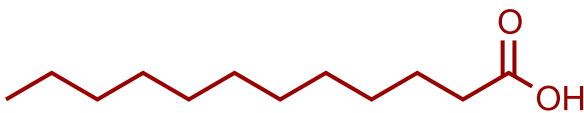




# Indian Coconut Journal

Lauric Acid (C<sub>12</sub> H<sub>24</sub> O<sub>2</sub>) Chemical Structure



Coconut oil contains 46-50% Lauric acid



*Coconut is heavy, oily, pacifies heat, sweet and cool. It improves musculature, maintains cardiovascular health, promotes growth and cleanses the urinary bladder.*

*(Sushruta Samhita)*

*Coconut oil is aphrodisiac, heavy, nourishes depleted tissues, pacifies heat and exhaustion and is useful in treating diseases like diabetes, asthma, cough, wasting and injuries.*

*(Saligrama Nighantu)*



## Coconut for Health & Wealth

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# Coconut and its products for health and wealth

*Dear coconut farmers,*

Coconut and coconut oil has been the subject of controversy for nearly four decades. The goodness of coconut and the health benefits and the wealth this crop offers to us are immense. In spite of the propaganda against coconut oil, it still holds the status of a premium edible oil.

It was in 1956, that some studies in USA found that there are saturated fatty acids in coconut oil. They concluded that all saturated fatty acids are not good for health. Later on it was revealed that these studies were funded by the association of soybean producers. Unfortunately this negative publicity against coconut oil linking its consumption with Coronary Artery Disease (CAD) in human beings got over attention of the media. This negative propaganda not only discouraged new users but also weaned away traditional users of coconut oil. This in turn impacted the demand of coconut oil and adversely affected the crop to a certain extent.

Later in the subsequent decades, American nutritionists like Dr. Mary G Enig and Dr. John J. Kabara have proved that coconut oil even though contains saturated fatty acids, they are medium chain fatty acids and not adding to cholesterol in human body.

**The lauric acid in coconut oil is used by the body to make the same disease fighting fatty acid derivative monolaurin that babies make from the lauric acid they get from their mother's milk.**

The medium chain fatty acids in coconut oil are similar to fatty acids in mother's milk and have similar nutraceutical effects.

Many renowned doctors from India also have proved that the mispropaganda against coconut oil is baseless. Researches done by Dr. Rajamohan, Head of the Department of Biochemistry of University of Kerala have revealed the beneficial effects of coconut oil and these results are published in many scientific journals.

Even though many people in the country are unaware of the researches and studies that have come up after 1956, there exist some speaking truths. USA which had initialized the propaganda against coconut oil is now the largest importer of coconut oil. Germany, Netherlands, Russia, China and Italy are just behind USA in import of coconut oil. The major portion of the coconut oil imported to USA are used by the baby food and bakery industries. It is also being used for producing ingredients of anti fungal medicines. USA is also a major importer of virgin coconut oil and desiccated coconut.

Until Second World War, coconut oil and palm oil were the major edible oils of USA. The economic recession that followed the World War forced them to shift from the imported coconut oil and palm oil to the locally available soybean oil. Soybean never had any acceptance among the Americans prior to Second World War as a cooking oil. It was cultivated mainly for making cattle feed. The soya oil was rarely used as it was not having the taste and quality of coconut oil. During that period the American society had been experiencing an increasing trend in Cardio Vascular Diseases. It was the research sponsored by an organisation of the soybean farmers propagated that soybean oil is less harmful for human heart than coconut oil and palm oil. This research result was given wide publicity by the soybean lobby through the media.

The 10 million small and marginal coconut farmers in India didn't had the backup of an organisation or the sound finance to counter this propaganda. The situation in other coconut producing countries in Asia and Pacific region was also not much different. Subsequently there came up many studies on the goodness of coconut oil, but there were no effective medium and strength to communicate them to the consumers. Now to broadcast the correct facts and truth there is a need of Farmers' Producer Organisations in India. Initiative of the Board to form CPSs and Producer Companies is a humble beginning in this direction.



Coconut and coconut related products help in maintaining wellness with a range of health benefits. There are an array of medicines, creams and ayurvedic oils which are made with coconut oil as basic medium. Virgin Coconut Oil (VCO) contains lots of vitamins, minerals and anti oxidants. VCO is a major source of lauric acid and Vitamin E. Coconut is a good source of dietary fibre known to be valuable in digestive function. Desiccated coconut contains the highest percentage of dietary fibre and due to this there is increasing demand for the desiccated coconut in many developed countries.

The whole world is turning to 'soya free, gluten free, dairy free, egg free and nut free' creams. The only source of such creams are coconut milk and tender coconut. Foreigners have started using creams made out of coconut for making ice cream and yoghurt. This opens up yet another opportunity for the coconut farmers. It is a happy news to the farmers that the Department of Biotechnology of School of Communication and Management Studies (SCMS), Kochi have developed a 'very low fat sugar free cream' from coconut.

**Coconut oil has anti microbial properties that provide great resistance to various kinds of skin ailments and hence coconut oil and virgin coconut oil are used widely in skin care products.**

There is no record of using soybean oil, sun flower oil, ground nut oil, palm oil, rice bran oil or other vegetable oils for skin care purpose. Only coconut oil, virgin coconut oil, olive oil and gingelly oil are predominantly used for skin and hair care. Opportunities can be enhanced in this front too.

Tender coconut water is the only wholesome natural beverage available in the world. Rich in vitamins and minerals, this thirst quencher rejuvenates the body and mind. The demand for tender coconut water is on the increase not only in South east Asian countries but also is USA, Canada, Germany and Australia. Philippines, Thailand, Indonesia, Malaysia, Sri Lanka and Brazil were the leading exporters of tender coconut water. But now as the demand has gone up, these countries are unable to cater to the growing demand of export requirements. Hence this is the apt time for India to explore the potential of tender coconut export market. Despite its increasing

demand the industry could not exploit it fully due to absence of processing units. Only a few units are there in Tamil Nadu, Karnataka, Andhra Pradesh and Gujarat which are into processing and marketing of tender coconut water.

How can we offer the farmer a steady and fair price for coconut and at the same time provide consumers the products at an affordable price. The consumer is forced to pay a much higher price than the existing wholesale market price for the filtered pure coconut oil in bottles and pouches. There are also cases of adulteration of coconut oil in unpacked form. It is high time that the coconut farmers as well as the CPS should think of making available pure unadulterated coconut oil to the consumers at a reasonable price.

The demand for coconut oil is also increasing in ayurvedic medicines and in cosmetics. There is also increased demand for coconut milk, desiccated coconut powder and virgin coconut oil. But there exists a wide demand supply gap. The coconut farmers and Coconut Producer's Societies (CPS) should work for forward linkages to bridge gap. It is high time that the Producers Societies should be graduated to form Producer's Companies with viable size and capital.

Concerted efforts are to be made to identify more avenues for the use of coconut and coconut oil beyond their edible utilities. Coconut oil is used as cooking oil only in Kerala, certain areas of Karnataka, Tamil Nadu and in some parts of North Eastern states. But coconut oil and virgin coconut oil do have a worldwide market in health care, skin care, baby oil and cosmetic industries. We must work unitedly for getting a profitable and steady price to farmers. This can be made possible through the farmers' forum like CPS and the Producer Companies. We may also bring forward new entrepreneurs especially NRIs into processing and value addition of coconut. Let us put our priorities for such activities in the coming year for achieving the goal of making India the world leader in coconut in production, processing, value addition and exports.

Wishing you all a very happy and prosperous 2012.

  
T.K. Jose IAS  
Chairman



## Tender coconut water, a divine health elixir

BM Hegde\*

*“Be careful about reading health books. You may die of a misprint”* **Mark Twain**

Nature has given us all that we need for good health in our environment. Man, with his inclination for comfort and greed has either destroyed all of them or has created his own poisons in place of the God given food or drinks. Tender coconut water is one such divine drink with multiple health benefits. Water from young tender coconut gives long list of health benefits. It is a store house of electrolytes, minerals, vitamins, amino acids, trace elements, enzymes, anti-oxidants and phytonutrients. Although it is sweet depending on where it grows, it does not contain much sugar and can even be used by diabetics with care. There is no other drink in the world which is both a good rehydrating fluid and is a great tonic for good health. It is sterile when it is inside the nut. Tender coconut water was given directly intravenously during cholera epidemics when I was a student in the 1950s. Probably this is the only one natural drink that could be taken both orally and intravenously!

Studies have shown that it's great for post-exercise rehydration, has anti-inflammatory properties, protects heart and urinary tract, is a digestive tonic, improves skin and eyes, supports good immune function and can even help balance blood glucose and insulin levels. It is a great source of cytokinins plant hormones that have anti-cancer, anti-aging, and anti-thrombolytic benefits in humans. Coconut water is the liquid part of the endosperm (kernel) of the coconut fruit. When coconuts are immature, the endosperm is semisolid and jelly-like. When it matures, the endosperm becomes more solid and fibrous and develop into firmer coconut meat. As the coconut matures, the water inside is replaced by more coconut meat and air.

### Coconut water has five electrolytes that the body needs

- Potassium** The most important positive ion (cation) inside your cells. Potassium regulates heartbeat and muscle function
- Sodium** The most important positive ion in fluid outside your cells, and also the one most depleted with exercise, as you lose sodium through sweat and urine
- Magnesium** Important for maintaining the electrical potential of your cells, proper muscle function and preventing calcium overload
- Phosphorous** Play important roles in bone health in transferring energy throughout your body, helping your muscles contract and regulating nerve function (partners with calcium)
- Calcium** Important for bone health (partners with phosphorous)

Cytokinins are phytohormones or plant hormones. These hormones regulate the growth development and aging of a plant. Coconut water has been an important horticultural resource used in the propagation of several plants including orchids and traditional Chinese medicinal herbs. The cytokinins found in coconut water support cell division and promote rapid growth. Cytokinins have actually been found to exert an anti-aging effect on human cells and tissues. When human cells are exposed to cytokinins aging slows down considerably. Cells treated with cytokinins doesn't undergo normal degenerative changes. Researchers

**Dr. Mercola of USA lists the benefits of coconut water in the table which is self explanatory**

Rehydration (water and electrolytes)	Increased exercise performance	Cardio protective (rich in potassium and magnesium); helps regulate blood pressure, improve circulation, reduces plaque formation
Anti-inflammatory; reduces swelling in hands and feet	Prevents abnormal blood clotting	Aids in kidney function (preventing and dissolving kidney stones, UTI remedy)
Helps balance blood glucose and insulin levels	Digestive tonic (rich in enzymes); feeds friendly gut flora	Remedy for constipation and diarrhea
Anti-aging properties	Enhances skin health (elasticity, age spots, wrinkles), improves wound healing	Enhances eye health (cataracts, glaucoma)
Supports good immune function; antimicrobial (contains monolaurin)	Helps prevent osteoporosis	Anti-cancer properties

have suggested that if you consume a diet rich in cytokinins, you may experience anti-aging effects and have less risk for degenerative and age-related diseases. Coconut water is the richest natural dietary source of cytokinins. Cytokinins have also been found to have anti-thrombolytic properties so may lower your risk for blood clots. But coconut's health benefits doesn't stop there. They have also been shown to have anti-cancer effects.

I hope the coconut industry realizes the importance of this heavenly elixir and would come out with a natural preserving method without chemical additions possibly in a vacuum container to be sold as the best health drink. Most if not all of the advertised health drinks and the fancy coloured soft drinks sold in the market are a good source of unhealthy chemicals that eventually destroy and damage body cells.

*“The best six doctors anywhere  
And no one can deny it  
Are sunshine, water, rest, and air  
Exercise and diet.  
These six will gladly you attend  
If only you are willing  
Your mind they’ll ease  
Your will they’ll mend  
And charge you not a shilling.”*

*Nursery rhyme quoted by Wayne Fields,  
What the River Knows, 1990*

*\*Former Vice Chancellor, Manipal Academy of Higher Education. hegdebm@gmail.com*

**"Doctor" by nature**

**T**ender coconut water is full of potassium, calcium and other vital minerals. It is also naturally antibiotic. It helps to reduce blood pressure, improve circulation, and reduce plaque formation.

Here are the reasons why tender coconut water is good for your health:

- It is naturally fat free.
- It is a healthy drink packed with vitamins and minerals needed by your body.
- It is a low calorie beverage.
- It contains more potassium than most energy and sports drinks.
- It has low sodium. It's gentle and easy to drink. Low sodium means less heart problems and less dehydration.
- It has natural sugars and electrolytes instead of processed sugar.
- It has natural fruit and can be used for dehydration.
- It is a healthy drink that is a great choice for a hot day. It has natural vitamins and minerals.
- It is filled up with natural and healthy nutrients.





Coconut and its products served man as important foods for thousands of years. Almost all parts of the coconut tree are useful to mankind. Coconut is most valued for its nuts. The nut contains a refreshing liquid, the coconut water and a white material called the kernel. The kernel is an important dietary component of food in all coconut producing countries. Coconut and its oil form an important part of the daily diet of the population in Kerala. They are also consumed for many centuries by millions of people in Philippines, Indonesia, Srilanka and the islands in the Pacific. Unfortunately, there is fear among the population that consumption of coconut oil may increase blood cholesterol and thus lead to cardiovascular disease. (CVD). Numerous studies have clearly demonstrated elevated blood cholesterol level as the major risk factor for CVD. In the late 1960's clinical and epidemiological studies shown that the risk of CVD was directly related to the concentration of blood cholesterol. Subsequently in the early 1970's, these findings were extended from the cholesterol hypothesis, when it was shown that the risk of CVD is directly related to blood LDL cholesterol and inversely related to HDL cholesterol. During 1980's, the American Soyabean Association afraid of competition from coconut oil and palm oil launched a campaign to boost soyabean oil sales by warning the American consumers that coconut oil elevates blood cholesterol. According to them the high percentage of saturated fatty acids in coconut oil tends to increase the level of serum cholesterol, one of the causes of CVD. Coconut oil contains 92 % saturated fatty acids. When we consider CVD, elevated serum cholesterol is an established risk factor. Many epidemiological studies have shown that it is the LDL cholesterol that is positively correlated with the CVD, while the level of HDL cholesterol is inversely correlated with CVD in both sexes and all ages. When we consider the effect of coconut oil on blood cholesterol, it is very important to remember that

## Coconut - an important functional food

*T. Rajamohan\**

dietary fat is the only one of the factors that influences heart disease. There are several other factors in your diet and lifestyle that influence serum cholesterol. Therefore in human situation it is the interaction of these factors which is important rather than the contribution of any one factor alone. Research findings now suggest that coconut can make a come back because of its unique and healthy properties.

### Studies in Kerala population

The characteristic feature of Kerala diet is the use of coconut oil and fresh coconut kernel in most culinary preparations. Thus the coconut oil diet is partly from the free oil and partly from the coconut kernel. Clinical studies carried out by the Department of Biochemistry, University of Kerala as part of the research project funded by Coconut Development Board clearly disproves the allegation against coconut oil consumption. A total number of 258 volunteers participated in the study. Average daily consumption of coconut kernel of these subjects was 55.8 g/head/day. The average free coconut oil consumption was 15.4 g/head/day. Thus the average coconut oil consumption (free oil + oil derived from kernel) was 38 g/head/day. These subjects were put on a coconut oil and groundnut oil diets for a period of 6 weeks. Fasting blood samples were collected from these subjects for the estimation of serum lipids. The result of the study indicates that coconut oil consumption does not cause increase in blood cholesterol or LDL cholesterol, but increase in blood HDL cholesterol. Consumption of coconut kernel along with coconut oil, as is the invariable practice in the Kerala population produced lower total cholesterol and LDL cholesterol and higher HDL cholesterol. Apart from coconut oil, coconut kernel contains 5% protein and 7% dietary fiber. In view of the importance of coconut in the diet of mankind, extensive studies were carried out by us using coconut and its constituents to find out its beneficial properties in health and disease.

### Coconut protein

Coconut protein is an important byproduct obtained during the extraction of oil from coconut and the major protein fraction is the globulins. Animal studies revealed that the major protein fraction isolated from the kernel possess significant hypocholesterolemic and cardio protective properties. Studies demonstrate that coconut protein is able to reduce hyperlipidemia and peroxidative effect induced by high fat cholesterol containing diet. Cardioprotective effect of coconut protein was studied using isoproterenol treated rats induced myocardial infarction. Results indicate that coconut protein may cause less incidence of myocardial infarction. Studies demonstrate that coconut protein has antidiabetic properties in rats induced diabetics. The beneficial effect of the coconut protein is mainly due to the L-Arginine present in it. It contains about 20% L-Arginine. L-Arginine has reported to possess significant cardioprotective and antidiabetic properties in several studies.

### Coconut fiber

Coconut is an ideal source of dietary fiber. Coconut kernel is one of the highest source of dietary fiber among all plant foods. For the last several years considerable research has been conducted using dietary fiber to find out its effect on health and disease. These studies indicate that a high fiber diet may reduce the risk of heart disease, diabetes, colon cancer etc.

