraged in many coconut-growing countries it is yet to be promoted in India. The only exception is small pockets in Tamil Nadu where the production of coconut sugar has continued over the years as a traditional rural activity. The production and marketing of neera and sugar could be successfully organized in the major coconut growing states of India for the benefit of the coconut farming community.

The Economics of Tapping for Neera

Toddy tapping and the sale of sweet toddy offer opportunities to coconut farmers for enhancing on-farm income and employment. In a study on tapping conducted in Kerala in 1998 by Peekay Tree Crops Development Foundation (PTCDF) the gross income recorded for 30 gardens was Rs.269,356 per ha per annum with a net income of Rs.139,661. The details are shown in Table 1.

In a case study conducted in the Vechoor Island, Kerala by PTCDF it was observed that the farmer employed one professional tapper for a unit of 20 trees. For the first 15 days when there was no toddy yield the worker was paid a daily wage of Rs.150 for preparing the trees. After toddy yield commenced the average yield was around one litre per palm per day or 20 litres from the unit of 20 trees. Following this, the yield increased to around 2-2.5 litres per palm per day or an average of 45 litres from 20 trees. The wages for the tapper after the toddy yield commenced were @ of Rs.4 per litre of toddy collected. The average yield of toddy from 20 trees was 1,200 litres for two months and 12,825 litres for 9.5 months, totaling 14,025 litres. The total wages paid to the tapper for

one year was Rs.58,350. By selling 14,025 litres of toddy at the rate of Rs.15 per litre the farmer received a gross income of Rs.2,10,375, which left Rs.152,025 as net income or Rs.7,601.25 per tree per annum. As the investment on tapping knife and pots was not much it was not accounted for. The net income from tapping was found to be 19 times higher than that from untapped trees which were in the yield group of 60-75 nuts per palm per annum. The opinion of the farmer was that the toddy yield increases with good management and that not only the number of nuts but the kernel out-turn per nut also increases after a tapping period of two years.

In a field study conducted in the same year the average yield of toddy recorded for 68 palms was 1.99 litres per palm per day. These palms were assigned by the farmers for tapping on rental basis to professional tappers and the rental receipt averaged Rs.56.47 per palm per month. In the surveyed area the practice was to allow tapping for 6-9 months in a year. If one-third of the palms in a garden or 60 palms per ha are allowed to be tapped for 9 months, the average rental receipt at the rate recorded in the study will be around Rs.30,500 over the tapping period. This income from tapping is substantially higher than that

obtained from untapped trees. The experience of the farmers covered in the study was that leaving up to one-third of the palms in a garden for tapping will not cause significant reduction in the production of nuts because most of the palms earmarked for tapping are either alternate bearers or poor yielders. They were also of the view that the trees left for tapping at 9 month rotation usually exhibit higher production potential during the post tapping phase.

It is possible to assign trees both for tapping and nut production. This is done by tapping only alternate spathes or by tapping only half the length of each spathe and leaving the lower half for nut production. The observations made in India and other countries show that 20-25% of the palms in each garden could be earmarked for tapping without causing significant reduction in the annual production of nuts from such gardens.

Production and Marketing of Coconut Sugar

The production of coconut sugar from unfermented sap is a profitable on-farm activity and is encouraged in many coconut growing countries for local consumption as well as for export marketing. The experience in countries like Philippines, Thailand, Indonesia etc. is that assigning palms for sugar production is much more profitable to the farmers than allowing to yield nuts. In the Philippines the average income from palms set aside for tapping and sugar production is 7-10 times that from palms maintained only for nut production. In Thailand producing sugar has been found to



be eight times more profitable than producing coconut or copra. In Indonesia the farmers are encouraged to leave up to 30% of the palms in plantations for sugar production. Tapping and sugar production also augment on-farm employment. While 50-60 palms do not require more than 90-100 man-days for annual maintenance, the same number of palms when utilized for tapping and sugar production will provide full time employment to one tapper and one or two women members of the family.

Consumer preference around the world is changing in favour of natural health foods. Coconut sugar is a health food and, as such, can be targeted to both domestic and global markets. There is growing demand in the developed countries for coconut sugar as an alternative to refined cane sugar. Health conscious people in India may also opt for coconut sugar if quality product becomes available in the market. In countries like Thailand and Indonesia sugar production is a popular household activity where specialized organizations procure sugar from the producing units and is marketed both in the domestic and export markets in attractive zinc

or aluminium containers. The export markets cover West Asia, Australia, New Zealand, U.S. and Europe.

In Thailand coconut gardens maintained exclusively for sugar production are found in the provinces of Samut Sakhon, Samut Songkhram and Samut Prakan. In these provinces the average size of gardens is one ha where tapping commences when the palms are five years old. There are special cultivars known for their high production of sap. In such palms the daily yield of sweet toddy is up to four litres and the tapping is generally continued for 10-11 months. These varieties are Tha-le Ba, Suricha, Sai Bua, Theung Bong, Kathi and Khi Kai.

In Indonesia production of coconut sugar is a popular household activity in 26 of the 27 provinces. According to a recent report, in the Banyumas district alone there are about 28,773 palm sugar making units employing about 58,500 workers. Although men collect the sap and lend a hand in the molding process, the household women take care of the processing. About 75% of the total production goes to big cities for local consumption and also for export to Singapore, Malaysia and Middle East.

Apart from solid palm sugar another useful product that could be made out of unfermented sap is treacle or sugar syrup. The syrup is a golden coloured product and the recovery is 16% of the sap used. It is a delicacy and its use is preferred as bread spread in place of fruit jam and a sweetening agent for special breakfast dishes.

Suggestions

1. Neera Production

The production and marketing of neera as a health drink has to be permitted in the major coconut growing states of India where restrictions on tapping is presently prevalent. Processing units for producing canned/bottled neera shall be promoted in suitable locations and appropriate technology for the same shall be transferred to promising entrepreneurs. To start with, the permission for tapping for neera, collecting, assembling, further processing, bottling the product and marketing shall be given only to coconut farmer's producer companies under proper government control.

2. Production of Coconut Sugar

When sugar production is organized as a rural activity under the aegis of grower's cooperatives, it could generate additional income and employment to a sizeable section of the rural community. It is possible to provide training facilities to selected village youth in the different states for palm climbing, tapping and manufacture of sugar. The production and marketing of sugar as a cottage industry in the cooperative sector can ensure direct employment to village youth without gender difference. To facilitate this activity, the state governments shall permit and encourage tapping for sugar production subject to restrictions such as that not more than 25% of

the bearing palms in a garden are to be earmarked for tapping and such palms shall have a resting period of not less than three months in a year.

When the production of sugar is organized in the cooperative sector, adequate quality control could be enforced at different stages such as collection of sap, assembling, boiling and conversion in to pellets, cubes, crystalline sugar etc. Apex organizations may undertake procurement of sugar from producing centres and its packaging, and marketing in the domestic and export markets. The existing Coconut Farmer's Societies and Federations in Kerala could be direct participants of the programme.

Health Benefits of Coconut Sugar

- Contains over 16 amino acids and four different B vitamins
- Source of iron, potassium, magnesium and zinc
- Low glycemic index food
- Relieve the symptoms of diabetic neuropathy
- Treatment for anxiety, depression and bipolar mood disorder
- Helpful in treating high blood pressure
- Treatment of wounds, traumas and burns

Source: www.rawforbeauty.com





Coconut palms suitable for Neera tapping

Jnanadevan. R

Deputy Director,

Directorate of Cashew and Cocoa Development, Kochi

Coconut palm is commonly regarded as an oil seed crop of tree origin in India. High cost of production and low profit is the main problem now faced by the coconut farmers. Though several value added coconut products have been developed through R&D efforts, profitability of this crop still depends on price of coconut oil. The price of coconut oil is fluctuating widely and its demand is influenced by the availability and price behavior of other comparable oils. There is an urgent need to make coconut industry profitable through processing and value addition. Production of neera, a healthy drink obtained by tapping the unopened inflorescence and extraction of palm sugar from neera are highly profitable industry in many other coconut growing countries which is yet to be started in India. Unfermented sap from young inflorescence called 'Neera, in India, 'Raa' in Sri Lanka and 'Tuba' in Philippines has rather high sucrose content. While selecting palms for tapping neera, several factors are to be taken in to consideration to get economic neera yield.

The yield of neera and sugar is highly variable. It varies considerably from palm to palm season to season, and spadix to spadix. It differs with palm variety, palm vigour and season. Naturally, the growing conditions of the palm and its vigour play an important role in neera production. It is reported that average

yield of sap per day with 8 months tapping per year in Sri Lanka is 1.5 liter. The sap flow is closely associated with the leaf's water content and the internal water condition of the trees. Neera yield will be decreased considerably when the water content of the leaves declined. The sugar content also varies with season and sap flow. The yield of neera and sugar is adversely affected by low rainfall, particularly when the soil water reserves are low and the palms suffer from water stress. As the flow of neera decreases with increasing transpiration, high temperatures and low relative humidity have similar effects. Hence tapping is planned accordingly to avoid severe water stress period. Sap production is relatively high at night, due to reduced transpiration and increased sap pressure. Once the tapping stopped, nut yield may show a temporary increase compared to the normal nut yield of the palm especially in low yielding palms.

High yielding young and well cared palms have been found to yield good quantity of Neera. Neera yield also varies with variety. Tall palms yield more neera than dwarf palms. Dwarf palms are highly suitable for tapping due to its short stature and high density of palm per unit area. The yield of neera will be less since the size and length of spadix is short in most of the dwarf varieties compared to tall and hybrids. But Malaysian dwarf varieties generally healthier than other tall may yield more neera and prove to be ideal for tapping in view of the advantages for tapping. A good healthy tall palm may yield up to 2 liter neera per day and hybrids even more. At a sugar content of about 15%, this would give a sugar yield of 300-400g per palm per day. In Indian conditions it is reported that a high yielding healthy tall tree under good management have potential to yield 50 liters of sap per spadix during one month tapping. If six such healthy trees with long spadix

is tapped for a period of six months, on an average 300 litres of neera can be tapped in an year. At the rate of Rs.40/-liter, the total revenue from a tree is estimated as Rs.12,000/- per year. If the tree is not tapped and the six inflorescence are left for normal nut production the maximum yield anticipated from six bunches will be 60 mature coconuts and @Rs.7/-per nut the income will be Rs.420/-. While selecting palms for tapping, care should be taken to select healthy middle aged good palms for best neera yield. Low yielding, root (wilt) affected old palms may be discarded. However more studies are needed for selection of suitable varieties for neera production under Indian conditions.

Maturity and length of the spadix selected for tapping and skill of the tapper are other factors that determine the yield of neera. A spadix tapped prematurely may burst open and become discolored. The discoloration starts at the cut portion. The same may happen to a spadix tapped when it is over-mature. In both the cases neera production may be much reduced because there will be a delay in the commencement of neera flow. In India and Sri Lanka the mature spadix appropriate for tapping is identified by observing the swelling appeared at the base of the spadix due to female flowers within an opened inflorescence. The tapping process is essentially an art, and the results therefore depend upon the skill of the tapper. The technique consists of carefully bruising and rupturing the tender tissues of the floral branch by gently hammering and pounding the spathe. After about three days, about 5 cm of the apical tissues is sliced off. The commencement of the flow takes place as early as 5 days and as late as 32 days after the tip of the spadix had been cut off for the first time. When the sap starts flowing, a container is placed under the dripping spadix. It is reported that the sap flow gradually increases and may reach a peak after 3-5 weeks. The peak may then continue for 1-3 weeks, after which the flow declines. The flow may continue for about a month until the length of the spathe is reduced to a length of about 10-15 cm after repeated slicing. The productive period depend on the spadix length. Palms with relatively low nut yields also have shorter productive period of the spadix than high yielders. To prevent sap fermentation after slicing, the fresh cut

Tapping for coconut nectar increase productivity of sap and nut yields

When coconut trees are tapped for the purpose of sap production, the tree's ability to produce coconuts for various uses is not lost. Research conducted in the Philippines at the Davao Research Center during 1988-1991 showed the viability of producing both sap and coconuts in sequence in the same unopened spadices (stems) of coconut palms. This technology involves tapping for coconut sap in the first half of the spathe (blossoms), and allowing the remaining half to develop normally, ultimately producing fully mature 12 month-old coconuts. This research further revealed, that incorporating this innovative new method increased productivity of sap and nut yields 5-7 times higher than traditional methods.

may be brushed with some lime, or some lime water may be put in the container. The most effective harvesting cycle is twice a day. If, for any reason the spadix is not sliced for a period of two days, a type of healing latex exudes from the wound which impedes the sap flow. Two weeks of tapping will then be required to recover normal sap production. Sometimes a closed spadix has to be abandoned. One or two days' rest for the harvester may lead to a production loss of 15-20 days. It is therefore important that tapping be performed by a team, whose members can substitute each other in case of sickness, etc.

