



**Radha Mohan Singh**

**राधा मोहन सिंह**

### *Message*

I am happy to know that Coconut Development Board is bringing out a special issue of Indian Coconut Journal on the occasion of World Coconut Day 2016 celebration which is scheduled on 2<sup>nd</sup> September 2016 at Bhubaneswar, Odisha on the theme, 'coconut- the tree of life sustains family well being'.

Coconut is one of the most useful trees in the world which provides food, shelter and raw material for various industries. I am sure, the coconut farmers in the country are now in a better position owing to the reasonable price they are fetching for coconut products. India is the global leader in coconut production and productivity and is making every effort to excel in coconut value addition and exports.

I am happy to note that Coconut Development Board has instituted the scheme of National Awards to recognize and promote excellence in coconut cultivation, innovative methods in coconut farming, product development, product improvement, quality improvement, product diversification, marketing, export and skill development. My hearty congratulations to the winners of the National Award and I wish all success for the conduct of the World Coconut Day celebrations. I also appreciate the efforts of Coconut Development Board in bringing out the special issue of Indian Coconut Journal.

**Radha Mohan Singh**

Secretary,  
Government of India  
Ministry of Agriculture & Farmer's Welfare  
Department of Agriculture, Cooperation  
& Farmer's Welfare



सचिव,  
भारत सरकार  
कृषि एवं किसान कल्याण मंत्रालय  
कृषि, सहकारिता एवं किसान  
कल्याण विभाग



**S.K. Pattanayak IAS**

एस.के.पटनायक भाप्रसे

### *Message*

I am happy to know that Coconut Development Board is bringing out a Special issue of Indian Coconut Journal on the occasion of the National Award distribution function and World Coconut Day celebration which is scheduled on 2<sup>nd</sup> September, 2016 at Bhubaneswar, Odisha.

Coconut is one of the most important horticulture crops grown in India. The country is the global leader in coconut production and productivity. Coconut is also having to its credit many value added products. We should work together to bring India the world leader in coconut value addition and exports also. The foreign exchange earnings from this crop have recorded a quantum jump recently which is to the tune of more than Rs.35,000 million.

I am hopeful that technical sessions of the programme would definitely serve as a good platform for educating the farmers who are expected to gather from across the country. My hearty congratulations to the National Award winners of Coconut Development Board and I appreciate the efforts of the Coconut Development Board in bringing out the special issue of Indian Coconut Journal.

**S. K. Pattanayak**



## From the desk of Chairman

Dear coconut farmers,

September 2<sup>nd</sup> of every year is celebrated as World Coconut Day. The objective of observing the World Coconut Day is to focus global attention to the potential of coconut crop and to encourage investment in this sector. On this occasion all coconut growing countries voluntarily organize programmes and events to promote the goodness of coconut which has earned its title amongst populations that depends on it. The day also marks the foundation day of Asian and Pacific Coconut Community (APCC), an inter governmental organization of 18 coconut producing countries formed in 1969 under the aegis of the United Nations Economic and Social Commission for Asia and the Pacific. Each year APCC announces a theme for World Coconut Day. The theme announced by APCC for this year's World Coconut Day is "Coconut - the tree of life sustains family wellbeing."

In India, Coconut Development Board organizes various programmes every year to celebrate the World Coconut Day. To mark the 18<sup>th</sup> World Coconut Day, on 2<sup>nd</sup> September 2016, the Board is organizing a national level celebration at Bhubaneswar, Odisha. Board will honour persons and organization with significant contributions personally or in a team and personalities who are dedicating their service for the betterment of the industry. The stage will also mark the release of publications on coconut and hold a seminar.

Many developments and innovations have taken place in the post harvest processing sector in our country in the recent years. The R & D effort of the Board in the last decade has made product diversification in coconut sector a reality. Large number of coconut processing units have been established. Several coconut based food products for the well being of family is now available in the market. The demand of coconut products has increased many folds as a result of the sustained promotional campaigns of the Board. It is heartening to note that India continues to be the global leader in coconut production and productivity. The gap between international and domestic price of coconut oil and copra has reduced considerably and during certain occasions the international price rules above the domestic price, which is a welcome trend for the coconut farmers while we observe the 18<sup>th</sup> World Coconut Day.

During this occasion, I request all to include coconut and coconut products in their daily diet for a healthy life, especially in the wake of the several nutritional findings of coconut. I also extend warm greetings to all for a successful World Coconut Day.