Coconut kernel contains about 7 % dietary fiber. The Neutral Detergent Fiber (NDF) isolated from the kernel contains 45.1% hemicellulose, 43.28 % cellulose, 8.15% lignin 3.28% cutin and 0.25 % silica. Animal studies using dietary fiber from coconut kernel revealed that it possesses significant cholesterol lowering and glucose lowering properties. There was significant lowering of serum total cholesterol, VLDL+LDL cholesterol and an increase in HDL cholesterol. A hypocholesterolemic effect was observed in the aorta and other tissues. Further studies indicated that the hemicellulose component was responsible for the observed hypocholesterolemic effect.

### Virgin Coconut Oil

Today, Virgin Coconut Oil is becoming valuable oil because of its several biological properties. Recent studies carried out by us indicate that Virgin Coconut Oil extracted by wet process from fresh coconut

kernel is more beneficial than the oil extracted from dry copra. Studies demonstrate that Virgin Coconut Oil has beneficial effects in lowering lipid components compared to copra oil. It is superior in antioxidant action than copra oil and groundnut oil. Further studies revealed that Virgin Coconut Oil has significant antithrombotic effects and the effects were comparable with that of sunflower oil. Tropical application of Virgin Coconut Oil results in significant dermal wound healing in experimental animals. Virgin coconut oil increased the wound healing process indicated by higher levels of collagen, elastin, DNA, protein and total glycosaminoglycans (GAG) than untreated controls.

### Tender Coconut Water

Tender Coconut Water (TCW) is the most nutritious wholesome beverage that the nature has provided to mankind. It contains several biologically active components namely sugars, proteins, free amino acids, vitamins, minerals and growth promoting factors. TCW has significant cholesterol lowering action and cardioprotective effect in rats induced myocardial infarction. Comparative studies using TCW with Lovastatin was also carried out in experimental animals. Lovastatin is a commonly used lipid lowering drug prescribed by doctors for reducing blood cholesterol in humans. The studies showed that TCW can lower cholesterol level similar to Lovastatin. The antithrombotic effects of TCW with Streptokinase were carried out in rats. Streptokinase is reported to be one of the most effective thrombolytic drugs in myocardial infarction. Results indicate that both TCW and Streptokinase possess similar thrombolytic effects while the antioxidant effects were more with TCW. Studies indicate that TCW has significant blood pressure lowering action. High blood pressure is a significant public health problem worldwide, which is associated with increased risk of cardiovascular disease, stroke and renal disease. The consumption of TCW has been demonstrated to an inverse relationship with blood pressure. Coconut water contains many macro and micro nutrients that can influence blood pressure. The antihypertensive property of TCW is mainly due to the presence of L-Arginine, Potassium, Calcium, Magnesium and Vitamin-C. These studies clearly revealed that coconut is an important functional food which protects our health and prevent diseases in several ways.

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# Coconut oil, the nectar of good health

*D.M. Vasudevan\**



There are strong evidences to state that the risk of coronary artery disease (CAD) is related with elevated levels of serum cholesterol, which in turn is correlated with an increased intake of saturated fats. A fear complex has been created among the general public that consumption of coconut oil results in elevated cholesterol levels. This myth is primarily due to the high content of saturated fats in coconut oil. It is known that saturated fatty acids will generally increase, while unsaturated fatty acids will tend to lower the cholesterol levels in blood.

Commonly occurring unsaturated fatty acids are linoleic acid (in ground nut oil) and linolenic acid (sun flower oil). Thus people started to take these vegetable oils with reduced usage of coconut oil. Within the last 50 years, per capita consumption of coconut oil in Kerala has been reduced to one-third. But during the same period in the same population,

the incidence of myocardial infarction has increased to three folds. This fact alone is enough to disprove the anti-propaganda against coconut oil.

It may be stressed that all saturated fats are not harmful. Now we know that saturated fatty acids in coconut oil are of the medium chain variety.

**Nearly 55 % of the fatty acids in coconut oil are lauric acid (12 carbon atoms) and 20% myristic acid (14 carbon atoms), both medium chain fatty acids.**

On the other hand, the fats that cause heart disease are saturated long chain fatty acids with 16 or 18 carbon atoms in their structure.

## **Differences between coconut oil and other oils**

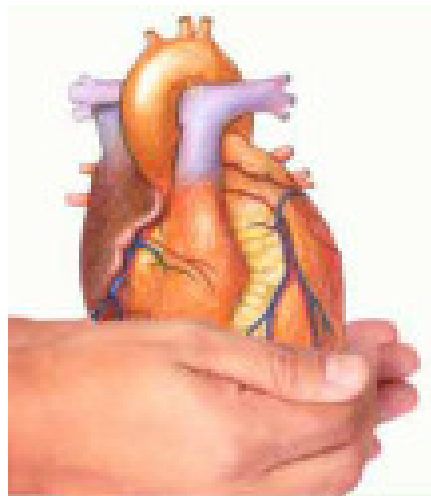
Coconut oil is chemically different from all other oils containing saturated fatty acids. Medium chain fatty acids ( in coconut oil) have certain definite advantages over other long chain fatty acids. The digestion of coconut oil is faster and undergoes complete digestion in upper intestine; this process does not require the help of pancreatic juice lipase. They are absorbed as fatty acids, and are directly entering into the portal blood. Thus fatty acids from coconut oil are entering the liver directly to undergo rapid oxidation to release energy. So, fatty acids of coconut oil are not deposited in tissues.

On the other hand, other oils containing long chain fatty acids have definite disadvantages. They need pancreatic lipase for their digestion. They are absorbed as triglycerides and are first incorporated into large insoluble particles called chylomicrons by the intestinal cells. These are then absorbed to the lymph vessels and then to circulatory system, thereby going round all parts of the body before going to the liver for final oxidation. This transportation in blood needs the help of lipoproteins. Fats in lipoproteins are deposited into various organs including heart vessels. Thus the long chain fatty acids also cause increase in the blood fat content.

In short, coconut oil is the most easily digestible and absorbed class of fats and does not circulate in the blood stream and is not deposited.

### Atherosclerosis

Coronary artery disease (CAD) is a complex degenerative disease that causes reduced or absent blood flow in one or more of the arteries that encircle



the heart. Atherosclerosis is the principal cause of CAD and is the single largest killer of both men and women all over the world. The most deadly presentation of CAD is acute myocardial infarction (AMI).

The earliest pathologic lesion of atherosclerosis is the fatty streak, which may progress to lipid accumulation and the migration and proliferation of smooth muscle cells. Thus a fibrous plaque is formed. Activated platelets and macrophages will further contribute to vascular inflammation and later thrombosis at these sites. Then a fibrous cap is formed that overlies a core of lipid-laden foam cells. Growth of the fibrous plaque results in vascular remodeling, progressive luminal narrowing, blood-flow abnormalities and compromised oxygen supply to the heart muscle.

### Risk factors of atherosclerosis

A number of large epidemiological studies have identified that an increase in serum cholesterol level is associated with increased risk of death from heart disease. For every 10% lowering of cholesterol, CAD mortality was reduced by 13%. In healthy persons cholesterol level varies from 150 to 200 mg/dl. If other risk factors are present, cholesterol level should be kept preferably below 180 mg/dl. Values around 220 mg/dl will have moderate risk and values above 240 mg/dl need treatment.

Blood levels of LDL cholesterol (bad cholesterol) should be kept under 130 mg/dl. Levels between 130 and 159 mg/dl are borderline; while above 160 mg/dl carry definite risk. HDL cholesterol (good cholesterol) levels above 60 mg/dl protect against heart disease. A level below 40 mg/dl increases the risk of CAD. For every 1 mg/dl drop in HDL, the risk of heart disease rises 3%. If the ratio of total cholesterol / HDL is more than 3.5, it is dangerous. Similarly, LDL : HDL ratio more than 2.5 is also detrimental.

Hypertension is an important risk factor for the development of atherosclerosis, atherosclerotic cardiovascular disease and stroke. Diabetes mellitus is commonly associated with hyperlipidemia, hypertension, abnormalities of coagulation, platelet adhesion, atherosclerosis and myocardial infarction. Good control of diabetes may also reduce the risk of complications of CAD. Smoking has been identified as a major and modifiable risk factor for atherosclerosis and is associated with an increased relative risk of dying from vascular disease.

### Prevention of atherosclerosis

People who are physically active are less likely to develop coronary artery disease and high blood pressure. Exercise that promotes endurance (aerobic exercise such as brisk walking, cycling, and jogging) or muscle strength (resistance training with free weights or weight machines) helps prevent coronary artery disease.

Convincing evidences are available to show that lowering serum cholesterol reduces the risk of subsequent coronary heart disease and overall mortality. The primary treatments of hypercholesterolemia are diet and exercise. This includes restriction of calorie intake; reduction in intake of saturated fats and avoidance of cholesterol-containing food stuff. Limiting the amount of fat to no more than 25 to 30% of daily calories is recommended. The type of fat consumed is important. It is better to take saturated (coconut oil), mono unsaturated (Gingelly oil) and poly unsaturated (sunflower oil) in 1:1:1 ratio. A diet containing mono-unsaturated or omega-3 fats will reduce the incidence of atherosclerosis. Eating fruits and vegetables daily will also decrease the risk of coronary artery disease.

**Coconut oil does not produce atherosclerosis. There are dozens of animal and human studies in world literature to disprove allegations about coconut oil enhancing the risk of a CAD. There is not even one paper in the whole literature directly showing that coconut oil increases cardiac diseases. In fact, coconut oil is neutral with respect to atherogenicity.**

### Human studies

Blackburn et al (1989) have reviewed the published literature and concluded that coconut oil will neither increase nor decrease the cholesterol level, and is a neutral fat in terms of atherogenicity. Kurup and Rajmohan (1995) conducted a study on 64 volunteers and found no statistically significant alteration in the serum total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides from the baseline values. Kaunitz and Dayrit (1992) have noted that the available population studies show that dietary coconut oil does not lead to high serum cholesterol or to high coronary heart disease mortality or morbidity. Sundaram et al (1994) fed coconut oil containing diets to healthy males. Their findings indicate that a favorable alteration in serum lipoprotein balance was achieved when coconut oil was included in the diet. Coconut is the chief source of energy for populations of Polynesian islands. But vascular disease is uncommon in these populations and there is no evidence of the high saturated fat intake having a harmful effect in these populations (Prior et al, 1981). When coconut oil was fed as 7% of energy to patients recovering from heart attacks, the patients had greater improvement compared to untreated controls, and no difference compared to patients treated with corn or safflower oils (Bierenbaum et al 1967). When compared with feeding coconut oil, feeding of soybean oils caused a significant decrease in HDL cholesterol (good cholesterol) (Lu et al 1997).

### Animal studies

Hostmark et al (1980) compared the effects of diets containing 10% coconut fat and 10% sunflower oil on lipoprotein distribution in rats. Coconut oil feeding produced significantly lower levels of LDL (bad cholesterol) and significantly higher HDL (good

cholesterol) relative to sunflower oil feeding. Awad (1981) compared the effects of diets containing coconut oil versus safflower oil on accumulation of cholesterol in tissues in rats. The total tissue cholesterol accumulation for animals on the safflower diet was six times greater than for animals fed the coconut oil. In mice studies, the phospholipid profiles were similar for diets on sunflower oil as well as on diets with coconut oil (Huang and Frische 1992). In studies with neonatal pigs, the feeding of coconut oil did not in any altered the blood composition of animals (McWhinney et al 1996). Trautwein et al (1997) studied cholesterol-fed hamsters on different oil supplements. Plasma cholesterol concentrations were higher for olive oil than for coconut oil (8.5 mmol/l). Even in this cholesterol-sensitive animal model, coconut oil performed better than olive oil. In summary, studies that supposedly showed a hypercholesterolemic effect of coconut oil feeding, in fact usually have only shown that coconut oil was not as effective at lowering the serum cholesterol as was the more unsaturated fat being compared.

### Avoid Trans Fatty Acids (TFA)

Poly unsaturated fatty acids (PUFA) seen in vegetable oils are said to reduce cholesterol level in blood. However, when such oils are heated, there is a probability of them to become Trans fatty acids (with double bonds having trans configuration). Trans fatty acids (TFA) are also formed during the partial hydrogenation of vegetable oils. TFA are found to be more atherogenic than saturated fatty acids. TFA decreases HDL (good cholesterol) and increases LDL (bad cholesterol) levels. Hence Federal Drug Agency (FDA) in USA stipulates that TFA content of food items be given on the labels. Reducing the intake of TFA to 2-7 g/day is now strongly advised.

### PUFA in excess may be harmful

Poly unsaturated fatty acids (PUFA, present in vegetable oils such as sunflower oil) can definitely reduce cholesterol level in blood. But there should be moderation. The diet should contain correct type and quantity. Very high intake of omega-6 oils will cause lowering of HDL, elevation of plasma triglycerides, and will promote platelet aggregation. Vegetable oils (such as sunflower oil), containing PUFA are rich in omega-6 variety while ghee and butter are low in omega-6.

Normal Indian diet consisting of cereals, pulses and vegetables provides “invisible oils”, which contains about 10 g of PUFA / day (out of which about 2g is omega-3 and the rest 8 g is omega-6). Further intake of omega-6 oils is unnecessary and may be harmful. The optimal ratio for omega-6 to omega-3 in diet is 4:1. In an average Indian diet, this is about 30:1. In sunflower oil, this value is 160:1, and therefore unnecessary addition of such vegetable oils will further deteriorate the condition. Coconut oil although contains saturated fatty acids the omega ratio is 3:1, and therefore superior to sunflower oil in this respect.

### Coconut oil and body weight

Overweight is an important health problem in developed countries and it is becoming so in India too. Overweight increases the risk for osteoarthritis, diabetes, heart disease, stroke and early death. The usual advice given to overweight individual is to reduce food intake, particularly fat intake. However, on such a diet, the person will feel hungry and feel depressed. In such circumstances they stop the dieting and end up in rebound weight gaining.

Coconut oil has an advantage in these types of settings. Overweight person taking coconut oil containing medium chain fatty acids, gradually over the months lose weight effortlessly (Geliebter 1980; Baba 1982; Bach and Babayan 1982). Replacing long chain fatty acids with medium chain fatty acids results in a decrease in body weight and a reduction in fat deposition (Bray 1980; Geliebter 1983; Hasihim and Tantibhedyangkul 1987). Coconut-oil-enriched diet was found to be effective in producing a decrease in fat stores (Portillo et al 1998). Cleary et al (1999) found that the safflower oil-fed animals had more fat cells than the coconut oil-fed.

Our idea is that when you take fat, you will gain weight. In this context, it may be a paradoxical finding that overweight person taking coconut oil is losing weight. The explanation is the following: Long chain fats will almost always go into fat stores; this will eventually make the person overweight and will cause dyslipidemia. However, as explained previously, the medium chain fatty acids will be immediately utilised for energy purposes, and will not be deposited in the body. Since coconut oil will speed up metabolism and

body will actually be burning more calories in a day. This will help to reduce weight (Hill et al 1989).

### Lipid profile in persons consuming coconut oil

Continuing these previous observations by other research workers, at Amrita Institute of Medical Sciences, Kochi, we have analysed serum from persons consuming coconut oil or sunflower oil. 70 normal healthy subjects were taken as controls and 70 subjects with Type 2 diabetes were recruited in patient group. Each group was further subdivided into two subgroups of 35 subjects each consuming coconut oil and sunflower oil respectively as cooking medium. Samples of blood were collected and analyzed for serum total cholesterol triacylglycerols and cholesterol in lipoprotein fractions. Triglycerides, LDL and VLDL cholesterol levels were high in the diabetic subjects compared to the controls. Though lipid profile parameters and oxidative stress parameters were high in Type 2 diabetic subjects compared to controls, no pronounced changes for these parameters were observed between the subgroups (coconut oil vs. sunflower oil) (Sabitha et al 2009).

This study was extended to analyse serum from 302 normal healthy persons, out of which 152 were consuming coconut oil and 150 were using sunflower



oil for the past 2 years or more. There was no statistically significant difference in the cholesterol, HDL or LDL levels in coconut oil consuming population versus sunflower oil consuming population. Thus plasma fatty acid composition reflected no changes with dietary fat source. Lauric acid, the principal fatty acid of coconut oil was found in low concentrations among subjects of both groups. Higher intake of coconut oil did not cause any significant



increase in the concentration of lauric acid in blood among coconut oil consumers.

### **Lipid profile in coconut oil consumers with disease**

At Amrita Institute of Medical Sciences, Kochi, lipid profile was analysed in 76 coronary artery disease patients, out of which 41 used to take coconut oil and 35 were using sunflower oil. There was no statistically significant difference in the cholesterol, HDL or LDL levels in coconut oil consuming patients versus sunflower oil consuming patients. Plasma fatty acid composition reflected no changes with dietary fat source.