So in conclusion neera tapping and coconut palm sugar industry can be a welcome source of higher income for smallholders and to make coconut farming profitable in future, especially in situations where copra prices are low. Neera tapping and palm sugar producing units are to be established at suitable locations by the coconut farmer's collectives like other major coconut growing countries, Philippines and Indonesia. The quantity of neera and sugar production varies with growing conditions; extend of management practices adopted, varieties, age and climatic conditions. Hence it is advisable to select well cared middle aged high yielding tall and hybrid palms for tapping to get good quantity neera and sugar. Malayan dwarf varieties also can be selected considering its short height advantage. However more studies on neera yield and sugar content in different varieties in India need to be conducted.

Bio Beverage - Coco Neera

R. Hali

The author is former Director of Agriculture, Kerala and former special consultant to M. S. Swaminathan Research Foundation, Chennai

The potential of neera as a nutritious health drink is widely discussed and deliberated in recent days. Indian Coconut Journal realised the potential and prospects of neera well ahead. An article published in the November 2004 issue of Indian Coconut Journal is reproduced here for information of readers.

Globalization and emergence of World Trade Organization have put tremendous pressure and at the same time created awareness among the developing nations to intensify the efforts for finding out farm produce which could earn fast, wide and profitable consumer acceptance. In this context when you hear that a coconut palm is capable to produce sweet floral sap worth Rs. 50,000 annually, it is both sensational and stimulating. A not so very impressive coconut palm at 'Cherthalai', in Alleppey District, Kerala, like several others in different parts of the state, is providing every day three liters of sweet toddy or neera earning a minimum Rs. 120 per kit. 'I climb the palm thrice daily except during a few days in the worst dry period and bring down a minimum of three liters of sweet toddy' claims thirty year old sturdy tapper Shri. Anirudhan. 'Though the palm is over thirty six year old, this has been subjected to tapping for last twenty years', he said.

Shri. Anirudhan the tapper, Shri. MD Thomas, the owner of the palm and Shri. T. S. Viswan, the former Agricultural Officer, several tappers and trade union leaders

have more hope generating experiences to narrate. Before that let us have a close look at the super qualities of sweet toddy.



Coconut phloem sap, the choicest health drink produced by tapping the unopened spadix of the coconut tree, is called 'Neera' in Tamil Nadu and Kerala; 'Tube' in Philippines and 'Tuvak' in Indonesia. Sweet toddy is rich in carbohydrates with sucrose as its main constituent. It is unctuous and cool in effect. Hailed as highly rejuvenative in traditional medicinal systems it is recommended for the cure of anaemia, tuberculosis,

bronchial suffocation and piles. Even today a glass of neera before going to bed is a 'grandmas' prescription to pregnant women and young girls to make the skin colour more charming. Unlike in the past, unfermented sweet toddy could be promoted as a health drink as techniques for preserving neera without undergoing fermentation for few weeks or months is available

now. Sri Lanka and Philippines are having coconut gardens maintained exclusively for producing toddy. Indonesia is the largest producer of sweet toddy for making jaggery and sugar. It is reported that Sri Lanka is producing and exporting 1 lakh litre of "Arrack" made out of coconut toddy. But the process to preserve sweet toddy for weeks is opening up opportunities for a massive and gigantic health drink or beverage industry if exploited well commercially.

One 'wonder palm', at Cherthalai, produces around Rs. 50,000 worth toddy every year, is only one among several hundreds and there must be more palms giving even double the yield. Anirudhan, the expert tapper reveals that he climbs the palm three times daily at 10 a.m., 5 p.m. and 8 p.m., but sweet toddy is collected during the morning and night climbs only. The afternoon climb is to 'tame' the spadix for stimulating the secretion of more sap. But toddy gets during night is sweeter. Shri. T. S. Viswan, former Agriculture Officer and several tappers' union leaders are of the opinion that one could find out more such trees in Cherthalai in Alleppey district though the area is prone to coconut 'root-wilt' disease. Scientists have not yet come forward with a package of practices for boosting the yield from palms exposed for sweet toddy collection.

Coconut Board of the Union Ministry of Agriculture has done commendable job for expanding area and diversification of coconut products in India. Here again the tender coconut promotion deserves very special kudos. But promotion of sweet toddy as a health drink is yet to gain momentum in the country. A lot of information is available with traditional experts in medicine, farmers and tappers on various aspects relating to sweet toddy. Among coconut varieties, it is said that hybrids give more toddy than others. The palms of Palghat, Trichur, and Neeleswaram are very profuse yielder's of sweet toddy. 'There are palms which give over six liters of sweet toddy every day' claims Shri. Anirudhan. Rs. 240

worth of toddy per day is the yield. A tapper becomes an expert in the field only if he has experience in tapping similar type of coconut palms of Palghat.

Even today toddy drinking is not considered as a good habit and there are movements against the same. But 'sweet toddy' or neera production and consumption are recommended by Shri. A. P. Udayabhanu Commission constituted by Kerala Govt to study the prohibition of liquor sales in the state. The bigger obstacle for the promotion of sweet toddy production and its sale was the lack of technology to preserve it without fermenting. Let us hope, a perfect technology on this will come to the rescue of coconut growers.

Composition of Neera

Specific Gravity	1.508-1.077
Total Solid (g/100ml)	15.2-19.7
Sucrose (g/100ml)	12.3-17.4
Total ash (g/100ml)	0.11-0.41
Protein (g/100ml)	0.23-0.32
Ascorbic acid (mg/100ml)	16.0-30.0

Coconut farming has been facing a threat of 'root wilt' in Kerala, Tanjore wilt in Tamil Nadu and the mite attack in the entire south India. Production is going down but the trade and labour are not at all farmer and crop friendly. While consumer has to pay Rs. 10 to 12 per coconut without its husk, the farmer is getting a cost of Rs. 6 only. The labour cost is prohibitive and farmers are not engaging people to harvest nuts and instead allow them to fall. This affects the health and yield of the palm in the long run. In this context promotion of tender coconut and sweet toddy as energy and health drink will give a new life

to the coconut care and it may revolutionalise the coconut culture and give a better deal to the coconut growers. It is high time to throw the century old excise laws for controlling tapping of coconut trees to the dustbin and declare sweet toddy as a raw material for the beverage industry.

It is not at all difficult to identify 15 to 20 million trees ideal for sweet toddy production from Kerala where total population exceeds 200 million. The country has over 400 million coconut palms now. 10 million palms are more than enough to give sweet toddy worth Rs. 25000 crores annually. The coconut production from the existing 1.9 million hectares is only 1259 crores and its cost will not be more than Rs. 6200 crores. From this we could estimate the huge value addition and the profit the farmer may get if he manages the situation. The huge employment it will create in the production, processing and marketing sectors will be very lucrative apart from the huge revenue the government could mop up at different levels as taxes.

The most heartening development is that farmers organizations and scientists have already detected the great possibilities the sweet toddy is offering. The international coconut summit held at Kochi has recommended that the government may take quick steps to declare sweet toddy as a soft drink. Another significant and specific recommendation of great repute is from the WTO impact and study report submitted by M S Swaminathan Commission constituted by the Govt. of Kerala. The report is titled as 'Building a

sustainable Agricultural trade security system for Kerala.' The Commission was chaired by M S Swaminathan, the great Indian Agricultural scientist who is at present the chairman of National Agricultural Commission for farmers constituted by Govt of India. The report specifically states that 'sweet toddy may command massive demand potential and it is a health drink... Like in Karnataka, Kerala should lift all restrictions in tapping coconut by farmers for promoting diversification to sweet toddy and jaggery products'.

The report has two sections. One section deals with the action to be taken at Govt. of India level and the other deals with the things to be attended by the State Government. May be due to various political and other compulsions not much has been done to implement the recommendations. But here again the coconut farmer is the loser. Farmer's organizations are also silent in urging the authorities to implement the suggestions. Diversification and new products development are twin paths to be developed for the prosperity of coconut farmer and coconut growers. Coconut is now cultivated in twenty states of India. It is loved and adored by the entire population of the country and is hailed as "Tree of Heaven". If the sweet toddy production is transformed into a gigantic health drink industry, it will emerge as the largest in the processed food sector with a huge turn over and excellent export prospects. Sweet toddy production in Indonesia is stated to be so high that annually they are producing over one million tonnes of coconut sugar. It is exported to Singapore,

Malaysia and Middle East and is rated very high over cane sugar and used as a health food. Australia is a new market for Indonesian sugar export. According to Shri. P. K. Thampan, Chairman of P K Tree Crop foundation Kochi, exclusive gardens are maintained in Thailand for sweet toddy production connected with sugar making where tapping of palm commences at the age of five. From neera the normal yield of sugar is almost 12 per cent and from this we may estimate the quantity of sweet toddy produced to prepare and market one million tonnes of coconut sugar. Sugar is done as a cottage industry in the villages of Indonesia and so the quantity used for drinking, as a beverage and making syrup are not estimated. It may be noted that unlike India, beer is treated as a soft drink like coco cola in Indonesia and so it is sold freely in every wayside shop.

India is one of the largest producers of coconut in the world. Due to pressure of palmoil and soyabean oil available at a cheaper rate, the use of coconut oil for edible purpose is dwindling all over the world. While India has the advantage of consuming the entire coconut produced, major coconut producing countries like Indonesia, Philippines, Sri Lanka, Thailand, etc are compelled to export coconut, coconut oil and copra as their domestic consumption is lower than their total production. They could export the above three items at a cheaper rate to India if trade restriction is taken away as per World Trade Organization conditions. This is really a threat to the coconut producers while industry and consumers may welcome the same.

Sweet toddy is nothing new to our people. According to the traditional books of knowledge 'the juice of young spadix of coconut when unfermented is a sweet, refrigerant, aphrodisiac, diuretic, mildly exciting tonic and useful in dyspepsia, diarrhea, diabetics and for general disability'.

When the palm in your homestead is ready to give you such a heavenly health drink, the man made laws that too proclaimed hundred years ago are prohibiting you from collecting and using the same. If collected and sold it will also give you economic prosperity. It is happening in a state, where farmers, politicians and economists are shouting that coconut cultivation is a huge loss and the golden period of coconut is over.

God's own country hails coconut as the 'Tree of Heaven' but so far has failed to identify its most potential produce capable to show great monetary gains on its growers. Neera from Nariyal could be made the most sought after health drink of the nation suited for all seasons. If just one per cent of the palms are subject to tapping it will give sweet toddy worth over Rs. 10,000 crores. It is easy to enhance the income from palm several folds if the market too is developed well. Read the strength of the 'Tree of Heaven' through the sweet toddy and use the nature's great gift to create sustainable prosperity to the growers and to the nation. Coconut is also termed as 'Tree of Plenty' and the efficient production and marketing of neera as the nature's choicest bio health drink will make it a 'Palm of ever lasting prosperity.' Time is ripe to commence the great task.

Indonesia and Philippines – a replicable model to grow sweeter with coconut

Deepthi Nair. S.

Marketing Officer, CDB, Kochi

Coconut is grown in the coastal areas in most of the countries located in and around the equatorial region. India stands first in area, production and productivity of coconut in the world, but the extent of processing of coconut into various value added products is insignificant in the country. Though coconut has been cultivated from time immemorial and referred to as Kalpavriksha, we failed to commercially utilize the multifaceted benefits of this crop. Having ventured into a concerted time bound plan for product diversification in coconut, the Cocotech seminar held in July 2013 was an eye opener for the nation and entrepreneurs interested in coconut. It provided insights into the various avenues for processing and value addition in coconut and the most promising of them turned out to be coconut inflorescence sap and its value added products.

The health benefits of Neera, the unfermented coconut inflorescence sap and the production of jaggery and sugar from the sap was known from early days. Traditional systems of medicine in India used coconut palm jaggery due to its nutritive, medicinal and health attributes. But we never gave a thought of commercially utilizing the potential of these products in today's health conscious world. As usual we never gave a second look at the indigenous knowledge. This is where coconut growing countries like Indonesia and Philippines excelled.