With warm regards,

A K Singh

Chairman

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*Cover picture : Crafts on coconut shell designed by Dayalu.  
Report on pages 16-17*

# Celebrating 18<sup>th</sup> WORLD COCONUT

# DAY



## Coconut - the Tree of life sustains family well being

● R. Jnanadevan, Dy. Director, CDB, Kochi -11

We are celebrating 18<sup>th</sup> World Coconut Day on 2nd September 2016 on the theme “Coconut- the tree of life sustains family well being”. Coconut is an important fruit tree in the world providing food for millions of people, especially in the tropical and subtropical regions. Coconut is a nutritious source of food, juice, milk, and oil that has been feeding and nourishing people around the world for generations. No member in the vast plant kingdom is more useful to human being than coconut. The palm has become so close to our life especially in places like Kerala, the land of coconut. Every household of Kerala plant minimum 2 or 3 coconut trees, as their kitchen will not function without minimum one coconut a day. Coconut is highly nutritious and is rich in fiber, vitamins, protein and minerals. It is classified as a “functional food” because it provides many health benefits beyond its nutritional content. With its many uses it is often called “tree of life”. Because of the various healthy nutritious products now available from coconut, it is also called “Nature’s super Market” that sustains the well being of families. There is a saying in Philippines about the uses of coconut. “He who plant a coconut tree, plant food and drink, vessels and clothing; a home for himself and heritage for their children”. “If you could count stars then you could count all the ways the coconut tree serves us”. Various products from coconut are used in some way or another in the daily diet of people in the traditional coconut growing

countries. Coconut kernel, tender coconut water, neera and neera sugar and coconut milk based beverages are being used as food. The coconut palm exerts a profound influence in the health and well being of family and rural economy of many societies, where it is grown. It provides nutritional food for the well being of millions of the families. Coconut possesses many health benefits due to its fiber and nutritional content. Which makes it a truly remarkable food and medicine. Once mistakenly coconut oil believed to be unhealthy because of its high saturated fat content. But now it is proved that the fat in coconut oil is unique and is different from many other fats and possesses many healthy properties. It is no wonder that coconut culture is now spreading even in non-traditional areas of the country. Moreover coconut is an eco-friendly crop and it is amenable to organic farming. Inter / mixed cropping can be done in the interspaces of coconut. Being a natural and eco friendly product, coconut has the bright future and potential for earning carbon credit. Taking in to consideration, the need for inclusion of more coconut based food products in the daily diet of human being for their family health and well being, the APCC appropriately announced the theme of the World Coconut Day- 2016, which is being celebrated on 2nd September 2016 as “Coconut – tree of life sustains family well being”.

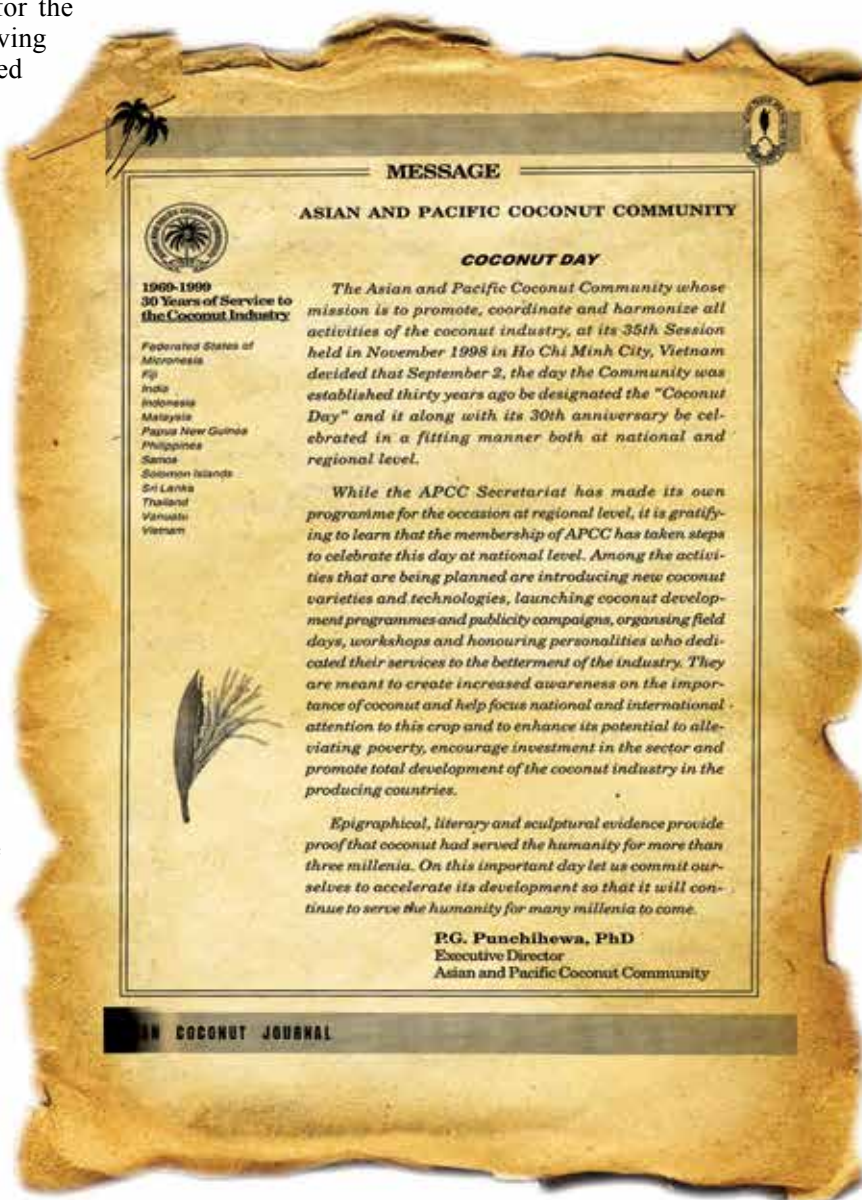
All coconut growing countries in the Asia and Pacific region observe World Coconut Day on 2<sup>nd</sup> September