### **Coconut oil and lipid oxidative stress**

Free radicals generated by oxidative stress are the cause for many chronic diseases such as coronary artery disease, ageing process etc. At Amrita Institute of Medical Sciences, the effect of diets containing coconut oil or sunflower oil on oxidative stress and lipid peroxidation was studied in rabbits maintained for 6 months. Serum lipid values did not show significant variation between animals fed coconut oil or sunflower oil. Lipid peroxidation was found to be higher in sunflower oil fed rabbits, compared to controls or coconut oil fed rabbits. Coconut oil intake did not cause hypercholesterolemia or oxidative stress in rabbits (Sabitha et al, 2010).

### **Fatty acid composition of atheromatous plaques**

In another study conducted at Amrita Institute of Medical Sciences, 71 samples of plaques (from diseased coronary arteries) were analysed. Out of these patients, 48 persons were using coconut oil and 23 persons were using sunflower oil routinely. Fatty acids were extracted by chloroform and then analysed by HPLC (high performance liquid chromatography). Surprisingly, the fatty acid content of the plaque did not show any difference between coconut oil consumers versus sunflower oil consumers. In both coconut oil consumers and sunflower oil consumers, the major substances present in the plaques were saturated fatty acids; palmitic acid (46%) and stearic acid (33%) of total lipids. The concentrations of unsaturated fatty acids and medium chain fatty acids were low. Lauric acid (fatty acid present in coconut oil) was only 3.5% of the total content of plaques in both coconut oil consumers and sunflower oil consumers.

In various other studies throughout the world, chemical analysis of plaques did not show lauric acid or myristic acid (fats seen in coconut oil) (Felton et al 1994). Thus plaques from coronary artery are not due to intake of coconut oil. Moreover, fatty acid content of plaques from coconut oil group and sunflower group are the same. This clearly shows that coconut oil does not have an effect to produce plaque or heart disease.

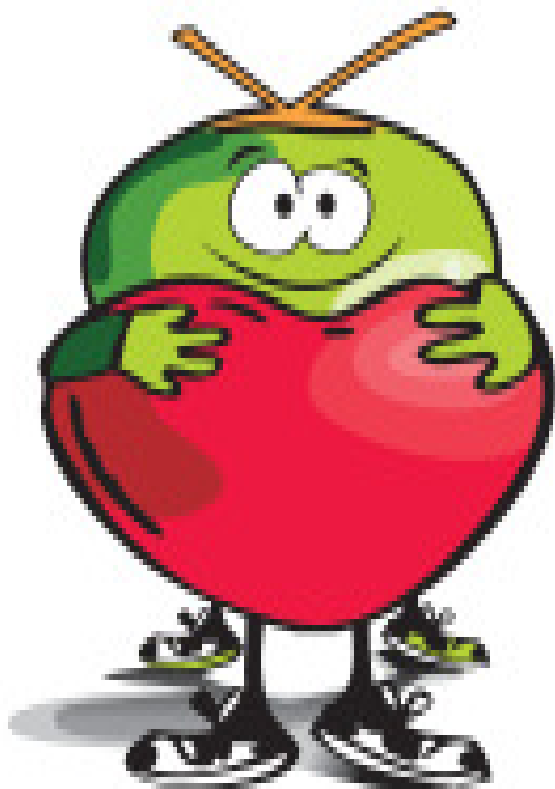
### **Other beneficial effects of coconut oil**

The major fat in mother's milk is the same lauric acid that is seen in coconut oil. The lauric acid of coconut oil is used by the body to make the disease-fighting monolaurin in the skin. This monolaurin will inhibit viral, bacterial and protozoal infections. The medical community has largely overlooked this important benefit. Kabara (1978) and others have reported that medium chain fatty acids have inhibitory effects on various microorganisms such as bacteria, yeast, fungi, and enveloped viruses. The medium-chain saturated fatty acids disrupt the lipid membranes and kill the micro organisms (Isaacs et al 1992).

**Simple observations prove the stability of coconut oil and resistance to oxidative effects of the atmosphere. Coconut oil kept at room temperature for many months does not turn rancid as against other oils. It has been established that coconut oil reduces the need for Vitamin E.**

The general advice given by physicians against the use of coconut oil needs re-evaluation. This misinformation arose, when long chain saturated fatty acids (LCSFA) were shown to increase cholesterol level. Since coconut oil also contains saturated fatty acids, people equated them with LCSFA. Now it is known that coconut oil contains medium chain fatty acids (MCFA). Metabolisms of LCFA and MCFA are drastically different. Coconut oil, within normal limits, neither decrease nor increase cholesterol levels. The advantages of coconut oil are that it does not affect serum cholesterol (neutral); it produces very little free radicals as opposed to other oils (beneficial); it is rapidly absorbed, rapidly oxidized and is not deposited (beneficial) and it helps in resisting invading micro-organisms.

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## Some truths on Coconut & Coconut Oil

*Soly James Pallickaparampil\**

Coconut in India is the traditional fruit for all auspicious occasions. In Sanskrit, the coconut palm is known as Kalpa Vriksha, meaning “tree which gives all that is necessary for living” since we all know that nearly all parts of the tree can be used in some manner or other. Traditionally in Kerala, one of the main staple food items was coconut. But now, because of the cholesterol-lowering fiasco it was advised strongly to avoid any preparations of coconut and coconut oil mainly to make the “heart” healthy.

So why has coconut and coconut oil got such a bad rap in the recent past? It actually started in the United States of America.

### The Politics behind Tropical Oils

Coconut oil was heavily used in the US at one time, being used for baking, pastries, frying, and theater popcorn. But since the 1980s some very powerful groups in the US, began to categorically condemn all saturated oils. The result was that most

people switched to vegetable oils, and the main source of lauric acid from tropical oils in the American diet was lost. It is only recently that the health benefits of these tropical oils are starting to become rediscovered.

### New York Times promotes coconut oil as a good fat!

This is a great news, especially when the news is from US!!! On March 1<sup>st</sup> 2011, New York Times published a very interesting article heading, “Once a Villain, Coconut Oil Charms the Health Food World,” which states that coconut oil is now being lauded as a good fat!!

Recently there has been a shift in the perception of coconut oil as a bad oil to a “functional food”; i.e. one which allows the body to function more efficiently. One side of the story is, it will be harmful to the heart and the other side as a functional food.

Dr Thomas Brenna, a professor of Nutritional Sciences at Cornell University who has extensively reviewed the literature on coconut oil, stated that the problem is more with trans-fats which come from hydrogenated products, not the unrefined coconut oil commonly used today. In the New York Times article Dr Brenna stated that, “We in the nutrition field are beginning to say that saturated fats are not so bad”

This was equally supported by Dr Mary Enig, a well-known nutritional scientist and one of the world’s leading authorities on fats and oils.

**With coconut oil containing 92% saturated fat, concerns around it being unhealthy were dispelled with when it was found to be composed of 62% Medium Chain Fatty Acids (Lauric Acid). This is what is unique about coconut oil.**

About 70% Sri Lankans are consuming coconut oil for over 1000 years but the epidemic of hypercholesterolemia and heart disease is of recent origin. Before 1950, heart attacks were not common in Sri Lanka. Hospital admission rate for heart attacks was 57.3 in 1970 to 182 in 1992. On the other hand the Central Bank of Sri Lanka figures out that the coconut consumption has gone down from 132 nuts per person per year in 1952 to 90 per person per year in 1991. It indicates that the increase of heart attack incidents in Sri Lanka is not due to the increased consumption of coconut.

In Kerala, the commonly used cooking oil was coconut oil and the Keralites too switched to other vegetable oils in 1980's, thinking we can reduce the heart disease and cholesterol. Today, the percentage of Diabetes, heart disease, cancer and several other diseases is so common among Keralites. The moment blood report shows an elevation in the cholesterol level, the first advise given is to avoid coconut. Remember the most important thing that "either coconut or coconut oil has Cholesterol in it and saturated fat and cholesterol are two different kinds of fats. This clearly shows it is not just coconut or coconut oil ruining our health. The real culprit is Trans Fatty Acids.

### Trans Fatty Acids (TFA) – the real cause for concern

In fact, the real problem in our diets are the trans fatty acids, mentioned above as a by-product of hydrogenated fats (eg: dalda, vanaspati) which is present in most processed food items, bakery products, etc. Additionally, when a person eats out (hotels, restaurants, junk and fast foods) regularly, the consumption of reused oil which is as harmful as hydrogenated fats increases.

It is now known that the process of hydrogenation creates "trans fatty acids" (TFAs), which are toxic entities that enter cell membranes, block utilization of essential fatty acids (EFAs) and impede cell functionality. TFAs also cause a rise in blood cholesterol. These substances are not present in natural coconut oil.

Widespread studies of coconut-consuming populations such as those found in Polynesia and Sri Lanka, show that "dietary coconut oil neither lead to high serum cholesterol levels nor to high coronary heart disease mortality or morbidity."

It's important to note that coconut oils in the market vary dramatically in terms of quality. Low-quality coconut oils processed by chemical extraction, using solvent extracts, produces higher yields. These oils contain chemical residues and many are also refined, bleached and deodorized (RBD). This type of coconut oil should be avoided at all cost.

High-quality coconut oil is a completely different product and is truly the healthiest oil one can consume and that is traditionally extracted or otherwise called as virgin coconut oil.

- Coconut oil is good for cooking, because saturated fat is not harmed by heat unlike unsaturated oils
- Coconut oil does not contain the trans fats that produce insulin-resistance, diabetes, cancer, and autoimmune diseases
- Coconut oil does not contain the oxidized cholesterol, produced by hydrogenation and high-heat processing, that are responsible for heart disease and stroke.
- Coconut oil consists primarily of *medium-chain* fatty acids, which are metabolized very differently, so they're burned as fuel rather than stored as fat.
- Perhaps even more importantly, medium-chain fatty acids are potent anti-microbial agents.
- Coconut oil was used in food products for centuries. It was only replaced by partially hydrogenated vegetable oils in recent decades, during which time levels of heart disease, stroke, diabetes, and obesity have reached epidemic proportions.

Throughout this article, "coconut oil" means *virgin* coconut oil/ good quality coconut oil ie oil that has not been refined, bleached, or deodorized (RBD). Although none of that processing is necessary, some manufacturers do it anyway, which produces the same problems as those associated with hydrogenated oils. (The 8% of unsaturated fats that coconut oil contains can be damaged by such high-heat processing.)

### Health Benefits of Coconut Oil

Coconut oil has multiple health benefits. It plays a role in hair care, skin care, stress relief, maintaining cholesterol levels, weight loss, increased immunity, proper digestion and metabolism, heart diseases, high blood pressure, diabetes and cancer. These benefits of coconut oil can be attributed to the presence of lauric acid.

Besides coconut oil, the only other good source of lauric acid is mother's milk. Lauric acid is critical for infants because it's the only protection they have until their immune systems develop. When we think about it, that fact speaks volumes about the power of lauric acid, it keeps babies healthy even in nonfunctional immune system! That's why coconut

oil is a critical ingredient in healthy milk formulas and is effective at treating and preventing AIDs.

### Lauric acid, a key component to health

Lauric acid is abundant in coconut oil, and considered responsible for many of its health benefits. Coconut oil comprises of about 50 % lauric acid. The only other abundant source found in nature is in human milk.

### How is lauric acid used by our body?

The human body converts lauric acid into Monolaurin which is claimed to help in dealing with viruses and bacteria causing diseases such as herpes, influenza, cytomegalovirus, and even HIV. It helps in fighting harmful bacteria. As a result of these various health benefits of coconut oil, though its exact mechanism of action was unknown, it has been extensively used in Ayurveda.

### Role of coconut oil in critically ill patients

As MCT from coconut oil are easily digested, absorbed, and utilized, they are used in hospital formulas to feed the very young, the critically ill, and those who have digestive problems. The best oil which can be used in various tube feedings is coconut oil.

### Heart diseases

The misconception among many people is that coconut oil is not good for the heart as it contains a large quantity of saturated fats. However, it contains about 50% lauric acid, which helps in preventing various heart problems including high cholesterol levels and high blood pressure.

### Weight loss

Medium Chain Fatty Acids in coconut breaks down quickly and is burned for fuel long before it can be stored as fat. That process makes all the difference in the world, not only to your weight. Further, it increases the body metabolism by removing stress on pancreases, thereby burning out more energy and helping obese and overweight people reduce their weight.

### Digestion

As a cooking medium, coconut oil helps in improving the digestive system and thus prevents related disorders including Irritable Bowel Syndrome (IBS).

### Immunity

It strengthens the immune system as it contains antimicrobial lipids, lauric acid, capric acid and caprylic acid which have antifungal, antibacterial and antiviral properties. Monolaurin helps the human body in dealing with virus and bacteria causing diseases such as herpes, influenza, cytomegalovirus, and even HIV.

### Healing and Infections

When applied on infections, it forms a chemical layer which protects the infected body part from external dust, fungi, bacteria and virus

**The presence of MCT and fatty acids in coconut oil helps in treating liver diseases as these substances are easily converted into energy when they reach the liver, thus reducing work load on the liver and also preventing accumulation of fat. It is also useful in treating pancreatitis.**

### Coconut Water – Fluid of life

Like coconut and coconut oil, coconut water also has certain medicinal effect in our body. Some remote areas of the world even used coconut water intravenously, short-term, to hydrate critically ill patients and in emergency situations. It is a natural isotonic beverage, with the same level of electrolytic balance as we have in our blood. One example is during the Pacific War of 1941-45, both sides in the conflict regularly used this naturally sterile coconut water siphoned directly from the nut to give emergency plasma transfusions to wounded soldiers.

Today coconut water is used for the patients who suffer from hypokalemia (low potassium levels in the blood), post intestinal surgeries, digestive tract disorders, dehydration etc. It can also be used after strenuous exercise.

To sum up, since ancient times, coconut and coconut oil has been used as a staple food item in Kerala with no emerging incidence of any cardiovascular diseases. The earlier delusion that coconut is a bad fat is no more factual and applied. According to recent data, it has been proven that coconut has a beneficial effect on lipid levels. It is considered as a Functional food as it helps in boosting immunity.

*\*Chief Dietician, S L Raheja Hospital, Mumbai  
(solyjames@rediffmail.com), Courtesy : Dr.B.S.Raheja*



# Coconut

## for Health & Wealth

Subhash K K\*



"Never before in the history of man it is so important to emphasize the value of basic oils. Medium chain fats are found exclusively in basic oils. *Thermodinium cholejace* is coconut oil or similar oils in mother's milk and have similar nutritional effects."

**Jan J. Kubota,**

Ph.D., Professor Emeritus,  
Michigan State University, USA.



Coconut forms the most important source of food and nutrition for millions of families spread across the wet tropical low lands of the world. In many countries it sustains the livelihood security of the dependent families through food, beverage, medicine, cooking, fuel, shelter, employment and cash income. Popular home medicines based on coconut have also evolved over time and most of which are still being extensively used in the households. Some preparations serve as rejuvenative tonics and others are reputed for their effect in specific ailments affecting internal organs and external parts alike. The knowledge of the aborigines of Nicobar Islands of India and the tribal communities of some other parts of India on the medicinal applications of coconut palm products is so exhaustive that they depend on these products for treating common ailments.

Fresh coconut kernel products contribute significantly to the health and nutrition of the consuming population. The dietary fiber and protein contents of coconut kernel exert positive influence on cholesterol metabolism as revealed in a series of studies conducted by the Department of Bio Chemistry, University of Kerala, India. The results of the study clearly proved that coconut protein is effective in reducing hyperlipidemia and peroxidative effect induced by high fat cholesterol containing diet and these effects are mainly mediated by the L arginine present in it. The cardio protective effect of coconut protein linked to the high content of L – arginine was also found in subsequent studies. Coconut kernel and coconut milk find applications in home medicines in the traditional coconut growing communities in Kerala. The semi ripe kernel of Chowgat Orange nut is scraped and put in coconut oil and boiled till the water content is completely

removed. The oil after cooling is applied against oral ulcer and its continued use is considered as a sure remedy against the disease. The ripe kernel is unctuous in property and increases body strength and purifies the urinary system.

Fresh coconut milk has cooling and soothing effect on the body. Hence it is used to clean the body of infants. Among the Yakan Tribe in the Basilan Island of the Philippines, newly born babies are given the first bath using coconut milk for immunity against affliction of scabies. In case of constipation, a daily dose of one or two tablespoonful of fresh coconut milk is taken until relieved. A popular household remedy against chest disease is a preparation consisting of coconut milk, black pepper, dry ginger and ocimum leaves boiled down to a thick consistency and administered in small doses. The liquid endosperm of tender and mature coconut possesses nutritional and medicated values. It makes a refreshing and agreeable drink, particularly during summer. Coconut water serves as a health drink because of the presence of proteins, fats, sugars, vitamins and growth hormones. It is also a useful medium for the formulation of nutritious beverages and other food articles. According to Ayurveda classics, tender coconut water is wholesome for heart and relieves burning sensation. A combination of cow's milk and tender coconut water not only nourishes infants and children but also prevents the curdling of milk in the stomach. Tender coconut water to which rice flour and jaggery are added is boiled down to the consistency of a thick paste. This is fed to emaciated children to regain health and vigour. Tender coconut water is used as a remedy for vomiting, loss of consciousness, fever and jaundice. Occasional washing of the body with coconut water during summer is good against prickly heat.