Coconut palm sap, jaggery and sugar were produced by indigenous methods traditionally in Indonesia. Realising the potential of this product, methods of production were streamlined and modified to suit world standards. Though Indonesia was the first to venture into commercial production of coconut palm syrup, jaggery and sugar, Philippines moved one step forward by organising planned research on coconut palm sugar in 1995. Actually, coconut sugar

expanding into an agribusiness. Once the processes were stabilized, research was directed towards good packaging. From 2004 onwards, efforts were directed towards promotion of the nutritional attributes of the products in the global market. With the opening up of the economy, Indonesia and Philippines were confident of entering into the international market with focus on the health conscious and quality conscious consumers in the developed world. The coconut sap sugar was massively promoted as a health product through the efforts of PCA and by the Food and Nutrition Research Institute (FNRI) of the Department of Science and Technology which established the Glycemic Index of the product. A food product was categorised as low glycemic food when the GI was less than 55. In case of coconut palm sugar it was only 35. This was a major health attribute for the consumers world wide, adding to the other properties of increased content of minerals and vitamins and sugars in coconut palm sugar and other products from the inflorescence sap.



production technology has been known in some coconut producing countries like Thailand and Indonesia for over a decade. In 1996, it was introduced in the Philippines but it gained popularity only in 2004. In the same year, the technology gained momentum as a commercially viable technology and became a small-scale enterprise

Rural cooperative partnerships were the driving vehicles for the establishment of coconut sap sugar business in Philippines and Indonesia. As Mahatma Gandhi told way back in 1939, the authorities in Philippines and Indonesia made rural households and farmer communities in villages make palm

sugar in palm tree habitats. Local populations could easily turn nectar into coconut blossom syrup, jaggery and sugar. This method reduced logistics and converted the highly perishable inflorescence sap into products with moderate shelf life like jaggery and palm sugar. Further refining, granulation and packaging of the products were undertaken in art of the state manufacturing centres to suit world standards.

PCA supported farmers groups which had the business skills and intrepid spirit to discover the profit potential of making sugar out of coconut inflorescence sap. Today, these rural enterprises are touted as the new agribusiness exploiting the potentials of making it a dollar earner. A women's group in Aroman established the Aroman Natural Food Producers Multipurpose Cooperative. With support from the PCA and the local government, the cooperative applied their coconut sap sugar for Organic Certification with the support of a natural medicine practitioner in the U.S, who assisted the group in marketing the product in the US as an ingredient for a nutrient supplement.

Coconut sap sugar (CSS) production now has a niche market and presently is in high demand locally and globally as more and more of its health benefits are discovered by the scientific community. This has led to the establishment of cooperative partnerships of village-level producers and enterprises with the PCA and local government units to enhance and support the reinvigoration of the coconut industry in the country. Since then, the PCA and its research centers have conducted massive trainings

for local communities to share viable technology to foster economic growth and social development.

An added advantage of the technology is its simplicity and uncomplicatedness considering that this involves only concentrating fresh sap into sugar granules - a change in physical form from liquid to solid state. It does not require skilled labor or sophisticated equipment and is best adapted to a farm level or medium scale enterprise. However, the process is very dependent on critical factors such as pH, temperature and the extent of microbial activity of the natural yeasts in the sap. Each step in the process requires specific conditions such as neutral pH of the sap, clean materials during sap collection and cooking, and controlled temperature during the peak of transforming the sap syrup into solid sugar form. This ensures quality and proper formation of the product.

The lessons learned and shared by the different community initiatives in Philippines and Indonesia are classic examples of local partnership between a budding business coconut community and government and

non-government organizations. It showed that simple farmers can establish their own linkages and networks in nurturing a ordinary business into a big enterprise. This kind of partnership has made farmers more aware of their social responsibility in their new business and has learned to be more accountable in the production and processing of their goods.

Cooperative partnership, as experienced in this coconut sap sugar production enterprise in Philippines and Indonesia provides confidence for the Board which is now working through the Farmer Producer Organisations of CPS, CPF and Producer Companies. Working through farmer communities together with technology application and adoption by local communities, was a powerful factor in developing the farmer groups' self-confidence to deal with pressing issues in production, processing and marketing. It also encouraged farmers to integrate and closely follow the set technology protocol for assured quality produce, and strongly supported self-reliance and empowerment of farmers as they pursued new challenges in this coconut sap sugar agribusiness endeavor. As a result, it provided more jobs to coconut farmers, not just as producers of nuts and other products, but as entrepreneurs with a defined business. It is interesting to note in this context that establishment of local units for coconut palm sugar production was even undertaken under the aegis of Food and Agriculture Organisation (FAO) of the United Nations. In its special programme for Food Security in Asia, FAO initiated programmes in West Java for coconut palm sugar production.



Vessel used for collection of Neera in Philippines

Coconut blossom sugar was recognised as the most sustainable form of sugar by FAO. It was referred satirically as a tree that provides year-round sustenance for the communities around them, the only hazard being underneath when a coconut drops!

Neera and its value added products are manufactured by all the major coconut producing countries. The major players in the field are Indonesia, Philippines, Thailand, Malaysia, Sri Lanka and Vietnam. The major destinations are USA, Canada, Norway, France, Middle East, South Korea, Japan, Australia and New Zealand. Export of Neera and its products, especially palm sugar has shown a surging trend in production and market demand as a healthy and natural product. Industries based on coconut with vast economic prospects have been established to cater to the domestic and local demands. Indonesia produces over 6 lakh MT of palm sugar in a year i.e., around 50,000 MT of palm sugar is produced per month. They moved through farmer groups since 90% of the coconut growers are small and marginal. Big Tree farms is the fore runner in coconut palm sugar production in Indonesia. Indofood and Unilever purchased around 30,000 MT of coconut palm sugar each in 2011. The production of palm sugar in Indonesia is estimated to reach 10 lakh MT in 2012. Even countries like Sri Lanka and Malaysia which are very much behind us in production of coconut have ventured into production of Neera and palm sugar. Codex Alimentarius Commission and Asia Pacific Coconut Community (APCC) have developed quality standards for Neera and its products. Countries like Philippines

and Sri Lanka have their own standards for Neera and coconut palm sugar. The Bureau of Agriculture and Fisheries products Standards in Philippines has developed specific standards in quality for coconut palm sugar. For instance Premium class is classified as Superior quality which has a color of light yellow to cream. Class I which is of good quality has a colour of light brown to brown. Class II includes those which do not fall in the above two.

Aroman cooperative by women leads in coconut palm sugar production in the Philippines while Chivadi leads in production of coconut palm syrup. The export price for coconut palm sugar is in the range of US\$ 4.50 -6.50 per pound.

The global demand for low calorie reduced sugar and sugar free products is increasing day by day with the increasing health awareness in the food market. The increase in the number of people with obesity, diabetes and dental caries is also alarming and Neera and coconut palm sugar can provide a healthy viable option. The low Glycemic Index of 35 for Neera and its value added products offers a potential substitute for people looking for sugar free foods. Coconut palm syrup, jaggery and palm sugar can be put to a variety of uses like in bakery items, ice creams, coffee, topping on desserts etc as sweetening agent. In this era when ***Health is the new wealth which drives the consumer market***, promoting a nutritive healthy product like Neera and coconut palm sugar will rewrite the history of coconut sector in the country. Working through the farmer collectives of CPS, CPF and

Comparative nutritional values of coconut sap sugar vs. brown sugar

Element (ppm or mg/L)	Coconut Sap Sugar	Brown Sugar
Nitrogen	2,020	100
Phosphorus	790	35
Potassium	10,300	650
Magnesium	290	None
Chloride	4,700	180
Sodium	450	None
Sulfur	260	None
Copper	2.3	None
Manganese	1.3	None
Boron	6.3	None
Zinc	21.3	2.0
Iron	21.9	12.6

Source: Philippine Coconut Authority Research Development and Extension branch

APCC standards for coconut palm sugar

Parameters	Value
Color	Light yellow/cream to dark brown
Odor	Sweet pleasant nutty aroma
Taste	sweet
Others	Free from filth and extraneous matter
Moisture Content (%)	Cube/block: max 10 Granular : Max
Glucose (%)	2.8-3.0
Fructose (%)	1.0-4.0
Sucrose (%)	78.0-89.0
Ash (%)	<2.4

Producer Companies will ensure efficient production of the products. Let us move forward taking the cue from Indonesia and Philippines and make the coconut sector emerge sweeter and stronger.

Neera tapping, a viable source of income to farmers

Shri. Vijayanda Kaimal from Thuravoor in Alapuzha district of Kerala, does not claim to be an experienced farmer, but firmly believes that neera tapping will definitely uplift the farmers and will revitalize the prospects of coconut farmers. On return to his home town after retiring from the Ministry of Human Development, Government of India as the Director, he was determined to be a farmer.



It is ten years now since he is into farming. In his 40 acre farm land he is cultivating paddy and coconut. Around 250 TXD and DXT coconut varieties are grown in his garden which is mostly 5-6 year old. When the price of coconut stooped below, Kiamal gave his 35

coconut trees for toddy tapping. On an average, a coconut tree yield 2-3 liter toddy per day and is being sold @ Rs. 70 per liter. Eventhough toddy tapping gives better yield than coconut harvesting, he is disappointed that he gets only Rs. 6.50 per tree per day while the tapper gets Rs.44 and the Abkari contractor gets Rs.90.

Kaimal, recently elected as the President of Changram Coconut Producers Society welcomes the initiative of the Coconut Development Board in spearheading the formation of farmer collectives, the CPS and federating them to CPFs. According to him neera tapping is the only alternative for saving the coconut farmers who are reeling under severe price fall of coconut and its products. He is happy that the recommendations put forward by the Coconut Development Board to

the Neera Committee that Neera production and marketing can be entrusted with Coconut Producers Societies, their Federations and Producer Companies. He ardently believes that neera production, its value addition and marketing can make drastic changes in the economic status of the farmer. The recommendation to have 50% of the income from neera production to the farmer and 25% to the tapper is a positive step.

This degree holder from Jawaharlal Nehru University dreams of a day where the farmer will have the right to fix the price of his produce. Here the farmers are denied that right and the middle men is exploiting the farmer. He is hopeful that the neera policy to be enacted by the Government of Kerala will definitely be an exception.

Environmental attributes of Coconut Palm Sweeteners

Tropical palms are an ecologically beneficial tree crop that grows in diverse, wildlife supportive agro-ecosystems, restore damaged soils and require very little water. Coconut palms are considered the “Tree of Life” by many traditional communities throughout the world, as one tree can provide a multitude of usable goods, such as; roofing material, food, coconut water, building material and shade for crops.

Reports by the Food and Agriculture Organization (FAO) of the World Bank show that Coconut Palms and other nectar producing species of palms are likely the

world’s most sustainable sweetener. Coconut Palms and other sugar producing tropical palms are nearly twice as productive per hectare as sugarcane and are a far more sustainable source of sweetener because they grow in diverse, wildlife supportive ecosystems as opposed to huge mono-crop plantings. Coconut Palms can grow in severely depleted soil (think of a sandy beach!) and use very little water; In fact, not only do they require such little maintenance, but they actually improve soil structure, fertility and water conservation, thereby allowing marginalized land to become lush jungle over time.

Many traditional communities throughout the world consider coconut palms the “Tree of Life”, as they provide a variety of accessible products from which they earn their livelihoods. The production of Sweet Tree organic coconut sugar has the single highest potential for lifting these farmers into a better life while creating a net benefit to their surrounding environment. Coconut palm sugar is not produced from the same palm species as is used for the production of palm oil. Coconut palms produce an average of 50-75% more sugar per acre than sugar cane and use less than 1/5th the soil nutrients for that production.

Two Coconut Producer Companies established in Kerala

Two Coconut Producer Companies made their kick start in Kerala. Tejaswini Coconut Farmers Producer Company Ltd. is a project of coconut farmers of Kannur and Kasaragode District and Palakkad Coconut Producers Company is an initiative of coconut farmers of Palakkad District. Coconut Development Board has initiated the formation of Coconut Producer Companies (CPC) by associating 8-10 Coconut Producer Federations in a contiguous area with a consolidated minimum of 8-10 lakh palms. The objective is socio economic upliftment of the farmers through productivity improvement, cost reduction, efficient collective marketing and processing and product diversification. A farmer equity contribution is also proposed to be mobilized. A matching equity contribution will be sought from the state Government as one time assistance for making the CPC effective.

Tejaswini Coconut Farmers Producer Company Ltd

Tejaswini Coconut Farmers Producer Company Ltd. is a dream project of coconut farmers of Kannur and Kasaragode District. This is the first producer company registered under Coconut Development Board in Kerala. The jurisdiction of the company includes Kannur and Kasaragod District and the head quarters of the company is at Cherupuzha, which is the main market place for agricultural

produces especially coconut products.

242 CPSs and 16 CPFs in Kannur and Kasaragod Districts have formed this company. Each federations comprises of 15 to 25 CPSs. Cherupuzha, Alakkode, Udayagiri, and Bheemanadi Coconut Federations are the members of the newly registered Thejaswini Coconut Farmers Producer Company. Other federations of the nearby area will join this company soon.

The objectives of the company include encouraging coconut farmers for better cultivation, production and marketing so that the farmers get maximum price to coconut, production of organic coconut, taking up value addition in coconut cultivation, exporting value added organic coconut products, neera production and its marketing, organizing FoCT programme, maximum tender coconut harvesting and production of coconut seedlings suitable for tender coconut, production of value added products from coconut husk, coir pith, coconut shell and timber and taking up research activities on pest and diseases of coconut and hybridization of coconut.