every year. The foundation day of Asian and Pacific Coconut Community (APCC), an intergovernmental organization is being observed as the World Coconut Day by all the member countries since 1999. APCC came into existence in 1969 under the aegis of Economic and Social Commission for Asia and Pacific (ESCAP) for strengthening the regional cooperation among the coconut producing countries. The mission of APCC is to promote, coordinate and harmonize all activities of the coconut industry. In its 25<sup>th</sup> session held in November 1998 in Vietnam, it was decided that September 2<sup>nd</sup>, the day on which APCC was established, be designated as World Coconut Day. The decision was taken recognizing the need for creating awareness among the people especially new generation on the importance of protecting this valuable crop for the future. The objective of observing coconut day is to create increased awareness and importance of coconut and help focus national and international attention to this crop and enhance its potential to alleviate poverty, encourage investment in the sector and promote the total development of coconut industry in the producing countries. This is an occasion to review policies and formulate plan of action in this sector. It is also an occasion to find ways and means to make coconut industry a sustainable one.

Every year Coconut Day is being celebrated since 1999 with a theme message announced By APCC. APCC's theme for the first World Coconut day was "Plant Coconut, Eat Coconut, Drink Coconut and Use Coconut". This messages of APCC while celebrating the first coconut day on September 2<sup>nd</sup> 1999 is having more importance in the present day condition in our country. There is urgent need for removal of old low- yielding palms and replanting with better yielding seedlings in the traditional coconut growing states in the country. Recognizing the

importance of promoting replanting of coconut palms, CDB has been implementing a massive program Replanting and rejuvenation of coconut gardens under the Scheme Mission for Integrated Development of Horticulture(MIDH), which extends financial and technical support for replanting.

Coconut is a unique source of natural products with high nutritive and medicinal values. Hence everyone should regularly eat coconut for a healthy life and for living 100 years like coconut tree. Parts of coconut like coconut kernel, coconut oil and sugar contains micro minerals and nutrients, which are essential to human health. Coconut is used as food by people in the world mainly in the tropical countries. It is reported that coconut protein contains high percentage of lysine,





cystine, arginine, and other essential amino acids which are highly nutritious and important for human body. In many preparation of dishes, coconut kernel is either used in the grated form or in the form of oil. Diet is the single most important factor under control in health and well being of all families.

Because of the increasing awareness about the health benefits of coconut and its products, there is a change in the dietary perceptions which has resulted in the increased demand of coconut products in the world. There was a mistaken impression in the past that coconut oil contains saturated fat which is bad for health. But the fact is that coconut oil contains medium chain saturated fat which is good for health. Hence coconut oil is now gaining recognition as a nutritious health food and its demand in the domestic and international market is increasing. Raw virgin coconut oil is having very high demand in the export market. The oil is extracted before the fermentation process sets in. It is normally bottled or packed within 12 hours from the time the nut is opened. This is not bleached nor deodorized and maintains the freshness and the sweet coconut scent. It will also be clear as water in liquid form as no heat was used in the processing.