Healthy food needs the right cooking medium. Coconut oil has been the cooking medium for generations in Kerala. In fact, for the Keralites there is no tasty food item without the use of either grated coconut or its oil. Though cardiologists advise against the use of coconut oil, there has been no established evidence to prove that coconut oil causes coronary heart disease. According to the ayurveda coconut oil nourishes the body and increases strength. It is good for the healthy growth of hairs. In naturopathy coconut gratings and coconut oil are accepted

ingredients of daily diet for patients suffering from hypercholesterolemia. The use of fresh as well as medicated coconut oil for external application is widespread among the people of India. Coconut oil is a highly saturated vegetable oil with the saturated fatty acids consisting about 92% of the total fatty acids. It is uniquely rich in fatty acids of 12 carbons or less which are generally classified as medium chain .As such coconut oil is basically a medium chain triglyceride (MCT). The short and medium chain fatty acids present in coconut oil have a low melting point , a shorter molecular size and greater solubility in water and biological fluids compared with those of long chain fatty acids. Coconut oil is therefore more appropriate than many other oil for infant feeding and for adults suffering from certain metabolic disorders in which long chain triglycerides cannot be digested.

**“I will not go a day without coconut oil. I personally take four tablespoons per day, either on my salads, in my cooking or in my cups of green tea”. Miranda Kerr, one of the world's most beautiful women, wife of actor Orlando Bloom.**

There is no part of the coconut palm that is not used in one way or other either as food or as medicine. Coconut fronds, roots, bark, shells etc are common ingredients in home medicines against many ailments. In Malay Peninsula the ash of shell with wine is used as a remedy against certain phases of syphilis. The Yakans of the Philippines burned the coconut shell and ashes rubbed on the painful parts of the body. There is no doubt that coconut palm is a versatile source of food, drink and medicine to mankind. As food and beverage, coconut kernel, coconut milk, coconut oil, coconut water and coconut sap are consumed in their fresh forms in millions of households. In most of these households, the members derive substantial portion of their dietary energy and nutrition from coconut products.

A significant portion of coconut is processed into coconut oil, desiccated coconut, coconut milk, cream and copra. Several traditional foods containing coconut products are being prepared and processed using new processing technologies and tested for their acceptability, quality and commercial viability. In recent years, emphasis is focused on product

diversification, by product utilization and development of value added coconut products to improve the coconut economy. Shell is the most versatile part of the fruit of the coconut palm. It serves man in various ways and varied forms in his day to day life. Shell based products like charcoal, activated carbon and shell powder have wide applications in the manufacture of various commercial products. The coconut shell which was once a poor man's container has now become a rich man's fancy. The coconut shells are now being exported to many developed countries as a container for coconut ice creams and bird's feeding pots. Spoons and forks of varied sizes are also exported to European countries for one time use in restaurants. Another traditional shell-based item which has regained its glory recently is buttons which have market in modern Europe. Coconut buttons are also used for rain coats in European countries. There is tremendous potential to export shell based handicrafts provided quality and packaging are given due importance. The thrust should be for manufacturing utility articles than show pieces to capture the world market. Many of the artisans make a decent living out of coconut shell and wood crafts.

Aqueous processed coconut oil has considerable market potential in India. There is a growing demand for this type of oil in ayurvedic medicated preparations as baby massage oil and hair oil. Aqueous processed coconut oil has a unique flavour and is easily absorbed in the body. These special characteristics could be commercially exploited within India and elsewhere through market promotional activities.

The production of edible cup copra is mainly in the unorganized sector. It is produced mainly in Lakshadweep and Kerala. It is used as a dry fruit and in the preparation of sweets. It is transported in distant markets like Mumbai, Delhi, Ahmedabad, Himachal Pradesh, Rajasthan and Assam. Edible copra always commands a premium price over milling copra. Edible copra packed in the form of chips has a high potential market in the northern, western and eastern parts of India. The demand for this product is bound to increase especially as a dry fruit. Shell charcoal briquettes possess tremendous market potential as fuel in smitheries, bakeries, foundries and iron and steel industries.

Vinegar is a commodity indispensable in every household. It is important in food preparation and

preservation and as a condiment. Vinegar has extensive use as preservative in the pickle industry and flavouring agent in food processing sector. Now

**“In the hands of a beggar a coconut shell serves as his begging bowl, in the hands of an artist it turns into a thing of beauty, it provides the humble housewife with a brightly burning fire to cook her simple fare, it lets the chemist unlock its secrets and yields a dozen new things. Such is the coconut shell, a versatile part of the world's most versatile tree the coconut palm”. (Dr. W.R.N. Nathanael)**

natural vinegar enjoys export market in place of synthetic vinegar. It is used in the manufacture of vegetable pickles and other tomato products. It is considered as one of the oldest fermentation products known to man. Since teak, rosewood and other exotic hardwoods are becoming increasingly scarce and considerably more expensive, the right alternative is coconut wood which is now available in plenty in India at lower prices. Tender coconut has great potential as a tasty natural beverage. As a self employment venture for unemployed youth including women, setting up tender coconut parlours have been encouraged by the Board. Through this approach consumption of tender coconuts can be stepped up to reach higher targets giving the farmers to sell their produce as tender coconuts depending on market situation.

Tender coconut is gaining acceptance in the developed countries as a natural source of nutritious food and beverage. Marketing of tender coconut will create opportunities for enhancing on farm income of farmers and employment at different levels. The aggressive promotional strategy adopted by the Coconut Development Board for promoting tender nut water has led to a phenomenal increase in its consumption. The efforts made by the Board to popularize tender nut water as a healthy drink through the media has resulted in about 15% of the production being diverted as tender nut. This has helped to diversify the market and fetch better return for the coconut farmers.

*\* Assistant Library & Information Officer, CDB, Kochi-II*

# From Software Engineer to Best Farmer



**F**or young people to take to agriculture, farming must be both intellectually satisfying and economically rewarding says Dr. M S Swaminathan. This became true to the young agri entrepreneur Chandrasekhar Ghaty who received the special award for the best coconut farmer from the Chief Minister of Assam, Shri. Tarun Gogoi. The occasion was the World Coconut Day celebration of the Coconut Development Board. Ghaty was the recipient of the special award for the best coconut farmer.

Chandrashekar Gatty aged 36, didn't feel the pinch of recession since he had switched over his carrier from IT to agriculture. He is determined that only those who have aspirations and willingness to work hard can achieve success in life. This son of Narayana Gatty and Chandravathi of Kondana in Kotekar near Mangalore is literally happy now as he is recognized as a best and progressive farmer by the Coconut Development Board as well as the Horticulture Department. A sound reward for his commitment and dedication to farming! This enthusiasm has been inculcated in him since his childhood as along with his studies, Gatty was actively involved in family agriculture. After completing his plus 2, he joined ITI diploma course in a reputed college in Mangalore and obtained merit fellowship. The receipt of a merit scholarship for his brilliant academic performance gave him the opportunity for an initial investment in his 2 acres of

agriculture land. His parents also encouraged a lot in the early stages. After completing his education, Gatty served as software professional and also an electronic data processing manager for three reputed firms. He was in the IT field for nearly 10 years. Gatty who was writing complex computer programmes, processing data and solving software problems is now engaged in tilling his land and adopting innovative techniques in his land. He quit the IT field when the responsibility of looking after about 10 acres of his father's property was on his shoulders.

The benign beginning with the cultivation of Kalpavriksha was the beginning of great wisdom and prosperity in the life of Gatty. He grows coconut, arecanut, banana, cocoa, nutmeg, coffee, vanilla, jasmine, anthurium, medicinal plants and also engaged in apiculture and vermin composting on large scale. He understood that diversification in farming was the secret beyond the prospects in agriculture. He devoted a considerable portion of his time to acquire more knowledge on the available agritech, analyzing the existing situation and simultaneously working on the dynamics of re-engineering and restructuring the existing farm for generating more income commensurate with his erstwhile job.

He is having Chowghat Orange Dwarf DxT hybrids and West Coast varieties which give comparatively higher yield. The unique marketing strategy adopted by him was to depend more on selecting the best cultivar and variety. He realized

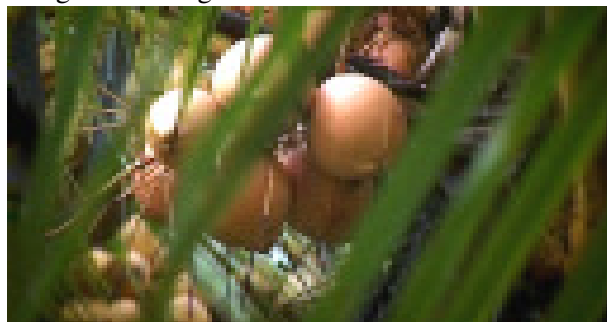


the potential of tender coconut as an emerging market and hence selected Dwarf and hybrids as the best crop mix which in turn was helpful in realizing high rate of returns. The bulk of his coconut harvest is disposed as tender coconut. Similarly he allows a few bunches of coconut in hybrid palms to mature to harvest as mature nuts during the festive seasons to realize highest rate. Ghatty schedules his harvesting period during the festival seasons and is earning Rs. 30-35 per Tender coconut. During off season also on an average he gets Rs. 15-20 per tender coconut. Ghatty is making good income from Dakshina Kannada local variety of arecanut plantations in two acres. Banana, Nutmeg, cocoa, coffee and vanilla are grown as inter crops in his arecanut garden. He is earning an additional income of Rs. 75000 per annum from these intercrops.

Ghatty asserts that he never depend on chemical fertilisers or pesticides. He is having 10 vermicompost units having capacity to produce 18 tons in three months using waste materials from his unit. These vermicompost is utilized for his own farm. He also sells the vermin compost to needy farmers at reasonable rate. He also prepares pesticide by mixing gliricidia leaves with rotten rice to control rate and bandicoot menace in his farm. In his farm, he has 20 units of honey bee hives. He believes that honey bee population in the farm indirectly enhances coconut and arecanut yield through flower pollination.

Ghatty's coconut and arecanut varieties are exhibited regularly in Krishimela programme

organized by University of Agricultural Sciences, Bangalore. Ghatty has bagged many rewards and recognitions for his innovative farming practices. For the past three consecutive years Ghatty is the recipient of the Best farmer of the District award given by University of Agricultural Sciences, Bangalore during the Krishimela.



Ghatty is in frequent contact with the Agriculture and Horticulture development departments and Krishi Vigyan Kendra. In order to keep him up date, he regularly participates in training programmes and exhibitions. He is earning a comfortable income by selling products from his farm. He opines that many young and educated people of his age consider agriculture as an unprofitable job. But only those who have aspirations and willingness to work hard can achieve success in agriculture. According to him, parents should encourage their children to work in the farm / field and assign some farm related responsibilities from their childhood onwards. More importantly they should feel proud for their children for choosing agriculture as their profession

#### Mr. Chandrashekar Gatty's Annual farm Income and Expenditure

Sl. No.	Crops / Enterprises	Yield	Expenditure (Rs.)	Income (Rs.)
1.	Coconut : 350 plants Chowghat Orange Dwarf : 100 Hybrid (DxT): 150 DK Local : 100	Nuts per year 12500 15000 8500	11,000	250000 150000 85000
2.	Arecanut	3000 kg	11,000	450000
3.	Vermicompost 10 units of 20x4x2.25 ft	2.5 tons	30000 (Establishment cost)	25000
4.	Apiary - 20 Honey bee hives	150 kg	16000 (Establishment cost)	18000
5.	Intercropping Banana, Cocoa, Netmeg, other medicinal plants		10000	50000
6.	Coconut Nursery	2000 plants	10000	150000



## SUBICSHA- on its path of progress

*M. Kunhammad Master\**

SUBICSHA is an innovative special 14.1 crore project implemented under 'Swarna Jayanthi Gram Swaroasgar Yojana (SGSY), a centrally poverty alleviation programme.

The project implemented in Perambra Block panchayat in Kozhikode in Kerala with DRDA as nodal agency envisages sustainable social and economic development of Perambra Block Panchayat through 700 micro enterprises. The project is effectively managed by 7000 BPL women spread over 7 Grama Panchayat of Block area, organized into SHGs for a period of 3 years, providing a wide range of hand holding escort services in areas such as technology, skill upgradation, training, quality control, brand building common production facilities, supply and marketing support services.

The company is sustainable evolution of an SGSY scheme which has effectively integrated various funds of local self government, Coconut Development Board, CPCRI, KILA, NABARD, CFTRI etc and made significant development in agricultural processing, social empowerment of women and got national acclaim as the best venture under cooperative sector.

The potential of coconut, most abundant resource available in the area was exploited fully. The project aimed to attain the novel objectives of poverty alleviation, women empowerment, social development and farmer friendliness. Subicsha has developed around 41 innovative coconut based products out of which 23 are marketed now. The company's turn

over which was less than a lakh 5 years ago has grown to more than 1.25 crores in 2010-11. This was achieved without the application of modern marketing techniques or publicity campaigns. Subicsha's intervention in the market has been instrumental in reducing exploitation of farmers by business community.

Subicsha started with house centered production units manufacturing and selling soaps and pickles and the Subicsha SGSY units slowly and steadily entered the local market. It was not so easy to capture the market, which was already flooded with similar products with which the poor women folks had to compete with. Mustering full courage and facing the odds in the marketing arena, unsupported by scientific publicity techniques or media support, the production and marketing groups could present a wonderful performance.

Virgin Coconut Oil production units were set up in 5 of the 7 Panchayaths under Perambra Block. Three copra dryer units which were established by Perambra Block Panchayath as a part of women development programmes earlier were transferred to SUBICSHA. Two oil extraction units also started operation.

The next venture was the virgin coconut oil units which were established with technical guidance from Coconut Pacific, an Australian company. RUBCO arranged collaboration, technology transfer, import of machines and equipments from Australia.



In 2005 Subicsha was registered as a Producer Company under the Companies Act and this gave SUBICSHA an autonomous status. The company steadily increased its production, sales and resultant profit to make it stand on its own feet. The greatest milestone in the history of Subicsha was the agreement made in the year 2006 between Subicsha and Rubco in respect of marketing of Virgin Coconut Oil.

Quality is one of the differentiating factors of the SUBICSHA products in comparison with the products generated by similar micro enterprises. Even for products like coconut water sip up, for which the demand is focused on the local area the quality of the products will be maintained at the highest possible levels. Quality is thus taken as a common philosophy for all the Subicsha units. Most of the products planned out of these units fall under the category of food products. Even though FPO certification is not necessary for selling in local market, it is absolutely necessary that strict quality control procedures be followed to ensure both process and product quality. Through a detailed quality control procedure, which insists on manufacturing process standardization, highest levels of hygiene and other quality parameters are maintained even in the smallest micro enterprise. Through this the project aims to make products comparable to quality levels promised by big competing enterprises. A full fledged laboratory was set up at the head quarters of SUBICSHA with the financial assistance of the Coconut Development Board. This was later instrumental in awarding AGMARK registration to the company by Ministry of Agriculture, Government of India.

A number of SHGs are engaged in making coir related products. To meet the raw material requirement, a fibre production unit was set up at Kadiyangad in Changaroth Panchayath. Naturally, while producing fibre from coconut husk, a large quantity of coir pith would form as a by-product. It is not easy to discard this material. Converting the pith in to bio fertiliser, was considered and a plant was set up at the same site for the purpose. Unprecedented support was offered by the farmer community for this product resulting in excellent sales

The unique features of SUBICSHA can be seen in its organizational structure too. The workers, supervisors, specialists, managers all are shareholders



of the company. The entrepreneurs themselves manufacture the product, inspect, pack and market the products.

Apart from giving training to the SHGs, to equip them for various types of jobs, the company also take up whole sale purchase and supply of raw material, obtaining technologies and implementing them and even modernizing the packaging systems.

### Training

To facilitate upgradation of technologies, and familiarization with new ideas Subicsha staff are periodically trained in its training centre at the head office. The facility centre conducts training to new entrepreneurs also. Subicsha faculties are sent to major institutions for upgrading their knowledge.

Subicsha is the first organization in Kerala having federation of women self help groups. Participation in festivals, sales, melas, Govt organized sales campaigns under various agencies, direct marketing, house to house sales etc., have helped in propagating the products among the people all over the state as well as outside Kerala. The products received wide spread acceptance and is acclaimed every where for its highest quality and moderate pricing.