Palakkad Coconut Producers Company

Palakkad Coconut Producers Company is an initiative of coconut farmers of Palakkad District, Kerala, India. Here 40 to 100

coconut farmers with about 4000 to 10000 coconut trees in a geographically well-defined area form a Coconut Producer Society (CPS). To be considered as a farmer one should own at least 10 bearing coconut palms in the area coming under the CPS. Eight or more CPSs in a Grama Panchayat or in a Block Panchayat are forming a Federation of Coconut Producer Societies (CPF). These entities are registered under charitable societies act relevant to the area in District Registrar Office and then with Coconut Development Board. The present venture is the effort of nine existing Federations in the district.

The equity of the company is being mobilized from farmers. Each farmer has to take shares equal to the number of coconut trees owned by him/her. The value of each share is one hundred rupees. The farmers can subscribe shares by paying twenty rupees. The rest may be paid as produce or cash within the next 24 months or eight harvests whichever is earlier. The Company is procuring coconuts, tender coconuts and is planning to collect Neera (un-fermented coconut sap), palm sugar and other produce from the shareholders and to resell the raw or value added produce to various governmental and business agencies through its own outlets. The produce collected from each farmer is proportionate to his/her number of shares.

Production of Neera

Sunil A. Nair*, Mejosh Jose, Regi J. Thomas, R.V. Nair

Central Plantation Crops Research Institute, Regional Station, Kayamkulam, Krishnapuram P.O., Kerala State

Amongst the 2,000 odd palm species in the world, only nine species yield inflorescence sap (neera) / sweet juice and of these only four general species are found in India viz., coconut palm, date palm, palmyrah palm and sago palm. The coconut palm, popularly known as 'tree of life', is characteristically a food supplier from its fruit, inflorescence and other edible products. India ranks first in the world in coconut production with a production of 10840 metric tonnes nuts from 1.89 million hectares; of these Kerala has around 18 crore coconut palms and about 25 % of the palms could be spared for neera tapping.

Neera is a sweet juice or sap, obtained by tapping the unopened inflorescence/spadix of the coconut palm. The inflorescence of this palm is a source of many food products. Its unopened spathe can be tapped to produce inflorescence sap, while its fertilized flowers or fruits can be processed to produce coconut meat, milk, cream, oil, water, flour, desiccated coconut, chips and nata de coco. The sap can be processed into sap juice / drink, syrup or honey, crude sugar or granulated brown sugar etc. In Philippines it is also marketed as an alcoholic drink (4.0-6.0% alcohol) or as 'lambong' or distilled wine (24.0-45.0% alcohol).



Season and stage for tapping

Tapping for extraction of neera is mostly done in the dry season extending from November to March and in wet weather period from April to October. Dry weather tapping is done mostly in the low lying lands where palms do not suffer due to moisture stress during drought period. The spathe is considered ready for tapping when the inflorescence opens or is just about to burst. The female flower within the unopened spadix causes a swelling at the base and this indicates the appropriate stage for tapping. Since coconut produces inflorescence regularly in the successive leaf axils, tapping can be done throughout the year. Neera can be extracted from Tall palms, Dwarf palms and the hybrids and out of these the hybrids followed by Talls are found to be high yielders and most preferred.

Tapping technique and collection of sap

The selected unopened spadix is wrapped with fibrous chord of coconut leaf petiole along its length to prevent it from splitting. Inflorescence suitable for tapping is trained and it consists of gentle uniform beating all over the surface using a hardwood mallet twice daily so as to carefully bruise and rupture the tender tissues of the floral branch. Approximately seven to ten centimeter of the tip of the spathe is cut off. After three days the surface appears moist due to oozing of juice. An earthen pot is just hung around the spadix to collect the oozing juice. The tip of the spadix is tied down with a string to a nearby petiole or leaf. The daily slicing of the tip of the spadix allows the sap to flow continuously and slicing is done once in the morning and evening. The finer the slice, the

longer is the life of the spadix. The mouth of the receptacle is covered with a net to prevent the entry of insects, mice and lizards. The collected inflorescence sap is filtered through a sieve to remove the foreign particles.

The yield of sap gradually increases and when it reaches the maximum, the collection is made twice in a day. The flow of the sap from the inflorescence continues for about one month or even more. During this period, the second spathe is also brought into production. Tapping is usually continued for a period of six months with a possibility of three spathes on the same tree being tapped at the same time. The maximum yield of neera is usually obtained during the third month after commencement of tapping. On an average a palm yields about 1.8-2.4 litres of neera.

In Philippines tapping is done twice a day. Harvesting of inflorescence sap can be done in the morning (taken before 8 am) for production of vinegar and in the afternoon (not later than 3 pm) for the production of sap juice, honey and sugar since sap produced in the

afternoon is sweeter than in the morning. To produce sweet inflorescence sap, it is necessary that all tools and containers used should always be clean.

Preservation of the collected neera (inflorescence sap)

Neera undergoes fermentation when exposed to sunlight. It first undergoes alcoholic and then acetic acid fermentation through microbial action. As the sap is highly perishable due to the natural yeast micro flora, the harvested sap should be immediately processed by pasteurizing for 10 minutes at 65° C in a large cast iron pan. This prevents the fermentation of the sap. Such hygienically prepared sap can be stored upto three days without any change in its quality. The commercial neera available in the market has an undesirable odour. Numerous methods are available for removing the odour, improving quality and shelf life of the extracted neera.

According to the method developed by DRDO, thermal processing of neera at a temperature of more than 95° C and reduction of thermal stress by

addition of bio-preservative 'nisin' at a concentration of 10 ppm was found to enhance shelf life of neera. A foil based multilayer packaging material such as PET (Polyethylene Terephthalate) / aluminium foil was found suitable to prevent adverse light. In order to increase the product appeal, the suspended particles in neera were removed by centrifugation at 4000 rpm for 10 min. The product as such without any additive treatment as well as heat processing was stable up to 72 hr. When the product was processed either by in-pack pasteurization or through retort pouch processing, the shelf life was about one year under refrigerated condition and 30 days under ambient conditions.

Taking into account the vast market potential of 'neera' (unfermented inflorescence sap), Government should take measures to accede to farmer's demand for their right to tap and market neera. A favourable decision in this regard will definitely benefit the coconut farmers and make coconut farming more competitive, which is otherwise losing its market to cheaper oils.

In Karnataka, Khadi Village Industries Commission (KVIC) has a demonstration unit for promoting Neera as a health drink. The central government is trying to develop Neera clusters under the scheme of Fund for Regeneration of Traditional Industrial (SFURTI). This will undertake programmes to help those who tap the Coconut trees and has under its wings 50 co-operative societies and institutions throughout the Gramodyog Sangham. The implementation of this scheme is as part of the increasing availability of the drink, with the aim of generating more employment opportunities for the Tappers.

The Neera Board constituted in Karnataka to market the value added products made from neera consists of representatives from the neera industry, i.e farmers, state government officials and neera training institute. The key objective of the Board is to inspect and control the quality of neera and its products, give approval to labels and come out with various schemes for the sale of neera and it's by products in the international market.



Focus on commercialisation of technologies to capitalise the opportunities for neera

Jayashree.A

Senior Technical Officer, CDB, Kochi-11

Product diversification and by product utilisation is one of the thrust areas identified by the Board for promoting coconut industry. The Coconut Development Board has been making several efforts to promote product diversification in coconut so as to reduce dependency on copra & coconut oil market and enable coconut farmers to get more remunerative price for coconut. Promotion of Neera as Nutritious health drink has been identified as an important marketing strategy for ensuring remunerative price to coconut farmers. Neera and its downstream products like coconut palm sugar, jaggery and syrup are some of the viable products for commercial exploitation to augment income for coconut farmers.

The vascular sap collected by tapping the immature coconut inflorescence is popularly called Neera. Neera is sweet, oyster white in colour, translucent, high in nutritional value, and susceptible to natural fermentation at ambient temperature within a few hours of extraction. On fermentation, Neera becomes toddy. Neera is widely consumed in India, Sri Lanka, Africa, Malaysia, Indonesia, Thailand, and Myanmar. It is a delicious and nutritious drink rich in carbohydrates with sources, minerals, vitamins proteins etc and nearby neutral pH. It contains ascorbic acid, nicotinic acid and riboflavin. The drink is popular on account of its high nutritive value, delicious taste and agreeable flavour. Coconut sap is a sweet juice or sap, obtained by tapping the unopened spadix of the coconut

palm. The sap is extracted generally during the early morning hours. The tapping involves the extraction of exuded sap from the inflorescence that yields sweet sap. The tapping methods vary from country to country and within the country. The spathe is considered ready for tapping when the mature one bursts or is just about to burst. The female flower within the unopened spadix causes a swelling at the base and its appearance indicates the appropriate stage for tapping. The yield of sap gradually increases and when it reaches the maximum, the collection is made twice in a day. The flow of the sap from the inflorescence continues for about one month or even more. During this period, the second spathe is also brought into production. The tapping is usually continued for a period of six months with a possibility of three spathes on the same tree being tapped at the same time. The maximum yield of Neera is usually obtained in the third month after the commencement of tapping. The yield of Neera is highly variable. It varies considerably from day to day, season to season, spadix to spadix and tree to tree. The period during which the spadix yields Neera is from 27 to 33 days in India. The studies on the yield of Neera have recorded an average of about 18 litres of Neera per spadix for a tapping period of about one month. Trees, which yield a large number of nuts, have been found to yield plenty of sap {Neera}. Such palms in India yield up to 300 litres of Neera during 6 months of tapping. On an average, the yield of Neera per palm per day is about 1.5 litres.

In Tamilnadu, neera called as “Padaneer”, is traditionally extracted and sold by KVIC and Tamil Nadu Palm Products Co-operative association sell refrigerated Padaneer at their outlets. In Andhra Pradesh the Khadi and Village Industries Commission (KVIC) promotes neera as a health drink. In Maharastra and Gujarat, neera is made available through various outlets known as “Neera Vikri Kendra”. The Neera Palm Product Cooperative Society had set up small green kiosks that sold neera in major railway stations, but they are now only to be found alongside highways and expressways outside the Mumbai city area. In Orissa, the state government established a cooperative organisation known as the Orissa State Palmgur Cooperative Federation to provide technological support in the processing and production of neera and its associated by-products such as jaggery and candy. However tapping of coconut palm is seldom practiced commercially. In Karnataka the state government has constituted the Neera Board, comprising farmers, provincial government officials and neera training institutes with an objective to inspect and control the quality of Neera and its product, give approvals for various schemes for sale of Neera and its by-products in the international markets. In order to give impetus to the coconut processing and Neera industry in Karnataka a separate policy was considered by the Karnataka Government called Karnataka Neera Policy -2006. In Kerala certain amendments have to be made to the Excise Rules by the Govt. of Kerala so as to enable the entrepreneurs to under take tapping and production of Neera. The Board has urged the State Govt. to take action for amendments of the relevant rules for production of Neera on pilot basis. Govt. of Kerala in the current year budget has announced a grant of 15 crores for establishment of 10 units at the rate of 1.50 crores for each unit. A state level committee constituted by Govt. has also submitted its report recommending neera production, processing and marketing through federated coconut producers societies, coconut producers federations and coconut producer companies.

Neera is highly susceptible to natural fermentation at ambient temperature within a few hours of extraction from the palm source. Once fermented, it transforms into toddy with 4% alcohol. Using several technologies developed by various research institutes, neera is processed and preserved in its natural form to

retain the vitamins, sugar, and other nutrients beneficial for health. To extend the shelf life of neera, heat preservation techniques such as pasteurization are used. A special filtration technique to enhance the shelf life of neera was developed by the National Chemical Laboratory in Pune, India.

Defence Food Research Laboratory (DFRL) in collaboration with Central Food Technological Research Institute (CFTRI), Mysore has developed the process for the preservation of coconut sap (neera) during July 2002 - March 2003. The process involves collecting coconut sap from the spathe of coconut palm, which is tapped earlier for more than 10 days using a mud pot, early morning from the nearby coconut farm, with healthy trees, identified specifically for the purpose and transported to the laboratory in the mobile chiller (4°C) followed by filtering the sap, chilling the filtered sap solution in the range of 2° to 8°C and adding an acidulant citric acid in the range of 0.04 to 0.2%. Further



preservative nisin of 5 to 15 ppm is added followed by bottling the solution and croning the glass bottles, and pasteurizing the bottles at 90-95° C for a time period of 3 to 7 minutes wherein the coconut sap retain its natural constituents. Heat preservation methods such as pasteurisation and sterilisation are necessary to preserve and extend the shelf life of the product. Temperature requirement for thermal processing of the Neera was found to be more than 95° C. Thermal stress could be reduced by the addition of bio-preservative nisin at a minimum concentration of 10 ppm both for in-pack pasteurisation and retort processing. Furthermore, Neera is highly photosensitive due to the presence of ascorbic acid, hence foil-based multi-layer packaging material such as PET/aluminium

foil/cast pp was found suitable to prevent the adverse effect of light. In order to increase the product appeal, the suspended particles in Neera were removed by centrifugation at 4000 rpm for 10 min. The product as such without any additive treatment as well as heat processing was stable up to 72 hr. When the product was processed either by in-pack pasteurisation or through retort pouch processing, the shelf life was about one year under refrigerated condition and 30 days under ambient conditions. No difference was observed between retort processed samples and in-pack pasteurised samples. The latter was found to be cost-effective.