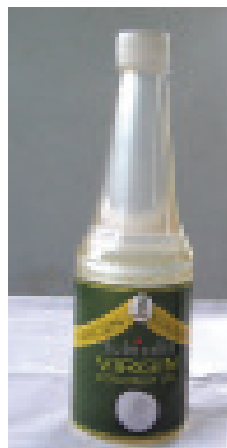
Contribution of Subicsha in the economic progress of Perambra Block Panchayath cannot be viewed as trivial. Active intervention in the market during the crisis period, has helped coconut farmers of the Block Panchayath to fetch better prices for their products. Manufacture and supply of coir pith based bio fertilizer at affordable prices could increase the fertility of the soil to a reasonable level in the project area.

The self help groups forming the part of the company have been immensely benefited by way of enhanced income from their activities under support

provided by Subicsha. Group insurance scheme introduced by the company to its SHG members have contributed considerably towards increasing the confidence level of these women folks during the past few years. The social status, attitude and standard of living have resulted in dynamic changes in their life style.

Subicsha is producing 41 value added coconut products viz. food, cosmetics, fertilizer and industrial products. Virgin coconut oil is the most important revenue earning product. Coconut based pickles, jam, coconut powder, chutney powder, chips, sweets, squash, vinegar, toilet soaps, haircare, shell charcoal, coir fiber, coir and coir pith fertilizer etc., are a few other products manufactured. The company proposes to produce coconut oil on a mass production basis, processing 10 tons of copra per day.

The company is on the path of fast progress, though economic recession has affected trade activities the world over. SUBICSHA has geared it



self to meet the challenges to a great extent. Diversification of products, adoption of sophisticated methods in production and modernization of packaging systems are a few steps forward in this direction. Subicsha was awarded as best co-operative society, in the year 2006 and 2011 by Coconut Development Board.

The traditional belief that coconut is useful only to produce oil and coir products, have been proved incorrect, by SUBICSHA. It is proved that more than 41 products could be successfully manufactured and marketed from this single raw material, that too by a section of women from BPL families belonging to remote villages.

\* Chairman, Subicsha, Nochad (P.O), Kozhikode, 673624

## Major Coconut Producing Countries of APCC

The Asian and Pacific Coconut Community (APCC) is an intergovernmental organization organized in 1969 under the aegis of the United Nations of the Economic and Social Commission for Asia and the Pacific (UN-ESCAP). The APCC has 17 coconut producing member countries accounting for over 90% of world coconut production and exports of coconut products.

The APCC member countries include: Federated States of Micronesia, Fiji, India, Indonesia, Jamaica, Kiribati, Malaysia, Marshall Islands, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Tonga, Vanuatu, and Vietnam. Jamaica is an associate member of the APCC. An introduction on Vietnam is given in this issue.

### Vietnam

#### A. GENERAL INFORMATION

1. Capital	: Hanoi
2. Total Area (Sq. Km)	: 33,150
3. Population (000)	: 86,025
4. Gross Domestic Product (Dong Billion)	: 1,658,389
5. Currency Unit	: Dong
6. Exchange rate to US\$ (Average)	: 20,979.95

#### B. COCONUT INDUSTRY

1. Area Under Coconut (Million Ha)	: 0.143
2. Total Coconut Production	
2.1. In Million Nuts Equivalent	: 813.10
2.2. In Copra Equivalent (Million MT)	: 0.181
3. Export Volume (MT)	
3.1. Copra	: 1,650
3.2. Copra meal	: 1,200
3.3. Coconut Oil	: 1,600
3.4. Desiccated Coconut	: 19495
4. Total Export Value (US\$'000)	: 17,495





## Value added products from coconut

*K. Muralidharan\* and Jayashree. A\*\**

Coconut has the advantage of having hundreds of uses which no other oil seed or horticultural crop can claim. Coconut products and by-products can be commercially utilized for multiple purposes. The coconut industry has not able to unleash its true potential mainly because of its oil driven market. However by realizing the imperative need to become competitive, the industry is now undergoing modernization, product diversification and byproduct utilization. Consumer demands for varied high value coconut products are tremendously increasing and hence the domestic industries have become vibrant. This in turn would help make the industry globally competitive. The emphasis given by the Coconut Development Board on evolving technologies for the development of new value added products has yielded results and the product diversification and byproduct utilization has gained momentum in the recent past. Many processing units have been established in different parts of the country for the commercial production of products with the technologies so developed. Accelerated efforts of market promotion and product awareness have fuelled the pace of commercialization. This is a continuation of the article which was published in the November 2011 issue of the Indian Coconut Journal. This article covers a couple of minor products developed from coconut.

### Snow Ball Tender Nut

Snow ball coconut is the whole round soft kernel

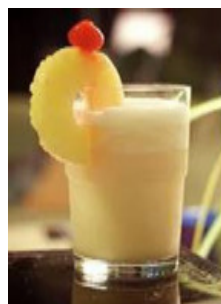
pulled out from shell with the water intact in it. The soft tender kernel or solid endosperm of tender coconut is a delicious dessert. It is the tender coconut without husk, shell and testa which is in ball shape and white in colour. This white ball will contain tender coconut water, which can be consumed by just inserting a straw through the top white tender coconut kernel. Coconut of 8 month maturity is more suitable for making snow ball tender coconut. Before scooping out the globular tender kernel with water, a groove is made in the shell by using a machine. By inserting the scooping tool, specially made for this purpose, in between the tender kernel and shell and then by rotation of the nut, the snow ball is scooped out from the shell. It is nutritive and is a drink and a snack at the same time.



The Central Plantation Crops Research Institute (CPCRI), Kerala has developed a technique and fabricated the machinery to pull out the whole round soft kernel from the nut. Snow ball tender nut can be packed in LDPE film of 200 gauge, which can be stored for 15 days at about 15°C under refrigerated condition without affecting its keeping quality. The technology is yet to take off commercially.

### Fruit juice blended tender coconut water

Process for preparation of fruit juice blended tender coconut water beverage using pomegranate, blue grapes, pineapple, mango and lemon juice have been standardized by Central Food Technological Research Institute (CFTRI) under sponsored project of CDB. Storage studies of these products at room temperature revealed that the beverages were safe for consumption for a period of 6 months.



### Bottled Coconut Water

Bottling of coconut water for use as a soft drink is gaining popularity. Coconut water can be marketed as natural soft drink if preserved and packed. Non-carbonated beverages can be produced from the coconut water of mature nuts. The process



involves collection of water filtration, upgradation (to adjust pH, taste, Total Soluble Sugar and shelf life), pasteurisation, filtration and bottling. The bottled drink can be stored for three months at ambient temperature. The drink can also be carbonated and used as beverage.

### Coconut water beverages

The Regional Research Laboratory, Thiruvananthapuram has developed a process for the upgradation and preservation of mature coconut water. The main operations involve collection, upgradation, pasteurization, filtration and bottling. The process essentially consists of upgrading the flavour of



mature coconut water to the level of tender coconut water by supplementation with additives including sugar and preserving it by a judicious combination of heat pasteurization and permitted chemicals. The drink can be carbonated and marketed as a beverage. In Philippines, matured coconut water formulations were developed with addition of sugars, acidulates and preservatives. The carbonated and non carbonated beverages ie. aluminum and poly ethelene laminated packages has a shelf life of six months at room temperature.

### Coconut water concentrate

M/s Winter Umwelttechnik of Germany had developed the technology for manufacture of fruit juice concentrate using spray evaporation technique. The special advantage of this technique is that the product retains all the original characteristics of juice. Application of this technique for concentration of coconut water was attempted in India by M/s Miracle Food Processors International (P) Ltd, Perinthallana, Kerala. The coconut water concentrate had a shelf life of 6 months to 24 months depending upon the degree of concentration. Ten litres of coconut water would yield about 800 g. of concentrate. The concentrate could be used to prepare aerated & bottled RTD beverages.

### Frozen coconut water

Fresh coconut water from newly opened coconuts is collected under hygienic condition and suspended

solids and oil in the samples are removed by means of three-way centrifuge. The salts present in coconut water may be removed if desired, prior to concentration, to produce a very sweet product by centrifugation and passing the centrifuged coconut water through a mixed-bed ion-exchange resin. The concentrate can be frozen or preserved in cans and after dilution to the desired strength, it can be used as base for the production of carbonated and non-carbonated coconut beverages. The concentrated coconut water is also reported to be used successfully in the brewery industry.

### Nata-de-coco

Nata de -coco is a gelatinous product prepared from matured coconut water by the action of cellulose forming bacteria namely *Acetobacter aceti* subspecies *xylinium*. The culture solution is prepared by mixing coconut water with sugar and acetic acid at a stipulated proportion, which is inoculated with *Acetobacter*, *xylinium* through a culture liquid. It is filled in glass jars covered with thin cloth and kept for 2-3 weeks without any disturbance. During this period a white colored jelly like substance forms and floats on the top of the culture medium. It is harvested, cut into pieces and washed in pure water to remove all acids, immersed in flavoured sugar syrup for 12 hours and packed in glass bottles. It is an excellent ingredient for sweet fruit salads, pickles, fruit cocktails, drinks, ice cream, sherbets and other recipes.



CDB has developed a technology under laboratory conditions for the production of nata-de-coco from matured coconut water. It was found that 100 litres of coconut water would yield about 20 kg of raw nata. There is very good demand for nata de-coco in countries viz. USA, Europe, UAE, Japan, Taiwan, and Korea. It is commercially produced and marketed mainly by the Philippines, Indonesia and Malaysia.

### Coconut jelly

The College of Home Science, Tamil Nadu Agricultural University, Madurai has developed a



technology for preparation of coconut Jelly. The process for preparation of coconut jelly using tender coconut water was developed through the sponsored research programme of the Board. Coconut jelly stored in glass bottles was found to be best up to 180 days.

### Coconut Vinegar

Coconut water can be converted into vinegar by using vinegar generators. The vinegar generator assembly comprises a feed vat, an acetifier and a receiving vat for collection on vinegar. The process involves fortification of coconut water with sugar, fermentation by inoculation of yeast and then mother vinegar, oxidation and acidification. Vinegar has extensive use as a preservative in the pickle industry and flavouring agent in food processing sector. Natural vinegar enjoys export market in place of synthetic vinegar prepared from commercial acetic acid.



### Bottled coconut milk



This product is of high commercial utility which can be used as a substitute for cow's milk, and is being produced in many countries particularly in the Philippines and Malaysia. The processing technology involves extraction of milk from finely grated unpared coconut with the addition of some water or coconut water, straining the milk in a cheese cloth into an aluminium kettle with 0.1 percent benzoic acid before placing the kettle in an autoclave at 117°C for three minutes with steam injection. The temperature of the milk in the pot is then brought down to 80-85°C, by running tap water. The milk is then homogenised for about five minutes and bottled at 70°C to 80°C. The final product is as good as cow's milk and is highly nutritious.

### Coconut cream

Coconut cream is a white, smooth, liquid cream with excellent coconut flavour and 20-30% fat, aseptically packed. The product is easily pourable and ready for direct serving or can be used in other food preparation.



For normal household uses, coconut cream is diluted with three times water if an undiluted coconut milk is needed and with five times water if the intention is to have diluted coconut milk for the traditional food preparations. Coconut cream is chiefly used as a fat source for the reconstitution of the skimmed dairy milk and as a component of infant milk powders. The cream could be included as a component for the production of recombined milk or filled milk into three types of milk product: beverage type, evaporated type and sweetened condensed type.

### Coconut syrup

Coconut syrup is a translucent, free-flowing liquid with the characteristic creamy, nutty flavour of the coconut. Coconut syrup is produced from coconut milk. Coconut milk is extracted from the freshly grated pared coconut meat. After homogenisation, an equal quantity of sugar and 0.05 percent citric acid or 0.25 percent sodium phosphate are added and then steam-cooked to a total soluble solids content of 65 to 68 percent. The boiling hot syrup is poured into lacquered tin cans, sealed and cooled under running water. It gives a delicious instant drink, which is milk-white in colour when mixed with water and is also an excellent bread spread. It is used as a topping or bakery products as a mixer in alcoholic drinks, or may be diluted in water and used in cooking rice cakes and other delicacies. Coconut syrup is becoming an important export oriented product to countries, where coconut is not grown.



### Coconut jam

Coconut jam is a high-sugar coconut food product commonly consumed as dessert, bread-spread, etc. It is prepared by cooking sweetened coconut milk to a very thick consistency at low heat with constant stirring. Process for preparation of coconut jam using tender coconut pulp with a shelf life of 6 months has already been standardized. Coconut milk is extracted after mixing coconut gratings with equal quantity of water and mixed with brown sugar and glucose in the proportions





of 10.25 percent and 5.5 percent respectively based on the weight of the milk, and cooked over a slow fire with constant stirring for about 20 minutes. The mixture is strained for removing suspended matter and again cooked over high heat. Before the mixture begins to thicken, citric acid at the rate of 0.25 percent of the original weight of the milk is added and cooking continued over low heat until the mixture thickens. The product is hot filled in sterilised containers and sealed hermetically. The jam so obtained has a rich creamy coconut flavour.

### Pinacolada (coconut milk with pineapple juice)



The process for preparation of health drink of coconut milk and pineapple juice packed in tetra packs was developed by Nadukkara Agro Processing Company Ltd, Muvattupuzha under a sponsored research project of the Board. The manufacturing process of

Pinacolada consists of blanching of ingredients, homogenization, sterilizing to required temperature time combinations, cooling and packing in tetrapak containers.

### Yoghurt

Coconut milk can serve the purpose of extracting the cow's milk for the preparation of yoghurt which has high commercial value in providing highly nutritious food items at reduced price. The process involves reconstitution of milk containing 50% non fat dry milk and 50% coconut milk, pasteurization, inoculation with bacteria, packaging, incubation and chilling.



### Margarine

Technology for preparation of virgin coconut oil based margarine to be operated at small and micro level industries is reported to be patented by Indonesia. The process involves mixing of emulsifiers, stearine,



antioxidants,  $\beta$ -Carotene, water and salt with VCO, blending at 60°C for 10 min. filling, packing and cooling at 16°C The product can be used as bread spread. It contains high lauric acids and no trans fats.

### Coconut Mayonnaise

Mayonnaise is a semi solid food product mixed into fresh vegetables or fruits or cooked meat to enrich flavour. It is prepared by mixing coconut oil, vinegar or citric acid or emulsifiers. Carbohydrates,



spices and flavour enhances are added to modify the flavour and avoid crystallization. The final formulation would consist of 70% VCO, 6% natural vinegar, 7% fresh yolk and 1% emulsifiers and cooled boiled water. Mayonnaise production units can be commercially operated at home or micro level to enhance the income of farmer families.

### Coconut Flour

After expelling the milk, the protein rich residue is dried and powdered to obtain a product called coconut flour. The flour so obtained typically contains 7-8 percent protein, 3-5 percent moisture and 17 percent oil. It can be used as an ingredient in weight control foods because of its high fibre content. The protein contained in the flour is identical to that contained in the original fresh kernel. After blanching the residue is dried and passed through a special type of screw press under a specified expeller setting to reduce oil content without too much change in colour. The de-fatted flakes are re-dried to reduce its moisture content to 2.5 to 3.0 per cent which is finally ground to a fine mesh.



The product has a low content of fat and higher percentages of protein, sugars and minerals and has been found to possess better water holding and thickening properties. The oil extracted from the dried gratings is of superior quality, which could command premium price. Flour derived after removing 60 percent oil has been found to have higher consumer acceptability. It is also seen that five percent coconut flour can replace proportionate amounts of wheat flour



and non-fat dry milk powder used in school nutrition programmes without affecting baking qualities and food value. Nutritionally coconut flour compares favourably with most of the common cereal flours. Coconut flour is naturally low in digestible carbohydrates and high in fibre content and good proteins and hence is a health / promoting food. This has 4 times more fibre than oat bran and 2 times more than wheat bran. Coconut flour can be used in baking recipes. It can be used in making high-nutritious breakfast bread (20 - 25% blend with wheat flour), cereals and cookies.

### Dietary fibre from coconut residue

The importance of dietary fibre in the human diet is gaining more attention due to the increasing awareness of its beneficial effect. The CFTRI, Mysore has carried out a study to develop a natural laxative based on dietary fibre from coconut residue under a sponsored project of the Board. The study proved that water retention capacity, water holding capacity and swelling capacity of coconut fibre is comparable with other commercially available dietary fibres.



### Coconut Honey



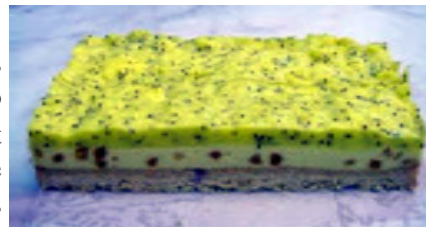
This is another useful product prepared from coconut milk and is an excellent substitute for real honey. The milk is extracted from the gratings of unpared fresh kernel after adding an equal quantity of water. To this extracted milk, 60 percent by weight of brown sugar and 30 percent by weight of glucose are added and then boiled in steam heated containers until a thick consistency is reached. The product is then hot filled in lacquered tin containers or bottles and sealed. The final product is a golden coloured thick paste with a nutty flavour. This can also be used as an excellent base for soft drink.

Coconut honey contains many growth promoting trace elements besides glucose, fructose and levulose.

Coconut water is filtered, evaporated and blended with a little golden syrup to produce coconut honey, a palatable, nutty flavoured breakfast food, soft drinks additive and a sweetener.

### Coconut Cheese

White soft cheese can be made from a mixture of 40% skimmed milk and 50% coconut milk which will have the same flavour, aroma, texture & acceptability as 100% cow's milk cheese. Fresh kernel is grated and pressed to extract milk. The milk is allowed to stand for eight hours, until the cream has collected at the top. The cream is slowly scooped out and the skimmed milk is heated with vinegar to coagulate the proteins. The coagulated protein is mixed with the cream and kneaded with salt. The process is simple and can be done as a household industry.

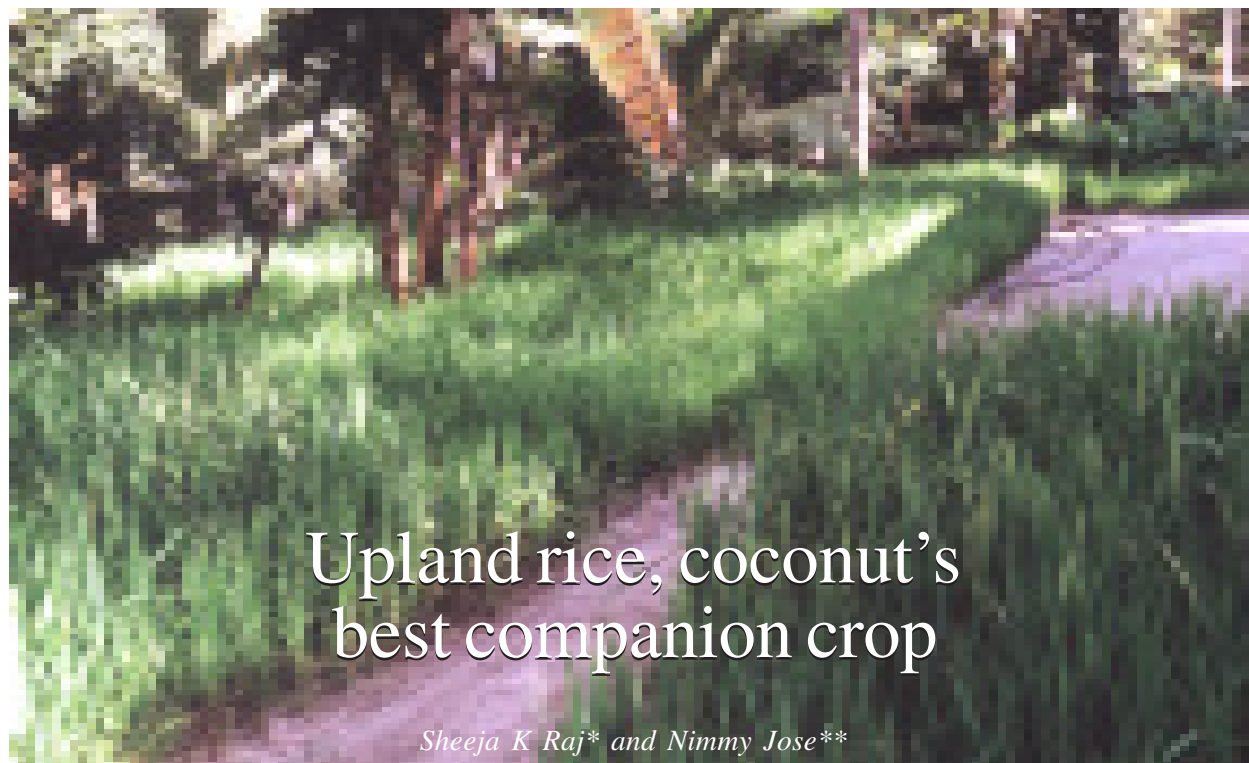


### Fermented beverage concentrate

This is a type of cultured milk using skim milk as a substrate and *Lactobacillus bulgaricus* as a starter culture. This product has been commercially prepared in many countries and named as 'Calpis' in Japan and 'Bulgarius milk' in Bulgaria. Milk is pasteurised at 90°C for 30 minutes in a water bath, cooled to 40°C and inoculated with 3 percent culture of *Lactobacillus bulgaricus*. The mixture is incubated at 37 - 38°C for 24 hours. Curdled milk is homogenised for five minutes and heated to 60°C before the addition of sugar. Sugar is then added in the ratio 1:1. The mixture is further heated to 80°C and cooled down to 60°C, then 0.5 percent flavoured extract is added. The finished product is bottled and pasteurised in water bath at 70°C for 30-60 seconds. The product is stable even after two months of storage, both at ambient and refrigerated temperatures.

This is a highly nutritious drink suitable for kids and adults alike. Unlike carbonated drinks, the fermented beverage contains proteins. It is non-fattening and easily digestible and is a perfect beverage for those suffering from digestive ailments.

*\*Director, \*\* Senior Technical Officer, CDB, Kochi-11*



## Upland rice, coconut's best companion crop

*Sheeja K Raj\* and Nimmy Jose\*\**

**I**ntercropping is the best alternative to boost the income of the coconut growers from a unit holding utilizing horizontal and vertical space efficiently. Intercropping takes the advantage of the nature of the coconut trees, canopy of fronds and its rooting pattern. On an average only 56% of solar radiation reaches the ground, although it varies with the age of the coconut stand, its planting density and alignment. Over 30% of the active roots occur in 25-60 cm depth and 2 m around the palm, leaving 70-75 % of the soil available for use by other crops. In widely spaced coconut gardens i.e. above 7.6 m, intercropping is possible irrespective of the age of the plant. However, closely spaced palms aged between 8 and 25 years are generally not suitable for intercropping. Mature plantations over 25 years old palms allow sufficient light to enter the under storey, making conditions suitable for intercropping. Studies conducted at RARS, Pilicode revealed that rice can be successfully grown as an intercrop in coconut garden by adopting scientific management practices. Applying the correct dose of manures and fertilizers will increase the income of the farmers.

### **Climate and soil**

Upland rice grows without flooding as long as the soil is kept moist. Typically it is planted in areas with frequent rains. The cultivation is also possible in low lying areas, on slopes and even in drought prone areas, where water is readily available. Its cultivation is conditioned by temperature parameters at different phases of growth. The critical mean temperature for flowering and fertilization ranges from 16 to 20° C whereas; during ripening the range is from 18 to 32° C. Temperature beyond 35° C affects grain filling. For vigorous vegetative growth moderately high temperatures are required whereas for panicle initiation, slightly lower temperatures (20 to 22° C) would be ideal. High temperature and high light intensity adversely affect grain filling. It comes up well in different soil types and can be cultivated best in soil having pH 5 to 8.5.

### **Seasons**

Upland rice can be sown as an intercrop in coconut garden during April- May as Viruppu crop and September - October as Mundakan crop. It could be raised as third crop in summer season if sufficient irrigation facilities are available.

## Land preparation

Prepare the field to a fine tilth during March by ploughing or digging after summer showers. Remove all stubbles, pebbles, stones and weeds. On receipt of pre monsoon showers in April, prepare beds of 1.5 m width, 5-10 cm height and convenient length with spacing of 40 cm between beds for drainage channels. This also facilitates easiness in cultural operations like weeding and plant protection measures.

As weed infestation is the major problem in upland rice cultivation, stale seed bed method may be followed. This can be done by allowing 5-7 days time for the weed seeds to germinate after pre monsoon showers. This is later destroyed by shallow cultivation or by the application of non selective herbicide Glyphosate @ 8 ml/l of water (800 ml / acre/ 100 l of water).

**Table 1. Varieties suitable for upland cultivation**

Local Varieties	High yielding short duration Varieties (HYSVD)	High yielding medium duration varieties (HYMDV)
Kattamodan, Karuthamodan, Chuvannamodan etc	Swarnaprabha, Mat tatriveni, Rohini, Annapoorna, Onam, Harsha, Bhagya, Jyothi etc	Aswathy, Aiswarya, Uma, Suvarnamodan, Athira, Gowri, Bhadra etc

## Seeds and Sowing

Seeds are sown @ 60-80 kg/ha. Sowing may be done after the receipt of one or two good early monsoon showers. Seeds can either be broadcasted or dibbled. Dibbling is better than broadcasting as it provides following advantages (i) lesser seed rate (ii) synchronous germination with uniform crop stand and desired plant population (iii) ease in weeding by hand hoeing and (iv) uniform growth of the crop. Two to three seeds are dibbled in lines to a depth of 2-3 cm at spacing of 10 cm between plants and 20 cm between rows.

## Seed treatment

Dress the seeds with the talc formulations of *Pseudomonas fluorescens* @ 10 g/kg of seed or

Carbendazim (Bavistin @ 2 g/kg of seed at the time of sowing. The seed treatment will protect the seedling from blast disease up to 30 days.

## Varieties

Local and high yielding short and medium duration varieties can be used for intercropping in coconut garden depending on the season, choice of the farmer, availability of seed, distribution of rainfall and availability of water for irrigation.

## Weed control

Management of weeds during early stages of crop is very important. Weeds compete with young rice plants for space, nutrients, water, light and serve as alternate host of pests. Weeds germinate earlier if it rains before seeding or it takes more time to seed after pre sowing irrigation; pre germinated weeds can be knocked with Glyphosate application @ 8 ml/l of water (800ml/acre / 100 l of water) or by one to two very shallow ploughing ( Stale seed bed technique). In line sown crop it will be economical to work in the inter space with a hoe and in broadcast crop, working with a tooth harrow reduces weed population. When labor is scarce chemical control methods can be resorted using pre emergence weedicides like Oxyfluorfen (Goal 23.5 % EC) @ 2.6 ml /l of water (260 ml /acre /100 l of water) within 3 days of sowing or Pretilachlor ( Refit 50% EC) @ 6 ml /litre of water ( 600ml/acre/100 l of water) within 6 days of sowing followed by one hand weeding at 30 DAS.

## Water management

The crop is sensitive to water stress during the reproductive stage. If rain fails during this period, irrigate the crop to bring the soil back to field capacity.

## Manure & Fertilizers

Apply F.Y. M or compost @ 5 t/ha or vermi compost @ 2.5 t/ha at the time of final ploughing or digging for improving the soil structure and water holding capacity. For better yield phosphatic fertilizers should be applied as basal along with organic manure and N and K fertilizers in split doses.

Ensure that there is sufficient moisture in the field

**Table 2. Fertilizer recommendation of different rice varieties sown as intercrop in coconut garden.**

Varieties & N:P:K recommendation (kg/acre)	Time and quantity of fertilizer application (kg/acre)
Local 16:8:12	1. 40 kg Rajphos / Mussooriephos basal
	2. 12 kg Urea+ 7 kg Potash 10-15 DAS
	3. 12 kg Urea+ 7 kg Potash 30-35 DAS
HYSDV 28:14:14	4. 12 kg Urea+ 7 kg Potash 55-60 DAS
	If Factomphos is used as a source of P fertilizer then
	1. 20 kg Factomphos + 3 kg Urea +7 kg Potash 10-15 DAS
HYMDV 36:18:18	2. 20 kg Factomphos + 3 kg Urea +7 kg Potash 30-35 DAS
	3. 12 kg Urea + 7 kg potash 55-60 DAS
	1. 70 kg Rajphos / Mussooriephos basal
HYSDV 28:14:14	2. 20 kg Urea + 8 kg Potash 10-15 DAS
	3. 20 kg Urea + 8 kg Potash 30-35 DAS
	4. 20 kg urea + 8 kg potash 55-60 DAS
HYMDV 36:18:18	If Factomphos is used as a source of P fertilizer then
	1. 35 kg Factomphos + 5 kg Urea+ 8 kg Potash 10-15 DAS
	2. 35 kg Factomphos + 5 Kg Urea + 8 kg Potash 30-35 DAS
HYMDV 36:18:18	3. 20 kg Urea+ 8 kg Potash 55-60 DAS
	1. 90 kg Rajphos/ Mussooriephos basal
	2. 26 kg Urea+ 10 kg Potash 10-15 DAS
HYMDV 36:18:18	3. 26 kg Urea+ 10 kg Potash 30-35 DAS
	4. 26 kg Urea + 10 kg Potash 55-60 DAS
	If Factomphos is used as source of P fertilizer then
HYMDV 36:18:18	1. 45 kg Factomphos + 7 kg Urea+ 10 kg Potash 10-15 DAS
	2. 45 kg Factomphos + 7 kg Urea+ 10 kg Potash 30-35 DAS
	3. 26 kg Urea + 10 kg Potash on 55-60 DAS

at the time of fertilizer application. Mixing urea with neem cake in the ratio of 5: 1 will prolong the period of nitrogen availability to the crop and also minimizing the losses of nitrogen.

### Plant protection

The major diseases of upland rice are Blast and Sheath blight. Blast is caused by *Pyricularia oryzae*.

The disease appears on the leaves as eye shaped spots often with grey centre and brown margin. They coalesce together resulting in the drying up of the leaves and results in the collapse of the entire plant. At the time of flowering, the fungus infects neck of the panicle causing dark brown to black lesions (neck blast). If the infection occurs in early stages of panicle development, all the grains will become chaffy. The neck infection also leads to breaking of the panicle at that region.

Sheath blight is caused by the fungus *Rhizoctonia solani*. The disease first appears as greenish grey irregular lesions on the sheath. Lesions may be oval, oblong or irregular and necrotic. In severe cases the lesions may spread to the leaves resulting in the crop failure.

As a prophylactic measure *Pseudomonas* fluorescence may be applied @ 10 g/l of water at weekly intervals. If the damage is above economic threshold level (ETL), then only chemical measures may be adopted to check the disease. ETL for blast disease is 5 to 10% of leaf area damaged or 1 to 2 % neck infection and for sheath blight disease it is 10% or more tillers affected. Application of neem cake 60 kg/ acre as basal will help to reduce the sheath blight incidence. In case of severe infestation of blast disease spraying Bavistin @ 1 g/l of water (200 g/acre / 200 l of water) or Kitazin @ 1 ml/l of water (200ml /acre / 200 l of water) or Fuje-one @ 1.5 ml/l of water (300ml / acre / 200 l of water) is effective. For sheath blight control Contaf 5 EC @ 2ml/ l of water (400ml/acre / 200 l of water) or Tilt 25 EC @ 1ml/l of water (200ml/acre / 200 l of water) is recommended.

Leaf folder, stem borer and rice bug are the common pests seen in upland cultivation. Symptom of stem borer attack in the vegetative phase is the drying of the central shoot later turning yellow in colour ( dead heart) and in the ear bearing stage, the ear head appears completely chaffy and white in colour (white ear head). In case of leaf folder attack leaves of the plant remain folded, rolled and webbed together with white patches. In both cases chemical



measures to control the damage may be adopted only if the damage is above ETL. The economic threshold levels for leaf folder attack is 2 freshly damaged leaves/hill and in stem borer attack it is 1 egg mass or 1 moth /m<sup>2</sup> or 10 % dead heart.

Use of egg cards of *Trichogramma chilonis* and *Trichogramma japonicum* will effectively control leaf roller, stem borer, skippers and cutworms. The 1 cubic centimeter trichocards has to be cut in to 10 small pieces and placed @ 1 piece for every 5 cents at weekly intervals. Six to eight releases are necessary for the efficient control of pests. The parasitoids have to be released immediately after noticing the moth activity in the field. Prophylactic spray of neem formulations viz. neemazal/ econeem/ neem gold @ 5 ml/l of water at weekly intervals will help to check the pest attack. In case of severe attack, spraying of any one of the following insecticides Takumi @ 0.24 g/l of water (48 g/acre / 200 l of water) or Fame @ 0.1 ml/l of water (20 ml/acre / 200 l of water) . Asataf 75 SP @ 1.6 g/l of water (320 g/acre / 200 l of water) can effectively control the leaf folder attack.

Rice bug is another major pest seen at the time of flowering. Adults and nymphs suck sap from the grain as a result grains become brown and discoloured. If the damage is above the ETL of 1 or 2 bugs /hill adopt chemical control measures. Spraying of Malathion 50%EC @ 2ml/l of water (400ml /acre / 200 l of water) can effectively check the damage.

Adopting the crop management practices, applying adequate quantity of fertilizers and manures and timely crop protection measures can assure an average yield of 2 to 2.5 t/ha from upland rice intercropped in coconut garden. This not only adds income to the farmer but also conserves soil moisture and fertility, better organic recycling and efficient utilization of natural resources both in spatial and temporal dimension.