Another invention provides an improved process for the preparation coconut sap collected from the spathe of coconut palm by retaining all its cloudiness and natural constituents. Invention relates to a process for the preservation of deodourised coconut sap (neera) by removal of obnoxious odour of the coconut sap is also patented. The process, in particular, describes the method of preservation of coconut sap in glass bottles. The fresh coconut sap is rich in carbohydrates with sucrose as its main constituent. It is well known that the coconut sap ferments very quickly even during the process of collection thus producing alcohol in it. The fermented sap smells obnoxiously thus making it unacceptable as a beverage for consumption. Hence, there is a need to deodorize and preserve the coconut sap without affecting its nutritional quality. The process involves collecting coconut sap from the spathe of coconut palm,

which is tapped earlier for more than 10 days using a pot, filtering the sap to remove any impurities; chilling the filtered sap to 2-8°C until processing, adding deodourizing aids either Bentonite or activated carbon and stirring the contents; centrifuging or filtering the mixture; optionally adding a preservative, packing the deodourised sap in glass containers and crowning the glass bottles, and pasteurizing the bottles at 90-95°C for 3-7 min. The bottles were cooled to 27° C. The juice had a characteristic cloudy appearance of neera devoid of fermented odour without any sedimentation.

Technology to preserve the sweet coconut inflorescence sap in non-alcoholic form under ambient condition has been developed by Regional Agricultural Research Station, Nileswar (Kerala Agricultural University). By this technology the coconut inflorescence sap can be preserved and marketed as a soft drink as well as there is scope for promoting small scale industries for preparing edible products from Neera. The technology for production of value added products such as jaggery, sugar, chocolate granulated powder, coconut honey etc. were also developed by KAU. However the technology could not be commercialized owing to restrictions prevailing in tapping of coconut trees for production of Neera. The issue has already been taken up with the State Governments and it is expected that some units for the down stream products such as Jaggery, Granulated powder and Coconut honey using this technology would come up in the near future. Kerala

Agricultural University has established a Pilot Plant with a processing capacity of 500 litres of Neera per day with the support from ICAR. The technology could be transferred to entrepreneurs by the KAU. However, the entrepreneurs to whom the technology would have to be eventually transferred for commercial production would require permission under the Abkari Act for trapping Neera. About 250 yielding coconut palms are required for the production of 500 litres of Neera. M/s Subicsha (a company promoted by Perambra Block Panchayath for Women Self Help Groups under SGSY project of Govt. of India) has come up with a proposal for commencing production of Neera and its downstream products on a pilot scale.

Director of Horticulture, Government of Karnataka has taken up a project for establishment of Neera demonstration unit at Horticulture Farm, Thumbi, D. Kannada for preservation of tapped Neera thermally in glass bottles at a total cost of Rs.115 lakhs with share of Deptt. of Horticulture, Karnataka (75%) to the tune of Rs.86.25 lakhs and Share of Coconut Development Board (25%) to the tune of Rs.28.75 lakhs. The production capacity is envisaged at 10000 lts per day. The objective of the project was to optimize the use of available natural resources, to educate the farmers there by improve the economic position of the farmers and to keep alive the tapping traditions of Dakshina Kannada and demonstration is taken up in order

(Continued on page 31)



Lakshadweep realizes the potential of Neera

Sasikumar C

Technical Officer, Coconut Development Board, Kochi

The economy of Lakshadweep is mainly dependent on agriculture and fisheries. This part of the country has wealth that is yet to be exploited. The economy here is simple and open with ample scope for development. Lakshadweep agriculture earns the livelihood for more than ninety percent of the population of this Union Territory. Coconut cultivation is a major economic activity of the people of Lakshadweep. Coconut is grown in 2700 ha. in 11 islands and the production is 40 metric tonnes per year. Lakshadweep Ordinary and Lakshadweep Micro are the two common varieties grown and copra and coconut oil are the traditional coconut products made. Tender coconut harvesting is also picking up now. Tapping of neera is another

activity undertaken in the island since time immemorial.

Agricultural Department is implementing various schemes on agricultural development in Lakshadweep. The Coconut Development Program is an important scheme for increasing the production of coconut.

Lakshadweep being a coconut territory, coconut productivity plays an important role in improving the economic status of the islands. Productivity has almost reached to the saturation level and no uncultivable land is available for converting into cropping area. Increase in population is mounting pressure on resources available in the territory. In order to meet the requirement of growing population

for a comfortable life, income generated from copra alone will not suffice the increasing demand. The only way out is to go for high value agriculture through product diversification and value addition.

Tapping of neera is intrinsically related to the life of the people of Lakshadweep. Tapping is usually done during September to December. Tapping is done at the auspicious of the Agriculture Department and is included under the coconut development programme. Department has fixed the wages of tappers @ Rs. 250 per day and the tapper should collect 10 liter neera per day. Department is giving the farmer Rs.800 for 6 months for neera tapping. Farmers are also giving trees directly for neera tapping.

Neera tapping initially started in Androth and Kalpeni Islands and later on in Minicoy, Kavaratti and Kadamat islands. Tapping is done both in the morning and in the evening. On an average 1.5 to 2 litres neera is obtained from a palm. Department is selling neera as a soft drink which is sold for Rs.15-20 per litre. Neera collected from the tappers is also used for making vinegar and jaggery. Vinegar, a permanent natural preservative ingredients for pickles, salads, soups, curry etc. and jaggery - a colloidal sugary substance made out of coconut neera used for making a varieties of snacks, a best substitute for jams, for making cool drinks etc. are very commonly used in Lakshadweep.

Neera is stored in large plastic containers with a clean netted cover allowing aeration and prevent entry of dirt and other foreign objects. Earlier earthen pots were

used for making neera. After 40 days of fermentation in a well ventilated room, the sap is harvested as vinegar. After the evaporation loss around 95 liter vinegar can be produced from 100 liter neera. Vinegar is having good demand in the Island since it is an ingredient in all seafood dishes. Lakshadweep vinegar is popular in Kerala especially in Malabar areas. Vinegar is produced by the department as well as private parties. The department is selling vinegar @ Rs. 22 per litre while private parties are selling it @ Rs.30 per litre.

Coconut jaggery is a common cottage industry in Lakshadweep. The island is having to its credit its own conventional method of making coconut jaggery out of neera. Tappers as well as the department making jaggery. Around 7 liter neera is required for making 1 kg. jaggery. Coconut neera immediately after collecting it, is boiled in large

shallow round bottom vessels. Two-three calcium stones are also deposited in the solution for balancing the pH. Neera collected in the evening is also poured into it and is heated at 80°C. This solution is heated and stirred continuously for eight hours. Later on, it is removed from fire and is stirred continuously until it gets cold. The jelly like jaggery is packed in glass jars and is sold @ Rs. 250 per kg. This product has good market in the island itself since it is used for making a variety of sweet snacks.

Neera tapping is a potential source of revenue for the Lakshadweep Island. Neera tapping is allowed in the Island and the department is directly running coconut jaggery and vinegar units. This success story of Lakshadweep is a best model to prove the relevance of tapping neera and also the significance of product diversification and value addition.

(Continued from page 29)

to bring Neera Policy in Karnataka. It was decided to set up a pilot neera plant for processing and packing of neera at Dakshina Kannada or Udipi district, as the two districts do not need any excise clearance as it is exempted and toddy tapping is allowed in these two districts. The pilot plant has already started trial production and packing of neera. Attempts are also made at packing in different flavours as per the customer's preferences.

Once the clearance is obtained from the concerned state govts, Coconut Development Board can extend back ended credit linked capital subsidy limited to 25% of the

input cost not exceeding Rs.50 lakhs under Technology Mission on Coconut. If the unit needs financial support, any Bank / financial institutions can be approached with detailed project report for availing loan. A detailed project report along with application, Bank appraisal, loan sanction letter and all the relevant supporting documents has to be submitted if the party intends for avail the financial assistance from the Coconut Development Board under the TMOC scheme, for production, processing, branding and marketing of neera in packaged form and for downstream products like coconut palm syrup, jaggery and coconut palm sugar. There is

also scope for small scale industries for honey, chocolate, candy and toffee from Neera. Setting up of such units will fetch better returns and generate employment opportunities in rural areas. In order to offset the crises of price fluctuation streamlining the process will allow the farmers to capitalise on the opportunity to produce coconut neera and its by products which has excellent international market, besides the domestic market. This will allow the farmers to capitalise on the opportunity to produce coconut neera and its by products which has excellent international market, besides the domestic market.

Neera Production through CPS, CPF and Producer Companies

Formation of Coconut Producers Societies (CPS) was initiated by the Board with an objective to mobilize coconut farmers and establish grass root level farmer institutions for undertaking production, processing and marketing of coconut. 40-100 farmers having 4000-5000 coconut palms in their jurisdiction form a CPS. Such 20-25 CPS units of a particular area are aggregated to form Coconut Producers' Federations (CPF). Federations undertake activities like production of value added coconut products coconut chips, ball copra, desiccated coconut, virgin coconut oil, charcoal etc. CPFs also extended support @ 50% subsidy for the installation of community infrastructure for copra making. So far 3536 CPS and 125 Coconut Producers Federations are registered with the Board. These federations can form the base for permitting production of Neera.

Board has the broad objective of integrating CPFs to form Producer Companies (PC). Two Coconut

Producer Companies are already established and many are in the offing, which are expected to be milestones to transform the entire coconut sector. The idea is to translate small farmers organizations to sound, dynamic functional teams.

Neera production, processing and packaging can be undertaken under the auspices of Federations of CPS registered with CDB. The neera committee constituted by Government of Kerala has recommended to give license for Neera production to Federations of CPS registered with CDB. Neera is collected at CPS level and assembled at a primary processing centre under the auspices of Federation. Primary processing of Neera can be done here under the guidance of the authorized research agency with strict monitoring of Federation. Further, processing and packing of Neera can be done at district level processing unit at Federation level. Producer Companies can initiate processing and value addition of neera and

develop value added products like syrup, jaggery and palm sugar. The palms to be tapped can be marked in advance. Tapped Neera collected by the Federations through the member CPS can be brought to a primary processing centre which is localized within the district.

The processing of Neera can be done under the strict supervision of officials from KAU for a definite period till the sector get stabilized. Tapped Neera need not be transported outside the district where it is produced thus preventing chances for misuse. Further processing to other products like palm syrup, palm jaggery and palm sugar can be undertaken at the level of Federations or Farmer Producer Companies envisaged by CDB.

Neera should be taken out of the Abkari act since it is unfermented inflorescence sap. Value of tapped Neera should be shared between the farmer and the Neera technician in a fixed proportion so that both the stakeholders are benefited and the sector emerges in a sustained manner. CPSs can start given training to Neera Technicians and identify coconut palms suitable for Neera tapping. Out of the 18 crores coconut palms in Kerala initially 1% may be set apart for Neera tapping. Tapping of 18 lakh palms would generate additional revenue of Rs.5400 crores in a year (300 days). Tapping and sale of Neera is permitted in States & UTs like Karnataka, Maharashtra, Goa, Lakshadweep, Andaman & Nicobar and Puducherry.



Recommendations of Neera Committee

The expert committee constituted by Government of Kerala under the Chairmanship of Shri. Anil Xavier IAS, Excise Commissioner to study the potential of neera submitted its report to Shri. K Babu, Minister for Excise, Government of Kerala. The committee examined various issues like how neera tapping can be beneficial to farmers, the alcoholic content in neera, production, marketing and export of neera etc. Dr. K Muralidharan, Director CDB was a member of the nine member committee.

The committee has recommended that Neera production, processing and marketing can be entrusted with federated Coconut Producers Societies, their Federations, and Producer Companies. As special processing units are required for the collection and processing of Neera, it should not be allowed as a part of toddy parlours. Necessary amendments shall be made in the existing rules on Issue of License for drawing sweet toddy(neera) for enabling neera production, and its value addition. License from the Excise department shall be obtained

from the said rule for tapping neera. For the modernization of toddy sector and for the production of neera and value added products from neera, Toddy Neera Development Board shall be established. Cess @ Rs.1 per liter of Indian made foreign liquor may be introduced for funding this Board.

On receiving the report, Shri. K. Babu Excise Minister, Government of Kerala assured that the government will certainly take a positive view of it and will promote the coconut water-based drink Neera as a non-alcoholic health drink.

Certified health claims for virgin coconut oil

Government of Philippines is pushing for the removal of the phrase “no approved therapeutic claims” in Virgin Coconut Oil (VCO) product labels after a clinical study and similar studies have proved that VCO increases good cholesterol. Philippine Coconut Authority (PCA) has requested the Philippine Bureau of Agricultural and Fishery Product Standards (BAFPS) to allow the producers of VCO to remove the phrase “no approved therapeutic claims” from the PCA certified VCO products. February 2012, a team of scientist and medical doctors from the University of Santo Tomas (UST) Research Center in Manila, Philippines presented to the public and journalists the results of a Clinical Study which they have conducted on the Effects of Virgin Coconut Oil (VCO) on the Human Body. The study was the largest clinical research ever undertaken

on the effects of VCO on cholesterol levels in the country. The UST Research Team was led by Dr. Christina Binag of the UST Research Center for Natural and Applied Science based in Manila, Philippines. The study was commissioned by the Philippine Coconut Authority and involved 110 participants who took 3 tablespoons of VCO every day for 4 months while 79 others had a placebo treatment for the same period.

The results of the clinical study revealed decreases in triglycerides and very low density lipoprotein (VLDL) - which is considered as bad cholesterol, among the VCO takers. The VCO takers had no change in their low density lipoprotein (LDL); they showed elevated high density lipoprotein (HDL) or good cholesterol. Medical doctors and scientists have indicated that high VLDL and LDL

(bad cholesterol) could lead to plaque formation in the inner lining of the arteries that blocks the free circulation of blood in the heart and to the brain. When the arteries are clogged-up, there is a high risk of heart attack and stroke. The UST Team of medical doctors and scientists indicated that the improved cholesterol to HDL ratio can mean that the individuals are less prone to heart attack or stroke. Aside from the effects on the lipid profile, the scientists also reported that the VCO takers had regular bowel movement, increased appetite and stamina, and better sleep. Similar studies have also been done in India and Sri Lanka. We can therefore say that there is now strong proof to disprove the allegations about coconut oil consumption and its relation to enhancing the risk of coronary artery disease.

Source: The Cocommunity

Health benefits of coconut nectar

Coconut organic nectar sometimes also called as coconut sap has high nutrient content, such as;- essential minerals (potassium, magnesium, zinc and iron) and vitamins. Moreover, it has a very low glycemic index and glycemic load, so coconut organic nectar will produce slow release energy, without regular blood glucose levels become too high or too low. The last one may be the most important health benefit of coconut organic nectar. By maintaining blood glucose as well as insulin level in normal range, coconut organic nectar can help preventing and treating various health problems. Here are some of them;

Obesity

As a low GI food, coconut organic nectar will be slowly digested and cause a gradual rise in blood glucose. It will keep you feeling satisfied and resulted in delaying the feeling of hunger between meals.

Cancer

Many researches have shown that there is a relation between high insulin levels and variety of cancer formation, including breast, colorectal, prostate and pancreas. There are also studies which show association between diet of high sugar, refined carbohydrates, high glycemic load and cancer development.

Cardiovascular Disease

Avoiding refined and high GI carbohydrates will significantly reduce the risk of heart disease. These type of foods increase blood insulin levels which then contribute to higher blood pressure, blood fats and tend to form dangerous clot that stay in blood stream.

Hypoglycemia

People with hypoglycemia secrete too much insulin after eating, resulting in too much sugar that was removed from the blood. As the end result, the body may feel

shaky, irritable, weak, dizzy, unable to concentrate and excessive feeling of hunger after few hours of eating. Low GI foods will make insulin to response slowly, because this kind of foods will raise blood sugar levels gradually. It will prevent the blood glucose to drop too low.

Diabetes

Many studies have proven that consuming low glycemic index carbohydrates instead of high GI ones can help lower blood sugar levels in people who have diabetes. A low GI diet also helps prevent diabetes from ever developing in the first place. That's why; glycemic index diet becomes an important part of nutrition therapy for diabetes in New Zealand, Canada, Australia and Europe for many years.

However, due to its fabulous health benefits of coconut organic nectar, this natural sweetener is also good for those who don't have health problems as listed above.

Vitamins and Minerals in Coconut Sap

Vitamin Content of Freshly Gathered Coconut Sap

Vitamin	Fresh Coconut Sap Value (MG/DL)
Thiamine (B-1)	77.00
Riboflavin (B-2)	12.20
Panthenic Acid (B-5)	38.40
Niacin (B-3)	40.60
Biotin (B-7)	0.17
Folic Acid (B-9)	0.24
Inositol	127.70
Choline	9.00
Vitamin (B-12)	trace
Vitamin C	23.4

Mineral Content of Coconut Sap

Macronutrient Mg/L (ppm) in Dry Matter	Coconut Sap
Nitrogen (N)	2,020.0
Phosphorous (P)	790.0
Potassium (K)	10,300.0
Calcium (Ca)	60.0
Magnesium (Mg)	290.0
Sodium (Na)	450.0
Chlorine (Cl)	4,700.0
Sulfur (S)	260.0
Boron (B)	6.3
Zinc (Zn)	21.2
Manganese (Mn)	1.3
Copper (Cu)	2.3
Iron (Fe)	21.9



Our great green umbrellas

G.S.Unnikrisnan Nair

Asst. Director of Agriculture on Deputation in Kerala State Biodiversity Board as Scientific Officer

There is no palm in this world, more beautiful than the coconut. The dense shade of nature's green umbrellas, the coconut palms are also providing relief to the people of tropics from the scorching sun. The coconut has an intimate relation with humankind through the variety of products and services it provides including environmental benefits, which is very much significant during this global warming era. Global warming has speeded up and debates continue about the best way to slow the increase of carbon dioxide that is trapping heat in the Earth's atmosphere. CO₂ is reported to be the most significant "greenhouse" gas among the GHGs produced by human activities

primarily as it arises from the combustion of fossil fuels. Excess in CO₂ can cause the earth's temperature to increase causing erratic changes in climate. Higher maximum and minimum temperatures would lead to more hot days in most landmasses; likewise, the amplitude and frequency of extreme rainfall are expected to increase over many years.

Trees-Storehouses of Carbon

Carbon needs to be pulled out of the atmosphere and put into long-term storage elsewhere. This process is called carbon sequestration, and high-technology ways to accomplish it are being

investigated worldwide. We can increase carbon sequestration by working with some specialists in this field, the trees. They have almost 350 million years' experience in sequestering carbon. Trees, like other green plants, use photosynthesis to convert carbon dioxide (CO₂) into sugar, cellulose and other carbon-containing carbohydrates that they use for food and growth. Trees are unique in their ability to lock up large amounts of carbon in their wood, and continue to add carbon as they grow. Considering that one half of the weight of dried wood is carbon, trees in a forest hold a lot of carbon. When the enormous amount of carbon stored in forest soils is added

to the trees' carbon, it becomes obvious that forests are major carbon storage reservoirs. Although forests do release some CO₂ from natural processes such as decay and respiration, a healthy forest typically stores carbon at a greater rate than it releases carbon.

Coconut –Potential Carbon Sink

The actual rate of carbon sequestration by trees will vary with species, climate and site. Even though Plantations sequester less carbon than natural forests, they are also valuable carbon sinks. In tree crops, carbon is stored or sequestered both by the biomass and the soil of the ecosystem. Thus, tree biomass and the soil are the main carbon sinks of atmospheric CO₂.

Productive and sustainable coconut farming ecosystems are potential “carbon sinks” that can minimize the effect of climate change. Central Plantation Crops Research Institute, Kasaragod conducted studies in different agro-climatic zones to estimate the carbon stocks and sequestrations by coconut mono-crop. Since in coconut tree also biomass and the soil are the main carbon sinks, researchers estimated the annual biomass production of coconut palms per hectare. About 45% of this was taken as sequestered carbon. Similarly the annual accumulation to the soil carbon stock was measured. The carbon sequestration would, however, depend on the health and growth rate of trees and the replanting cycle adopted. Thus, the standing biomass and annual biomass production in coconut was studied by CPCRI.

The net primary production (NPP) estimations of coconut monocrop in different agro-climatic zones indicated that annual carbon sequestration potential of coconut above ground biomass ranged from 8 T CO₂/ha to 32T CO₂/ha depending on variety, agro-climatic zone, soil type and management. The standing carbon stocks ranged from 18 T CO₂/ha to 51 T CO₂/ha. Annually sequestered carbon stocked in to stem was in the range of 0.3 to 2.3 CERs (Certified Emission Reductions). A “certified emission reduction” or “CER” is a unit representing one ton of carbon dioxide-equivalent (CO₂-e) sequestered or abated, using global warming potentials defined by 2/CP.3 of Kyoto protocol. According to the study, annual C sequestration by coconut plantation was higher in red sandy loam soils and lowest in coastal sandy soils.

The output on the net primary production of coconut in its economic life span of 60 years was also observed. Estimates indicate long-term (about 60 years) carbon stocking in stem is more than 150 T CO₂/ha. The carbon stored for short to medium period (2 to 5 years) was found to be 1350 T CO₂/ha during the entire economic life span of coconut. Further, carbon storage in leaf and inflorescence, for short to medium duration (2-3 years) was estimated to be around 1000 T CO₂/ha in entire span of coconut.

Growing coconut palm assimilates more carbon dioxide

According to a study by Philippine Coconut Authority (PCA), adoption of coconut farming systems could help ease the effects of climate change. According to PCA, the Philippines, with its

extensive coconut lands has a high potential to mitigate carbon emissions.

It was found by PCA that among the crops studied, coconut had an average C storage capacity of 24.1T C/ha per year. Study of PCA indicates that the growing coconut palm assimilates more carbon dioxide during daytime in the process of photosynthesis than they release in darkness through respiration. Only the excess carbon dioxide assimilated is sequestered as stored carbon in the woody biomass and not all the carbon dioxide assimilated. The coconut palms also enrich the carbon content of the soil occupied by them through the regular addition of organic debris, particularly dead and decaying root tissues, the root exudates etc. The crop was also found to have the most stable C storage, being a perennial crop with almost nil burning of crop residues compared to other agricultural crops such as rice and sugarcane.

While young and growing palms are capable of net absorption of carbon dioxide, mature palms with little growth do not sequester additional carbon, as their assimilation during daytime normally equals their emission during night. When the palms become over mature, they probably become net emitters of carbon dioxide, as their absorption during daytime is less than the quantity emitted in respiration. PCA recommends that if coconut palms are to function as effective sink of carbon, they have to be replanted before they reach full maturity to maintain a healthy and dynamic growing stand of palms continuously.

Coconut palms also permit the growing of miscellaneous tree species as companion crops. In such a cropping system the carbon sequestration potential per hectare annually will be much higher than that of a monocrop of coconut palm.

More moisture, more Carbon sequestration

The study of Srilanka Coconut Research Institute estimated the carbon sequestration potential of 25-year-old Tall x Tall coconut plantations under S2 (highly suitable for coconut) and S4 (moderately suitable for coconut) soils in wet (WL3, high moisture availability), intermediate (IL1a, moderate moisture availability) and dry (DL3, low moisture availability) agro-climatic conditions during May to September. Variation in total carbon stock (plant and soil), total carbon input (measured as Gross Primary Production of coconut, GPP), total carbon output (measured as plant and soil respiration) and net carbon balance of ecosystems were assessed. It was found that there is a significant agro-ecological region (AER) x land suitability class (LSC) effect on all the components of the carbon balance in a coconut plantation. The total ecosystem carbon stock reduces along a decreasing moisture gradient from WL3 to DL3 and decreasing soil fertility gradient from S2 to S4.

The GPP (Gross Primary Productivity -Gross primary production is the total energy or nutrients assimilated by an ecological unit such as an organism, a population, or an entire community) and $R_{tot-eco}$ (Total ecosystem respiration- the sum of all respiration occurring by the living

organisms in a specific ecosystem) do not show a reduction along a decreasing moisture gradient from WL3 to DL3 on S2, even as it shows a reduction from WL3 to DL3 on S4. The net C balance reduces from WL3 to DL3 on S4, even as it does not reduce from WL3 to DL3 on S2. Of the measured components, GPP and maintenance respiration of coconut palms and soil respiration had greater contributions to the overall C balance of the system.

Subsidies from the Carbon (C) market

Coconut lands could be developed for income-generating carbon sequestration projects and the carbon credit market. Under the 1997 Kyoto Protocol, industrialized countries committed to reduce their emissions of carbon dioxide and other green house gases (GHGs) or engage in emissions trading if they maintain or unable to decrease their emission of gases. These countries can meet part of their target in reducing global CO₂ emission by purchasing emission reduction credits from developing countries in the form of planted forest and plantations.