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*Assistant Professor\*, Assistant Professor\*\*,  
Senior Scale, Rice Research Station,  
Moncompu, Alappuzha district, Kerala*

## DSP Farms set to achieve the production target of 1.1 million seedlings

*T.I. Mathewkutty\* & Deepthi R\*\**

The present area under coconut in India is 18.95 lakh hectares. The requirement of seedlings for new planting in non traditional and traditional areas and for replanting in traditional areas is estimated at about 10 million seedlings. The present production of seedlings by various Government agencies like Agriculture and Horticulture departments, State Agricultural Universities and ICAR institutes is around 3.2 million seedlings. Thus only 32 % of the requirement is met through these agencies. Considering the high demand many private nurseries are also supplying seedlings.

Board has established seven Demonstration cum Seed Production Farms in different parts of the country in 240 hectare. The Board is also running commercial nurseries attached to all the farms for the production and supply of quality coconut seedlings. The first DSP farm of the Board at Mandya is the leading supplier of dwarf coconut seedlings to southern states. In order to meet the increasing demand for coconut seedlings, Board has fixed an enhanced production target to the tune of 1.1 million seedlings during the 2012 planting season. Seed nut collection has been already started from identified mother palms in the states of Assam, Orissa, Andhra Pradesh and Karnataka. More coconut gardens are identified in the coconut growing belts of Karnataka for procuring 5.5 lakh seednuts for DSP farms in Kondagaon, Mandya, Madhepura and Pitapally. Three lakh seednuts are procured from these gardens and sowing of seednuts is in progress. In Orissa 88,000 seednuts are procured from Brahmagiri area in Puri district. For the DSP farm Vegiwada 50,000 seed nuts are procured from the East and West Godavari districts of Andhra Pradesh. Similarly in Assam 50,000 seednuts are procured from progressive farmers in Kamrup district. For sowing in DSP farm Neriamangalam, 12000 nuts are procured from Munderi in Nilambur. In addition to these, the identified mother palms of the 7 DSP farms are expected to provide 4.3 lakh seednuts.

Sowing of 17 lakh seednuts is scheduled to be completed by March, 2012 and 1.1 million seedlings will be ready during 2012 planting season to be supplied through its DSP farms. Board assisted Regional Coconut Nurseries in Kerala, Tamil Nadu, Orissa, Gujarat, Assam, Tripura, Nagaland and Arunachal Pradesh will produce 4.00 lakh seedlings. Board under its various schemes viz. Production and distribution of hybrids/ other released varieties and Aid to registered/ private nurseries will produce 4.00 lakh and 3.75 lakh seedlings respectively.

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*\*Deputy Director, \*\*Technical Officer, CDB, Kochi-11*

# Coconut Shell Powder

Coconut shell powder is manufactured from matured coconut shells. The manufacture of coconut shell powder is not an organised industry in India. The product finds extensive use in plywood and laminated board industry as a phenolic extruder and as a filler in synthetic resin glues, mosquito coils and agarbathis. Coconut shell powder is preferred to other alternate materials available in the market such as bark powder, furfural and peanut shell powder because of its uniformity in quality and chemical composition, better properties in respect of water absorption and resistance to fungal attack.

The product is manufactured in sizes ranging from 80 to 200 mesh. Keeping in view of the vast industrial uses, the demand for coconut shell powder appears to be promising.

## Process of Production

Coconut shells free from contamination of coir pith, are broken into small pieces and fed into a pulveriser. The powder from the pulveriser is fed into a cyclone and the parallel product is collected in bag filters. The shell powder is then fed into a vibrating sieving machine and packed according to mesh size requirements for various end uses.

The rejects from the sieving machine can be recycled in the pulverizer for size reduction. The

main requirements for consistent good quality of coconut shell powder are proper selection of shell of proper stage of maturity and efficient machinery

## Technology

The Coconut Development Board in collaboration with Defence Food Research Laboratory, & CFTRI Mysore has developed the technology for making Coconut Shell Powder, which is available to entrepreneurs at a technology transfer fees.

## Plant & Machinery

A brief list of plant and machinery for the Coconut Shell Powder is given below.

- Hammer mill
- Storage bin
- Impact pulveriser
- Cyclone
- Bag filter
- Air blower
- Sieving machine

## Project cost for establishing a coconut shell powder unit having capacity to process 1 tonne shell power per day

Land required: 40 cents

Building & Civil Works(200m sq. feet): Rs. 10 lakhs

Plant & Equipments: 14.5 lakhs

Preoperative Expenses :Rs.3 lakhs

Miscellaneous Expenses: Rs. 1.5 lakhs

Working capital: Rs. 5 lakhs



## Yield

Raw material: 12,000 shell

Shell powder: 1 tonne

Annual sales: Rs.12.0 lakhs

Net profit: Rs.2.25 lakhs

Return on investment: 20 per cent

## Sources of Machinery / Equipment

Kaps Engineers, 831, G. I. D. C. Makarpur, Vadodara - 390 030

Pilots India, Kalletumkara - 680 683, Irinjalakuda Dist., Kerala

Universal Enterprises, 99/77/1B Sri Rampura, H. O. Court Road, Mysore - 570 008

## Manufacturing units

M/s.Kongunad Agro Products, Olappalayam PO, Kangeyam Taluk, Erode District, Tamil Nadu  
Ph: 0491-2567232, Mob: 9447503399

M/s.S.S. Agro Mills, Sidco IGC, Phase II, Samba, Jammu and Kashmir, Pin: 184121. Phone: 9419394038, 9906094038

## 108<sup>th</sup> Board Meeting held



*A view of the 108<sup>th</sup> Board meeting. Seen are Adv. Varkala V. Ravikumar, Shri. Om Prakash, Shri. Mani C. Kappan, Shri. T.K. Jose IAS, Shri. G.S. Basavaraj M.P., Shri. Charles Dias MP, Dr. A.K. Mishra, Smt. K.R. Nethravathi and Shri. R. Kalaiselvan.*

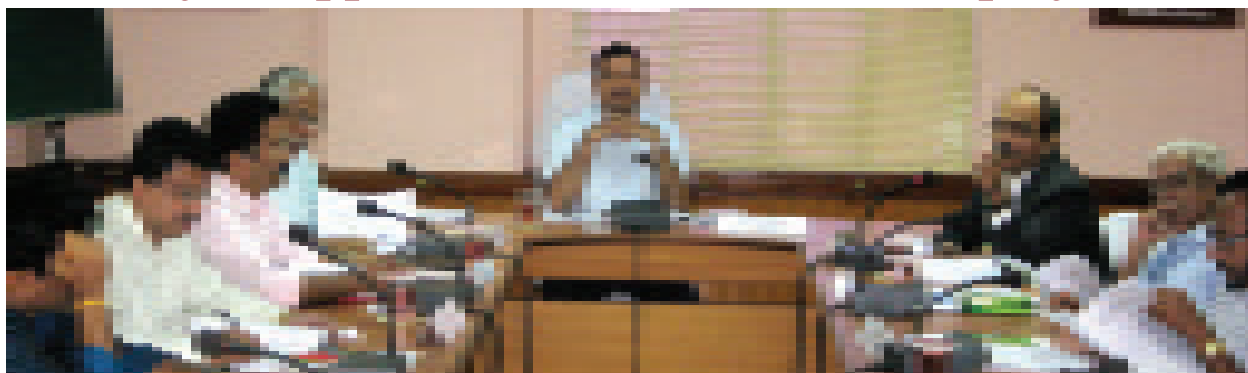
The 108<sup>th</sup> meeting of the Coconut Development Board was held on 17<sup>th</sup> December at the DSP farm of the Board at Mandya, Karnataka. Shri. T K Jose IAS, Chairman, Coconut Development Board presided over. Vice Chairman of the Board Shri. Mani C Kappan, and other members of the Board, Shri. Basavaraj MP, Shri. Charles Dias MP, Adv.

Varkala B Ravikumar, Shri. Vasanth Vishnu Limaye, Shri. A K Mishra, Director (Co operation), Ministry for Consumer Affairs and Food, Shri. Om Prakash, Additional Commissioner, Ministry of Agriculture, Shri. M Thomas Mathew, CCDO, CDB and Dr. A K Nandi, Secretary, CDB attended the meeting.

Members of the Board visited

the Farm and expressed happiness over the excellent performance of the cultivars. The team congratulated the Farm Manager and other employees of the Farm. Board is planning to elevate the status of the Farm into an international research institute. Chairman and members of the Board also planted coconut seedlings in the Farm.

## Project Approval Committee clears 21 projects



*A view of the 37<sup>th</sup> PAC meeting. Seen are Dr. A.K. Nandi, Dr. K. Muraleedharan, Shri. M. Thomas Mathew, Shri. T.K. Jose IAS, Dr. KSMS Ragavarao, Dr. M. Aravindakshan and Dr. R. Chandramohan*

The 37<sup>th</sup> meeting of the Project Approval Committee (PAC) on Technology Mission on Coconut (TMO) held at Coconut Development Board, Kochi on 12<sup>th</sup> December 2011 cleared 21 projects. Projects on Pest and

Disease Management, Development of technology for Processing and Product Diversification, Adoption of technology for Processing and Product Diversification and Market Promotion at a total cost

of Rs.2073.086 lakhs and with an eligible subsidy of Rs.358.922 lakhs were approved by the meeting.

Shri. T.K. Jose IAS, Chairman, Coconut Development Board chaired the meeting. Dr. KSMS

Raghavarao, Head, Department of Food Engineering, CFTRI, Mysore, Dr. R. Chandramohan, Head, Crop Protection Division, CPCRI, Kasargod, Shri. Pushpangadan V.V, Additional Director, Department of Agriculture, Government Secretariat, Thiruvananthapuram, Sri. K.B Dundi, Joint Director of Hort, (Plantation Crops & Plant Protection), State Horticulture

Department, Karnataka, Shri. Venu S. Menon, Asst. General Manager (District Development), NABARD, Ernakulam, Shri. M.M. Jose, Senior Marketing Development Officer, Directorate of Marketing & Inspection, Kochi, Shri.D. Sarvothama Rao, Chief Manager, Indian Overseas Bank, Regional Office, Ernakulam, Shri.M. Thomas Mathew, Chief Coconut Development Officer,

Coconut Development Board and Dr.K. Muralidharan, Director, Coconut Development Board attended the meeting. Dr.M.Aravindakshan, Coordinator, Amritha School of Environmental Studies, Ettimadai, Coimbatore & former Chairman of Coconut Development Board attended the meeting as invited expert.

## Board approves the proposal to launch neera unit in Karnataka

The Project Approval Committee meeting of Technology Mission on Coconut held at Coconut Development Board, Kochi cleared a project for establishment of Neera Demonstration Unit at Horticulture Farm, Thumbe District, Karnataka at a total cost of Rs.115 lakhs. The project was submitted by the Department of Horticulture, Government of Karnataka under Technology Mission on Coconut. The share of the Coconut

Development Board is Rs.28.75 lakhs i.e., 25% of the project cost. Neera is a non alcoholic and nutritious drink obtained by tapping unopened spadix (inflorescence) of coconut palm. Neera can easily be converted into value added processed products such as jaggery, sugar, candy, ice cream, toffee etc. These products have high market value. The Board intends to promote the drink owing to its value addition, employment generation, and sustenance of

enhanced returns to the farmers. On an average 150-180 litres of neera can be tapped per tree (average 2-3 liter per tree per day) over a period of six months tapping period. This gives a return of nearly Rs.30,000 per acre (approximate 30 functional trees). The DFRL and the CFTRI have already developed the technology for preserving neera for 3 days to 6 months. The low fat neera can also be utilized to make honey, powdered sweet toddy, sweets and ice creams.

## Board recommends coconut farmers for Padma award

Considering the significance of coconut in the economy of the country as well as the role played by the small and marginal coconut farmers, Coconut Development Board has requested the governments of Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Goa, Maharashtra, West Bengal and Andaman and Nicobar Islands to consider coconut farmers also to the Padma award category. Various coconut products and its by

products form a major share of the export basket of the country. Coir and coir products fetch export earning of Rs. 1000 crores annually and the activated carbon alone fetches Rs.450 crores. Coconut which is cultivated in 18 states and 3 union territories provide livelihood security to more than one crore people. Board has instituted the scheme of National awards to recognize and promote excellence in coconut sector.

## Agro pro tech

Coconut Development Board, State Centre, West Bengal participated in Agro Pro Tech 2011 held at Kolkata from 3<sup>rd</sup> to 5<sup>th</sup> November 2011. Shri. Abu Hena, Minister for Food Processing Industries, Government of West Bengal visited the Board's stall and appreciated the activities of the Board. Tender coconut water vending machine manufactured by Fruit Hut, Hyderabad was displayed in the Board's stall. Various coconut products, handicrafts and informative charts were also displayed. The event was organised by Indian Chamber of Commerce and Industry.



## 2500 Friends of Coconut Tree in operation

The Friends of Coconut Tree programme of the Board has crossed its half way mark. So far 2740 trainees including around 100 ladies have successfully completed training by the 16<sup>th</sup> week. Board targets to train 5,000 people this year and is in the process of creating a pool of trained personnel among the coconut-growing districts of Kerala.

The Board embarked on this training programme in the state of Kerala on 17<sup>th</sup> August 2011 covering 11 districts in the first phase. The feedback Board receives from public is overwhelming. The Board is planning to implement this project



in a phased manner in other states also.

FoCT training is an opportunity for unemployed youths to realize better income and livelihood at his own place. Training curriculum includes scientific management practices of coconut, major pests and diseases and their control measures, harvesting, collection of seednuts and management of

coconut nursery, irrigation, fertilizer application etc besides classes on human resource development, banking, yoga and healthy way of living.

The Board is visualizing a bright future to those who have completed the training successfully and to those who consider this as a serious profession. A charge of Rs.10 for a normal tree (40 feet height) Rs.15 for taller as well as those trees in the city limits (where harvesting is a bit difficult) is fixed. Most of the trainees are making Rs.300-900 per day. Some of the trainees are making income of Rs.1000 per day.

## Registration of CPSs in progress

The formation of the Coconut Producers' Society (CPS) are progressing well in various districts. Nearly 500 societies are in its formation stage and 162 societies are already registered with the Board. Board is targeting to form 1000 societies in Kerala during this financial year. CPS would be an effective medium in increasing the production through procuring, processing and marketing. The plan is to unite small and marginal farm holders and register them under the Charitable Societies Act. The societies will enable the farmers practice scientific farming practices. They will offer an opportunity to farmers to get acquainted with new technologies in production, plant protection, processing and marketing. Planting material, fertilizers and pesticides will be made available at

reasonable price. Other objectives of the Society include establishment of small and medium nurseries, extension of financial assistance to establish organic manure units and copra dryers, offering opportunity for participating in study tours and exhibitions as well as procurement, and pooling of tender coconut.

Farmers having atleast 10 bearing palms can be made members of the Society. There can be around 40-100 members in a society. The governing body of a CPS comprises of a President and 6 executive committee members. The Societies would have to be registered under the Charitable Societies Act and also with the Board. The Bye law for forming CPs are available with the Board. So far 51 societies in Kannur, 34 in Kasaragod, 39 in Kozhikode, 13

in Malappuram, 7 in Palakkad, 12 in Thrissur, 4 in Ernakulam and 2 in Alapuzha have been formed. Board has invited application from the Societies for financial assistance for copra dryers.

Societies eligible for registration with the Board shall pay Rs.200/- by way of demand draft drawn in favour of the Chairman, Coconut Development Board, Kochi-682 011 payable at Ernakulam/Kochi. The validity of the registration shall be two years. Societies should renew their registration at least one month prior to the expiry of the registration by paying Rs.100/-. This renewal will be valid for 2 years. Application for registration as CPS with the Board should be submitted to The Chairman, Coconut Development Board, Kerabhavan, SRVHS Road, Kochi - 682 011

## International Conference cum Exhibition on Agri Business and Food Processing

Coconut Development Board, State Centre, Hyderabad participated in the International Conference-cum-Exhibition on Agri business and Food Processing held at Hyderabad on 22<sup>nd</sup> and 23<sup>rd</sup> November 2011. Shri Kasu Venkata Krishna Reddy, Minister for Co-operation, Government of Andhra Pradesh inaugurated the exhibition and the Board's stall. This International Conference-cum-Exhibition named as Food 360° was an initiative to synergize collaborative efforts among the stakeholders to deliberate on the challenges for developing greater linkages at state, national and international level enabling the



*Shri Kasu Venkata Krishna Reddy, Minister for Co-operation, Government of Andhra Pradesh in the CDB stall. Ms. Anna Kalate, Former Minister of Labour, Government of Poland & Shri K.R. Kuttikrishnan, Deputy Director, CDB, Hyderabad are seen*

growth of the agriculture and food processing sector. Board displayed informative posters, publications and value added coconut products. The event was organized by

Federation of Indian Chamber of Commerce and Industry (FICCI), Hyderabad Chapter and Government of Andhra Pradesh

### Krishi 2011



*A view of the Board's stall*

Coconut Development Board participated in the Seventh International Agriculture Trade Fair and Conference Krishi 2011 from 1<sup>st</sup> to 5<sup>th</sup> December 2011 at Nashik, Maharashtra. Shri. Chagan Bhujaal, Minister for PWD and Tourism, Government of Maharashtra inaugurated the fair. Shri.