The above studies indicate that Coconut - as a perennial tree crop with 50-60 years of economic lifespan, has a great potential as Carbon Sink for mitigating climate change. Hence coconut is an important candidate of carbon sequestration for carbon trade in Clean Development Mechanism. Farmers, who cultivated coconut, should be paid for sequestering carbon dioxide, but the issue had to be taken up at inter-government level. To what extent coconut monocropping and coconut-based agro forestry qualify for carbon

trading has to be examined on a priority basis.

The Clean Development Mechanism (CDM) is presented as an opportunity for developing countries to get certified in order to negotiate subsidies from the Carbon (C) market. Productivity and net carbon balance of types of land used for coconut are key issues for the CDM. Various Studies revealed that a 25-26 yr old tall coconut plantation could sequester about 17-80 MT of Carbon dioxide per hectares in one year depending on the agro-climatic and soil conditions. If the carbon is marketed at the rate of 11 US\$ / unit, growers can earn about Rs 20,000 – 96,000 per ha in one year under CDM. The same coconut plantations contain a carbon stock of about 30 - 70 MT per one hac (plant and soil) depending on the agro-climatic and soil conditions. Carbon stored in plants other than the stem wood or trunks are generally decomposable biomass, which eventually becomes part of the soil organic matter (SOM) of which the more stable component is the 50 percent soil organic carbon (SOC).

Coconut-producing countries and the agencies concerned should do more formal and scientific collaborative studies in this area. These are needed in order to take the best advantage of the desirable attribute of coconut production and its ecosystem, not only for judicious environmental management but, more importantly, to generate acceptable methodologies and empirical data for certified emission credits. Coconut palms are no doubt, one of our finest shields for the warming world.

Black headed caterpillar spreads across Visakhapatnam

The black-headed caterpillar disease has affected two-thirds of the 7,500 hectares of coconut area in Visakhapatnam and the farmers have initiated control measures. The disease has severely affected in Anakapalle, Mungapaka and S. Rayavaram mandals.

The crown of coconut tree would turn black and all its green leaves would be licked away by the black-headed caterpillar. The nuts would die young causing a huge loss to the coconut farmer.

More than 500 hectares of coconut plantation in 15-20 villages in the Anakapalle-Munagapaka zone has been hit by the pest, directly affecting more than 600 families and close to 1,000 agricultural workers who are totally dependent on the yield.

Farmers told a team of horticulturists and scientists who surveyed the damaged coconut plantations in the Anakapalle belt that their yield had dropped by 50% in a span of four months.

The team of experts led by C V Rama Rao, coordinator, District Agricultural Advisory and Transfer of Technology Centre (DAATTC), Anakapalle, of the NG Ranga Agriculture University, M Srinivas, a scientist with the same institute, and Radhakrishna of the horticultural department, found that 4% of the total number of trees were badly affected and that the pest could be dealt with before all the 60,000 trees in the 500 hectares are damaged. "Only about 2,400-

odd trees were affected and seemed to be in a bad shape. The others can be salvaged and the plantations can be back on track in one year," observed Rao.

Rao said one of the reasons for the pest quickly spreading in the region was that the trees were too closely planted.

Campaign is being conducted and demonstrations organised to



Coconut garden severely affected by black headed caterpillar

explain to the farmers the ways to control the disease since all farmers in an area have to take the measures simultaneously as individual efforts would not be of any use since the black-headed caterpillar would spread from one tree to another and one area to another.

Horticultural officers are visiting every village to explain the control measures. A pamphlet was also being brought out on control measures. The farmers were being told to take up root-feeding method,

spraying or introduce bio-agents on the affected trees which eat away the black-headed caterpillar.

Spraying of pesticide was not possible in case of long trees and root-feeding method (mixing a pesticide with water and tying the bagful of mixture to a root) could be adopted in such cases, he said. Rain would bring down the problem but right now hot summer heat was being experienced, he added.

The farmers were already on the job and the effect of the measures could be seen only when fresh leaves start sprouting after the caterpillar was killed, Mr. Prabhakara Rao said.

Campaign through television and oral publicity was first done by a scientist of District Agriculture Advisory Committee C.V. Rama Rao after he noticed the problem in the coconut groves in January.

(Source: The Hindu)

Tiptur coconut ravaged by pests and diseases

The mere mention of the name of Tiptur conjures up the images of vast coconut plantation and of the sweet tender coconuts. No doubt, Tiptur coconut is famous across the country for its big size, thick pulp and sweet water.

However, this year, the coconut plantation in the taluk has been ravaged by pests and diseases.

The trees have been ravaged by pests like mites (nusi in Kannada), red palm weevil (Kempu Muti Hula), Black-headed Caterpillar (Kappu Tale Hula) and by stem bleeding disease.

Coconut trees affected by wilting and devoid of leaves have become a common sight in the taluk. This is the first time in the history of the taluk, which is known as Kalpataru Nadu (land of bounty) due to the sheer number of coconut trees, that the plantation in many fields are totally destroyed.

The farmers of the region who traditionally cultivated coconuts, reaped huge profits from the crops. So much so that even rain or no rain didn't affect their prospects much. However, today the hapless farmers are forced to see the destruction of their plantations, they once cherished so much.

According to an estimate coconut is cultivated in as much as 25000 hectares and there are three lakh trees. Nearly, 30 percent of these trees are reportedly dead.

As much as 60 percent of the trees are affected by wilting and many stand out like sticks stuck in the ground after losing all the leaves. The worst affected are the farmers,

An expert team from Coconut Development Board headed by Director will be visiting the affected areas shortly and will prepare a preliminary report on the infestation.



who had newly raised the tree and hoped to see the flowers (hombale). However, the trees are dying even before flowering.

According to Agriculture Department, 25 percent of the coconut yield has been destroyed. But it is estimated that the yield will go down by 60 percent as many trees are very weak.

However, in reality the situation is said to be even worse with farmers silently suffering the loss.

Apart from the pests and diseases, the successive droughts coupled with rapid decline in groundwater and scorching heat have also contributed to the withering of the trees.

Due to the drought, the groundwater had depleted severely in the taluk. During summer, the farmers sunk bore wells and harnessed the water through motor pump to cultivate the crops.

However, this time even that option is not there as one has to dig more than 600 feet to get water and even that is not confirmed.

The coconut trees in Halkurike, Honnavalli, Gunguramale, Mallenahalli, Shivara, Bennayakanahalli and Byranayakanahalli in the taluk have been severely affected.

The trees in Belagarahalli, which were infested by Black headed Caterpillar, have lost all the leaves and also new shoots and have ended up looking like sticks needled to the ground.

It is said that even if it rained well this season, the trees may take more than three to four years to reach the fruit-bearing stage again.

It is also said that reviving groundwater might be the only way to save coconut plantation in the taluk.

(Source: Deccan Herald)

Karnataka farmers visited Coconut Development Board

In order to create awareness on various schemes implemented by CDB in Karnataka and to have a first hand information on the different value added products and processing techniques of coconut

Growers Association Karnataka had interaction with Shri. T K Jose IAS, Chairman and officers of Coconut Development Board.

Shri. T K Jose IAS spoke on the

level awareness programme on TMOc in the district. Many of the farmers who were already into processing of different coconut products shared their experience. Dr. Remyan Gopalakrishnan,



Karnataka farmers in the meeting at CDB

and assistance provided by CDB, a team of 45 coconut farmers from different parts of Turuvekere taluk of Tumkur district visited Coconut Development Board, Kochi on 17th May 2013. The team led by Shri Siddabasappa, Convener Coconut

importance of formation of CPS, CPF and PC in the state of Karnataka. Chairman assured full support from CDB in providing training in value addition of coconut products and in organizing district

Deputy Director, CDB and Smt. Mridula. K., Technical Officer, CDB spoke during the occasion. The team also visited CPCRI Kasaragod, coconut seed gardens, coconut processing centers etc.

Farm Review Meeting held

2nd Farm review meeting of CDB was held on 23rd and 24th May 2013 at Coconut Development Board, Kochi. Shri. T K Jose IAS, Chairman, CDB in his introductory remarks emphasized the importance of producing quality coconut seedlings. Except the DSP farms of the Board, very few government agencies are producing quality coconut seedlings and hence the seedlings of CDB are in great demand. Since states like Maharastra, Tamil Nadu, West Bengal and Tripura are potential areas for coconut cultivation, Board is planning to establish DSP farms



Shri. T K Jose IAS, Chairman, CDB addressing the Farm Managers. Shri. Sugata Ghose, CCDO and Dr. A.K. Nandi, Secretary are seen

in all these states. Shri. Sugata Ghose, CCDO spoke on Changes in concept and outlook of DSP Farms. The activities of the Farms were reviewed and the Annual Action Plan and Performance

Indicators for 2013-14 was finalized by the meeting. It was decided that nursery programme will be continued during the next year also and a production target of 1.5 million seedlings was fixed.

Symposium on Neera held

Tapping neera and making value added products out of it is the best alternative to save the coconut farmers now who are reeling under severe price crash of coconut, said Shri. T.K. Jose IAS, Chairman, Coconut Development Board in his introductory remarks in the Symposium on Neera held at Kochi on 27th April 2013. Even though the technology is available in Kerala for processing neera, neera tapping is not permitted in Kerala. He requested that CPSs shall be accorded permission to tap neera. Dr. V K Raju, Kerala University spoke on the technology and economics of neera. Shri. Gopi Kottamurikkal, State Treasurer, Karshaka Sangam, Adv. Chitra Bhanu, Representative, Kissan



Shri. T.K. Jose IAS, Chairman, CDB delivering the introductory remarks

Sabha, Shri. C M Ahmed Bava, Representative, Karshaka Sangam, Shri. Babu Joseph, Member Neera Committee, Smt. Deepthi Nair, Marketing Officer, CDB and Shri. K S Sebastian, Assistant Marketing Officer CDB spoke during the

occasion, Shri. Sugata Ghose, CCDO, Coconut Development Board delivered the welcome address and Dr. Remany Gopalakrishnan, Deputy Director, Coconut Development Board proposed a vote of thanks.

Expert Committee for revitalizing the Regional Commodity Exchanges visited CDB



Shri. T K Jose IAS, Chairman, CDB in discussion with the expert committee.

The Expert Committee for revitalizing the Regional Commodity Exchanges constituted by the Department of Consumer Affairs, Ministry of Consumer Affairs, Food and Public

Distribution visited Coconut Development Board on 24th May 2013. The Committee held discussion with Shri. T K Jose IAS, Chairman, CDB on views and suggestions of CDB regarding

future trading in coconut oil and copra. Prof. Gopal Naik, Professor of Economics and Social Sciences, IIM Bangalore is the Chairman of the Committee.

Meeting of the leaders of Thrissur District CPF held



Shri. T K Jose IAS, Chairman, CDB addressing Federation leaders of Thrissur district

A meeting of the leaders of Coconut Producers Federation from Thrissur district was held on 23rd May 2013 to discuss the progress and formation of Coconut Producers Company in Thrissur District. 30 leaders from 16 CPFs from various Panchayaths attended the meeting. Shri. T.K. Jose, IAS, Chairman,

CDB spoke on the concept of Farmers Producers Organization (FPO)/Coconut Producers Company (CPC) and the vision of CDB. He has also spoke on how to avail subsidy from Small Farmers Agri Business Consortium and state government for the Producer Company. Shri. K.S. Sebastian,

Asst. Marketing Officer delivered the welcome address and Shri. Sasikumar C, Technical Officer, spoke on the status and achievement of CPFs in Thrissur District. A preliminary meeting to discuss the formation of Producer Company is scheduled on 10th June 2013 at Kodungallur Taluk in Thrissur District.

Kozhikode district Coconut Producers Federation leaders workshop held



Shri. T K Jose IAS, Chairman, CDB and Prof. G. Balachandran, Chairman, Coir Board in discussion with Federation leaders

One day Coconut Producers Federation leaders Workshop from Kozhikode District was held on 30th April 2013 at Kerabhavan, Kochi. Shri.T.K. Jose IAS, Chairman, Coconut Development Board spoke

on the potentials of Producer Company. Prof. G. Balachandran, Chairman, Coir Board and Shri.Kumaraswamy Pillai, OS(D), Coir Board spoke during the occasion. 25 representatives of 14

CPF attended the meeting. Shri.K.S. Sebastian, Asst. Marketing Officer delivered the welcome address and Smt. Mridula K, Technical Officer, CDB proposed a vote of thanks.

Fruit Festival-2013

Coconut Development Board, State Centre, Pitapally participated in 2nd State Level Fruit Festival-2013 organised by Directorate of Horticulture & Odisha Horticulture Development Society from 19th to 22nd May 2013 at Adivasi Ground, Bhubaneswar. Shri Naveen Patnaik, Chief Minister, Odisha inaugurated the festival. Dr. Prasanna Kumar Patsani, Member of Parliament, Khurda, Mr. Rangalal Jamuda, IAS, Principal Secretary to Govt. of Odisha, Dept of Agriculture, Shri Debi Prasad Mishra, Minister of Agriculture, Fisheries & Animal Resources Development and Dr. Sanjeev Kumar Chadha, IFS, Director, Directorate of Horticulture, Odisha were present during the occasion.