Radhakrishna Vikhe Patil, Minister for Agriculture, Government of Maharashtra and Shri. Yashwantrao Chavan M.P, Nashik were present on the occasion.

Krishi 2011 focused on seeds, food processing, farm machinery and equipments, agro chemicals,

agri logistics, retail and distribution sectors. The fair was jointly organised by Human Service Foundation, Maharashtra Chamber of Commerce, Industry & Agriculture (MACCIA) and Apex Chamber of the State.

Board displayed various value added coconut products like packed tender coconut water, coconut oil, coconut milk powder, virgin coconut oil and handicrafts made of coconut wood and shell, informative charts and publications of the Board. M/s. Annu Coco-products, M/s. KLF Nirmal Coco-products, M/s. Keratech Pvt. Ltd, M/s. KMR Industries and M/s. Jupiter Wood works had their sales counters in the Board's stall. More than two lakh people visited the fair.

# AGRI MART



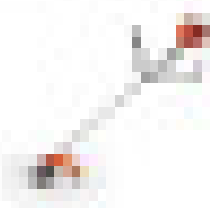
## Complete Farming Solutions under one roof

Attracting experienced farmers, Agri Mart has a comprehensive range of products, services and solutions. From tillage to sowing, from crop protection to harvest, we have the expertise to help you grow your business. Our experienced staff will help you choose the right equipment for your needs, and we offer a range of financing options to help you get the most out of your investment. Agri Mart is the one-stop solution for all your farming needs.

Agri Mart is a leading provider of agricultural equipment and services. We offer a wide range of products, from tractors and harvesters to irrigation systems and crop protection solutions. Our experienced staff will help you choose the right equipment for your needs, and we offer a range of financing options to help you get the most out of your investment. Agri Mart is the one-stop solution for all your farming needs.



Tractor



Tractor



Tractor



Tractor



Tractor

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# Monthly operations in coconut gardens

## January

**Andaman & Nicobar Islands:** Irrigate the palms. The frequency of irrigation and quantity of water depends on the type of soil and the method of irrigation.

**Andhra Pradesh:** Clean the crowns of the palms. Search for leaf eating caterpillar and destroy the affected leaves by cutting and burning. Detect the palms affected by Ganoderma wilt and drench the plant basin with calixin 5 per cent or aureofunginsol by dissolving 1 g aureofungin + 1 g. copper sulphate in 5 litres of water. The same treatment is to be repeated after 15 days. Isolate the disease affected palms by taking isolation trench around the palm. The healthy palms in the immediate vicinity of diseased palms should be treated similarly with the above solution to prevent further spread of the disease. If attack of the mite is noticed, spray neem oil - garlic - soap emulsion 2 percent or azadiractin @ 4ml per litre or root feed azadiractin @ 7.5 ml with equal quantity of water. Under rainfed condition a light ploughing may be done. Start irrigating the palms.

**Assam:** Continue irrigation. Attend to intercultural operations around the palm. Continue collection of seednuts from the selected mother palms and store them in a cool dry place. Apply pond silt to coconut garden. Start digging pits of 1m x 1m x 1m size in the main field at a spacing of 8m x 8m in square system for transplanting of seedlings.

**Bihar / Madhya Pradesh/ Chhattisgarh:** Clean the crowns of the palms. Continue irrigation. If there is scarcity of water, adopt drip irrigation. Keep the basins of palms weed free. Provide shade to the newly planted seedlings. Mulch the basins of the palms with dried leaves. Apply tank silt/forest soil/ compost in coconut gardens. Apply blitox @ 5g/litre or Dithane M 45 @ 2g/litre on the crown and bunches to avoid secondary infections due to cold injury.

**Karnataka:** Irrigate the palms regularly. Under drip system 60-70 litres of water per palm per day may be given. Raise suitable intercrops under irrigated conditions. If leaf spot disease is noticed spray the leaves with one per cent bordeaux mixture. If the palms are affected by leaf eating caterpillar cut and burn the severely affected leaves. Spray the underneath of leaves with 0.05 m per cent malathion or 0.02 per cent dichlorvos. Release parasites of suitable stage. If spraying has been done release the parasites only after 15 days in the pest prone areas. If the attack of the mite is noticed, spray neem oil - garlic - soap emulsion 2 percent (20 ml neem oil + 20 gm garlic emulsion + 5 gm soap in 1 litre water) or azadiractin @ 4ml per litre or root feed azadiractin @ 7.5 ml with equal quantity of water. Plough the land and destroy weeds under rainfed conditions.

**Kerala/Lakshadweep:** Irrigate young seedlings and adult palms. Clean the crowns of palms. Cut and remove all the senile and unproductive palms from the garden. Continue the prophylactic spraying either with bordeaux mixture or any other copper fungicides available in the market. If the attack of leaf eating caterpillar is noticed, spray the under surface of affected leaves with 0.02 per cent dichlorvos or malathion. Select mother palms for seednut collection. Start irrigation. If mite infestation is noticed clean the crowns of the palms and spray neem oil - garlic - soap emulsion 2 percent or azadiractin @ 4ml per litre or root feed azadiractin @ 7.5 ml with equal quantity of water.

**Maharashtra/Goa/Gujarat:** Clean the crowns of the palms by removing dead and decaying matter. Spray the crowns with one per cent bordeaux mixture if fungal diseases are noticed. If the attack of leaf eating caterpillar is severe, cut and remove all the affected leaves and spray the lower side of the leaves with 0.05 per cent malathion or 0.02 per cent intervals for one year. In areas where mite infestation is noticed, spray neem oil - garlic - soap emulsion 2 percent (20 ml neem oil + 20 gm garlic emulsion + 5 gm soap in 1 litre water) or azadiractin @ 4ml per litre or root feed azadiractin @ 7.5 ml with equal quantity of water especially on the perianth region of buttons and affected nuts.



**Tamil Nadu/Puducherry:** Clean the crowns of the palms. If rain is not received in early January, start the regular irrigation. Treat the stem bleeding affected palms by applying coaltar or bordeaux paste after removing the affected tissues. Dig isolation trenches of 1m deep and 50cm wide, 2 meters away from the base of the palms affected by Thanjavur wilt. Apply 5kg neem cake per palm per year. Drench the basins with 40 litres of one per cent bordeaux mixture per palm. Treat the palms with 100 ml calixin 5 per cent through root feeding at quarterly intervals for one year. In areas where mite infestation is noticed, spray neem oil - garlic - soap emulsion 2 percent (20 ml neem oil + 20 gm garlic emulsion + 5 gm soap in 1 litre water) or azadiractin @ 4ml per litre or root feed azadiractin @ 7.5 ml with equal quantity of water especially on the perianth region of buttons and affected nuts.

**Tripura:** Irrigate the palms at an interval of 3-4 days. The basins of each palm should be mulched with leaves, to reduce the loss of soil moisture. Before mulching, drench the basins with chlorpyrifos 0.05 per cent to avoid the attack of termites. Provide partial shade to new plants to protect from scorching. One per cent bordeaux mixture or any other copper fungicide may be sprayed to protect the palms from bud rot or leaf rot.

**West Bengal:** Continue harvesting of nuts. Start irrigating young seedlings in the field as well as in nursery and provide shade. Select mother palms for seednut collection.



### Characteristics of coconut oil

- 1. Coconut oil is a natural product.
- 2. It is a healthy and nutritious oil.
- 3. It is a good source of energy.
- 4. It is a good source of vitamins and minerals.
- 5. It is a good source of antioxidants.
- 6. It is a good source of essential fatty acids.
- 7. It is a good source of lauric acid.
- 8. It is a good source of medium chain triglycerides.
- 9. It is a good source of capric acid.
- 10. It is a good source of caproic acid.



# Market Review November 2011

## Highlights

- ◆ The price of milling copra, ball copra and coconut oil expressed a mixed trend at all the major markets during the month under report.
- ◆ The international price of coconut oil expressed an upward trend during the month under report. The domestic price of coconut oil at Kochi market was about 12 percent higher than that of the international price.

## COCONUT OIL

The price of coconut oil quoted at all the major marketing centres in the country expressed a mixed trend during the month under review. The weekly average prices at Kochi market varied between Rs.8038 and Rs.8400 per quintal. The monthly average price of Rs.8177 per quintal was marginally higher than the price of October 2011 and was higher by about 8 percent than that of November 2010.

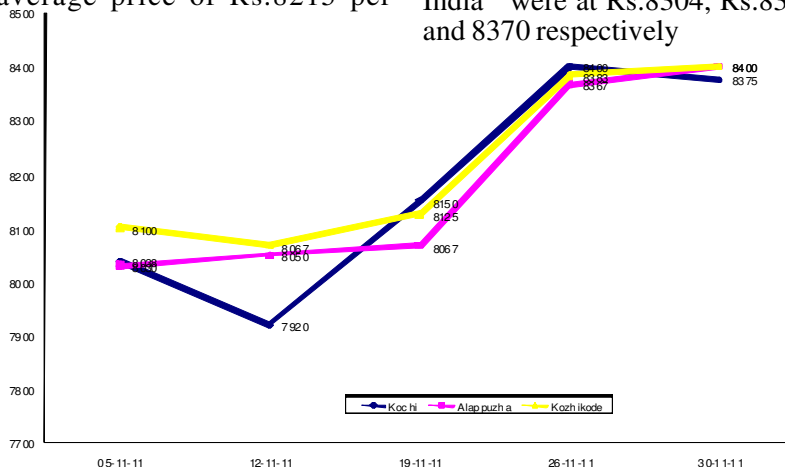
The price of coconut oil at Alappuzha market also moved in tune with the price behavior of Kochi market. The weekly average prices ranged from Rs.8030 to Rs.8400 per quintal.

The weekly average prices of coconut oil at Kozhikode market, varied between Rs.8100 and Rs.8400 per quintal. The monthly average price of Rs.8215 per

quintal was marginally higher than the price of October 2011 and marginally higher than that of the corresponding month last year.

Price of coconut oil is ruling high in recent times because of the festive season in Kerala. Price is expected to fall from the present level in January because of the beginning of harvesting season in Kerala. The monthly average price of coconut oil at Kochi market projected by the First Commodities Exchange of India Ltd. for the month of November 2011, during August 2011 September 2011 and October 2011 were Rs.9141, Rs.8553 and Rs.8065 respectively, while the average spot price ruled at Kochi was Rs.8177 per quintal.

The Futures Prices quoted for the next three months of December, January and February during the current month by the First Commodities Exchange of India were at Rs.8304, Rs.8390 and 8370 respectively



Price behaviour of coconut oil during November 2011

## MILLING COPRA

The weekly average prices of FAQ copra at Kochi market ranged from Rs.5444 to Rs.5675 per quintal. The monthly average price of Rs.5539 per quintal was marginally higher than that of the previous month and about 7 percent higher than that of the corresponding month last year. The weekly average prices of Rasi copra at Alappuzha market varied between Rs.5440 and Rs.5700 per quintal. The monthly average price of Rs.5508 for Office Pass copra at Kozhikode market was higher by about 4 percent when compared with the price in October 2011 and higher by about 5 percent when compared with the price in November 2010.

The weekly average prices of milling copra at Ambajipeta market in Andhra Pradesh ranged from Rs.4700 to Rs.4800 per quintal.

## EDIBLE COPRA

The weekly average prices of Rajapur copra at Kozhikode market varied between Rs.7950 and Rs.8467 per quintal. The monthly average price of Rs.8183 per quintal was marginally lower than that of the previous month and about 46 percent higher than that of the corresponding month last year.

The weekly average prices of ball copra at Kozhikode market varied between Rs.7167 and Rs.7625 per quintal.

The weekly prices of ball copra at APMC market Tiptur, in Karnataka varied between 6500 and 6616 per quintal. The monthly average price of Rs.6638 per quintal in October 2011 slid to Rs.6537 in November 2011.

The weekly average prices of Rs.6500 per quintal for ball copra at Bangalore market ruled steady till the end of the month. The weekly average price of Ball copra at Arsikere APMC market, varied

between Rs.6475 and 6550 per quintal.

**DRY COCONUT**

The monthly average price of Rs.7391 per thousand nuts for dry coconut at Kozhikode market was marginally higher than that of the previous month and about 62 percent higher than that of the corresponding month last year.

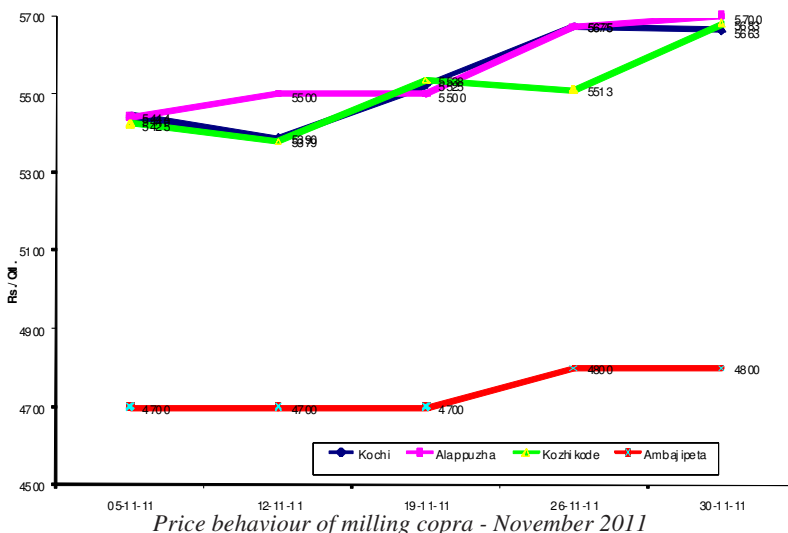
**COCONUT**

The monthly average price of Rs.7000 per thousand nuts for dehusked coconut at Nedumangad market was the same as that of the previous month and about 9 percent lower than that of the corresponding month last year.

The monthly average price of partially dehusked coconut at Arsikere APMC market in November 2011 improved to Rs.6927 per thousand nuts from Rs.6600 in October 2011.

The weekly average price of partially dehusked coconut at Bangalore APMC market ranged from Rs.6000 to Rs.6620 per thousand nuts.

The monthly average price of partially dehusked coconut Grade-1 quality at Mangalore APMC market improved to Rs.10000 from Rs.9827 of October 2011. The weekly average prices ranged from Rs.9550 to Rs.10350 per thousand nuts.



**TENDER COCONUT**

The weekly average prices of tender coconut at Kochi market ranged from Rs.18 to Rs.20 per nut.

**INTERNATIONAL PRICE**

The monthly average price of US \$1409 per MT for coconut oil in Europe (C.I.F. Rotterdam) for the month of November 2011 was higher by about 21 percent when compared with the price of the previous month and lower by about 8 percent compared to that of the corresponding month last year. The monthly average price of US\$ 910 per MT for copra was about 18 percent higher than that of the previous month and about 11

percent lower than that of the corresponding month last year. The domestic price of US\$1582 for coconut oil at Kochi market was about 12 percent higher than that of the international price.

The domestic price of coconut oil during the month of November in Philippines was US\$1350 per MT and in Indonesia; the price was US\$1200 per MT. The international price of Palm oil, Palm kernel oil and Soybean oil were US\$1200, US\$1370 and US\$1350 per MT respectively, while the price of coconut oil in international market was US\$1409 per MT and the domestic price in India was US\$1582 per MT.

**Market Price**

Date	Coconut Oil			Milling Copra				Edible Copra	Ball Copra				Dry coconut	Coconut	Partially dehusked coconut						
	Rs./Qtl.																Rs./1000nuts				
	Kochi	Alappuzha	Kozhi-kode	Kochi (FAQ)	Alappuzha (Rasi Copra)	Kozhi-kode	Kankala	Kozhi-kode	Kozhi-kode	Tiptur	Bangalore	Arsikere	Kozhi-kode	Nedumangad	Arsikere	Bangalore	Mangalore (Grade-1)				
05-11-11	8038	8030	8100	5444	5440	5425	4700	8100	7500	6616	6500	6550	7440	7000	6600	6620	9860				
12-11-11	7920	8050	8067	5390	5500	5379	4700	8467	7625	6571	6500	6550	7817	7000	6833	6500	9550				
19-11-11	8150	8067	8125	5525	5500	5538	4700	8417	7558	6494	6500	6550	7817	7000	6617	6083	10040				
26-11-11	8400	8367	8383	5675	5675	5513	4800	7983	7183	6506	6500	6550	7283	7000	7083	6083	10350				
30-11-11	8375	8400	8400	5663	5700	5683	4800	7950	7167	6500	6500	6475	6600	7000	7500	6000	10200				
<b>Average</b>	8177	8183	8215	5539	5563	5508	4740	8183	7407	6537	6500	6535	7391	7000	6927	6257	10000				

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. NT : No transaction

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