Stall of Coconut Development Board in the Fruit Festival 2013

Board displayed various value added products like virgin coconut oil, VC capsule, desiccated coconut, coconut milk, coconut jam, squash, coconut oil, coconut milk powder, activated carbon, handicraft items etc. Different informative posters on various aspects of coconut and its products were also exhibited during the programme.

FoCT and CPS programme spreading across India

The FoCT and CPS programme initiated by the Board in the state of Kerala is taking root across the country now. Friends of coconut Tree Programme is conducted in eight states now and 13,377 people are trained by the Board so far. The formation of CPS and CPF is also picking up in the major coconut growing southern states. So far 3,536 CPSs and 125 CPFs are formed in the country.

FOCTs trained across India

Lakshadweep	101
Maharashtra	256
Karnataka	406
Odisha	40
Chhatisgarh	17
Goa	60
Tamil Nadu	1,196
Andhra Pradesh	80
Kerala	11,221
Total	13,377



A meeting of Chamundeshwari CPF at Kadakola, Karnataka
Progress of Coconut Producers' Society and Federation

States	CPS in formation process	CPS registered with CDB	CPF in formation process	CPF registered with CDB	CPC registered
Kerala	3013	2282		106	2
Tamil Nadu	199	47	9	0	0
Karnataka	105	1	35	19	0
Andhra Pradesh	219	1		0	0
Total	3536	2331	44	125	2

Krishi Fair 2013

Coconut Development Board, State Centre participated in 3rd Krishi Fair 2013 organised by Shree Shrikshetra Soochana, Puri from 19th to 23rd May 2013 at Puri. Dr. S. C. Jamir, Hon'ble Governor of Odisha inaugurated the fair. Sri Brajakishore Tripathy, former Union Minister and Shri Naba Kumar Nayak, Collector, Puri were the guests of honour. Dr. S. C. Jamir Governor of Odisha visited all the stalls. Board exhibited value added products of coconut like virgin coconut oil, VC capsule, desiccated



A view of the Board's stall in Krishi Fair 2013

coconut, coconut milk, coconut jam, powder, other handicraft items, squash, coconut oil, coconut milk photographs on various activities and achievements of the Board.

Business Opportunities

SPA, VCO AND VCO-BASED PRODUCTS:

Virgin coconut oil (VCO) made in Java Indonesia. VCO based products such as body scrub cream, massage cream, massage oil aromatherapy, soap, shampoo and hair conditioner. Interested parties may directly contact:

Mrs. Yayi
Marketing Manager
Cocona Spa
PT. Trimatari Bio Persada Recovery
Jl. RS. Fatmawati 39, IEC
Jakarta 12430, Indonesia
Email: trimatari@dnet.net.id
Mobile: 62-81380394653
Tel: 62-21-75906715, 75906505
Fax: 62-21-75906604
Website: <http://cocona-vco.id.88db.com>

ACTIVATED CARBON AND COCONUT CHARCOAL BRIQUETTE

Ready stock/supply capacity: 40 tons a month. Offered selling price: USD 340 per ton FOB Makassar, Indonesia. Warehouse and factory open for visit or survey. For further details contact:

Mr. Jadmiko
PT. Asmir Agro Prima
Jl. Insinyur Sutami No. 3, Makasar
Mobile: +62-82190659999
Email: djadmiko_sby@yahoo.com

VCO AND VCO-BASED PRODUCTS

Virgin Coconut Oil (VCO) made in Indonesia by centrifugal process is available for domestic and international market. Other VCO based products such as herbal scent body soap, hand body lotion, coco-spa body scrub and sprayed flu care are also available. Interested parties may directly contact SME producer:

Mr. Wisnu Gardjito
CEO Sumber Rejeki Ltd
Permata Duta E3 No. 17, Sukmajaya, Depok
West Java, Indonesia 16415
Email: sumberkelapaindonesia@yahoo.com
Mobile: 62-818802921
Website: www.thegreencocoisland.net

Source: Cocommunity, May 2013

RAW COCONUT SHELLS

Raw hard coconut shells in any desired quantity and safe packaging obtained from best quality natural coconuts for making shell charcoal, shell based activated carbon, shell powder and application for chemical industry is available for sale. Interested parties may directly contact:

Selva, Sekhar Export and Import Logistics
S R Stone, 50 A Avudaiyalpura Keela Street,
Indinthakarai Post, Thirunelveli District
Tamilnadu -627 104
Phone: 0091 9629111747/00919941659680
Email: kumarsalesindia@gmail.com

Monthly operations in coconut gardens

June

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 1litre 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 1 percent bordeaux mixture. Adopt plant protection measures 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 chlorpyrifos



Grub of Cockchafer beetle

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.



Bud rot affected palm

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 - April 2013

Depthi Nair S.

Marketing Officer, CDB, Kochi

Highlights

- ◆ The monthly average price of milling copra and coconut oil expressed a slight increase over the previous month though a downward trend was noticed during April 2013 at all the major markets.
- ◆ The international price of coconut oil expressed a downward trend during the month under report.

The month of April witnessed a downward trend in the prices of copra and coconut oil at all important markets in Kerala. The price of coconut at Nedumangad market remained steady through out the month.

COCONUT OIL

The price of coconut oil quoted at all the major marketing centres in the country expressed a downward trend during the month of April 2013, but the monthly average price in April 2013 in Kochi, Alappuzha and Kozhikode markets were marginally higher than the price of March 2013.

The monthly average price of coconut oil at Kochi was Rs. 6352/- per quintal. The price of coconut oil at Alappuzha market also moved in tune with the price behavior of Kochi market. The monthly average

price was Rs. 6323/- per quintal at Alappuzha market and Rs.6633/- at Kozhikode market.

MILLING COPRA

The monthly average prices of FAQ copra recorded at Kochi market was Rs.4453/- per quintal. The monthly average prices of Rasi copra at Alappuzha market was Rs.4467/- and at Kozhikode market was Rs.4460/- per quintal. The prices at Kochi, Alappuzha and Kozhikode were marginally higher than that of the previous month. The Minimum Support Price of milling copra has been fixed at Rs. 5250/- per quintal for 2013 season.

The monthly average prices of milling copra at Ambajipeta market in Andhra Pradesh was Rs.4220/- per quintal.

EDIBLE COPRA

The monthly average prices of

Rajapur copra at Kozhikode market was Rs.4673/- per quintal, which was marginally lower compared to the price of the previous month.

The monthly average prices of ball copra at Kozhikode market averaged at Rs.4223/- per quintal.

The monthly prices of ball copra at APMC market Tiptur, in Karnataka averaged at Rs. 4634/- per quintal in April 2013 while it was Rs 4870/- in Bangalore and Rs. 4634/- in Arsikere.

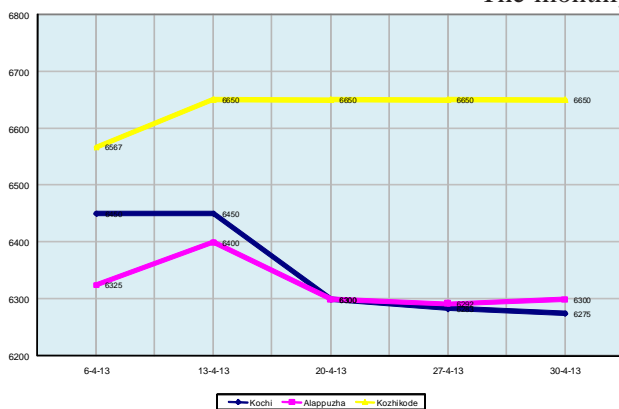
The Minimum Support Price of edible copra has been fixed at Rs. 5500/- per quintal for 2013 season.

DRY COCONUT

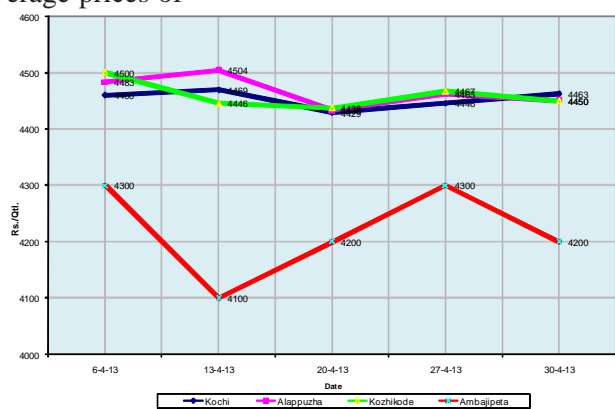
The monthly average price of dry coconut was around Rs.4231/- per thousand nuts at Kozhikode market which was about 6 percent higher than that of the previous month.

COCONUT

The monthly average price of Rs.7210/- per thousand nuts for dehusked coconut at Nedumangad market was marginally higher than that of the previous month.



Price behaviour of coconut oil during April 2013



Price behaviour of milling copra during April 2013

Monthly average prices of mature nut, tender nut and ball copra in North Eastern Region during April 2013

Products	Mature nuts (in Rs./ nut)	Tender Nuts (in Rs./ nut)	Ball Copra (in Rs./ Kg.)
ASSAM			
Guwahati	40	25	85
Nelbari	36	15	170
Nagoan	NA.	NA	NA
Sonitpur	34	18	NA
Darrang	47	23	130
Karimganj	25	20	95
Silchar	24	25	NA
NAGALAND			
Dimapur	31	19	110
MIZORAM			
Aizawl	50	50	NA
TRIPURA			
Agarthala	25	20	98

Arsikere APMC market recorded an average of Rs.6528/- for thousand partially dehusked nuts which was about 5 percent higher than that of previous month.

The monthly average price of partially dehusked coconut at Bangalore APMC market was Rs. 7083/- which was about 8 percent lower than that of previous month.

The monthly average price of partially dehusked coconut Grade-1 quality at Mangalore APMC

market slid to Rs.9300/- per thousand nuts which was about 15 percent lower than that of the previous month.

The monthly average price of coconut was Rs.34/- at Sonitpur and Rs.40/- at Guwahati in Assam, while it was Rs.50/- at Aizawl in Mizoram and Rs. 25/- at Agartala in Tripura.

TENDER COCONUT

The retail price of tender coconut at Kochi market ranged

Market Price

Date	Coconut Oil			Milling Copra				Edible Copra	Ball Copra				Dry coconut	Coconut	Partially dehusked coconut					
	Rs./Qtl.																Rs./1000 nuts			
	Kochi	Alappuzha	Kozhikode	Kochi (FAQ)	Alappuzha (Rasi Copra)	Kozhikode	Karkala	Kozhikode	Kozhikode	Tiptur	Bangalore	Arsikere	Kozhikode	Nedumangad	Arsikere	Bangalore	Mangalore (Grade-1)			
6-4-13	6450	6325	6567	4460	4483	4500	4300	4667	4213	4600	5000	4592	4217	7200	6500	7250	11000			
13-4-13	6450	6400	6650	4469	4504	4446	4100	4700	4200	4633	4900	4627	4220	7250	6917	7167	8667			
20-4-13	6300	6300	6650	4429	4433	4438	4200	4708	4250	4654	4850	4698	4250	7200	6042	7000	9000			
27-4-13	6283	6292	6650	4446	4463	4467	4300	4642	4250	4683	4800	4680	4217	7200	6433	7000	8833			
30-4-13	6275	6300	6650	4463	4450	4450	4200	4650	4200	4600	4800	4575	4250	7200	6750	7000	9000			
Average	6352	6323	6633	4453	4467	4460	4220	4673	4223	4634	4870	4634	4231	7210	6528	7083	9300			

Source: Kochi: Cochin Oil Merchants Association and Chamber of Commerce, Kochi - 2, **Kozhikode:** The *Mathrubhumi* daily **Alappuzha:** The *Malayala Manorama* daily, **Arsikere :** APMC, Arsikere
Price quoted for *office pass* copra at Kozhikode and *Rasi* copra at Alappuzha markets.

from Rs.20 to 25/- per nut. The monthly average price of tender coconut at Guwahati in Assam was Rs.25/- per nut while it was Rs.50 at Aizawl in Mizoram and Rs. 20/- at Agartala in Tripura.

INTERNATIONAL PRICE

The monthly average price of US \$800 per MT for coconut oil in Europe (C.I.F. Rotterdam) for the month of April 2013 was marginally lower when compared with the price of the previous month and lower by about 41 percent compared to that of the corresponding month last year. The monthly average price of US\$528 per MT for copra was about 6 percent lower than that of the previous month and about 61 percent lower than that of the corresponding month last year.

The domestic price of coconut oil during the month of April 2013 in Philippines was US\$792 per MT and in Indonesia; the price was US\$806 per MT. The international price of Palm oil, Palm kernel oil (RBD) and Soybean oil were US\$843, US\$828 and US\$1101 per MT respectively.