Drink coconut and promote coconut as a beverage crop was yet another message of the first coconut day. Tender coconut, coconut neera and coconut milk based soft drinks are healthy natural products of coconut.

Tender coconut has emerged as the safest undiluted, unpolluted, natural soft drink as a global beverage. Coconut water is the pure stuff from nature with full of natural sugars, salts, and vitamins that ward off fatigue. Coconut water contains more potassium. It is rich in minerals like calcium chloride, potassium, magnesium and sodium. It is also rich in sugar and protein. Undoubtedly it can be consumed as a health drink and this beverage is ideal for people, who are health conscious. The mineral content always remains constant, but the protein and the sugar concentrations increase simultaneously with the growth of the nut. Coconut water contains varied nutrient elements as well as minerals. Neera and coconut milk based beverages are the other soft drinks from coconut promoted by the Board. To make coconut milk, the juice inside coconut is combined with the white flesh of coconut. The result is the wonderful white milk that is full of healthy nutrients. Best of all, coconut milk is delicious. Making coconut milk at home is quick and easy. Once you experience the cool, luxurious, super-delicious taste of coconut milk you will always want to have it.

Maximizing the utility of coconut is another important message of first Coconut Day. Compared to other countries in the world, India is lagging behind in coconut processing and value addition. Many development and innovations have taken place in this field in the recent years due to the concerted efforts of the Board. Many coconut processing units are established in the country. Several coconut based value added products and by products are available in the market. But still there is immense potential for development of this sector. On the occasion of 18<sup>th</sup> Coconut Day, let us remember the message Coconut – tree of life sustains family well being focuses on the daily benefit and usefulness of coconut to families for a healthy life and sustainable development of coconut in our country. ■



# Coconut production in Kerala – trends, challenges and opportunities

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

Coconut farming plays a vital role in the agrarian economy of Kerala state besides its unique place in the socio-cultural fabric of the region. It was always considered as the symbol of rural prosperity and for many years Kerala ranked first in both area and production of coconut in the country. However, Kerala, the 'land of coconut' is gradually losing its supremacy in coconut production scenario of the country. Its share in area as well as production of coconut in the country is declining over time and coconut growers are going through a crisis situation as they find it tough to manage the crop on a remunerative basis. Though coconut sector in the state of late confronted by umpteen challenges, there are ways out to combat and conquer the obstacles and steer the sector to a profitable vibrant and sustainable road map. The present article discusses in detail the existing challenges faced by the coconut sector as well as the opportunities and the way forward.

## **Trends of coconut production**

Coconut is the most important cultivated crop in

Kerala covering about 39 % of the net area sown in the state, as per 2013-14 statistics. Among the leading coconut producing states in India, Kerala rank first in area and second in production of coconut. Presently (2013-14), coconut is cultivated in the state in an area of 8.09 lakh ha with annual production of 5921 million nuts. The coconut sector contributes around 15 percent of total agricultural GDP of Kerala, thus inextricably linked to the agricultural economy of the state. It is estimated that there are about 3.5 million holdings and at least 5 million people depend on this crop directly or indirectly for their employment and livelihood. In spite of the vital role of coconut in the economy of the state, per palm productivity of this crop in the state is abysmally low at 42 nuts per tree, which is lower than the national average.

The area under coconut has been shrinking continuously since 2000 due to various factors. It has declined by 13 % from 9.26 lakh ha to 8.09 lakh ha during the period from 2000-01 to 2013-14 with a

negative average compound growth rate (ACGR) of 0.96%. During the same period, area under coconut in the country has increased by 17% (with ACGR of 1.15%). It is to be noted that Kerala's share in the total area under coconut in the country (2013-14) has declined to 38 % from the 62% share contributed in 1950-51.

Eventhough Kerala stands first in area under coconut in the country with 38% share, it is losing its share (from 44 % in 2000-01 to 27% in 2013-14) to other competitive states like Tamil Nadu which stands first in production with 30 % share in national production. Increase in production of coconut in Kerala state over these years is a mere 7% as compared to 71% at All India level. ACGR in coconut production is 3.9% and 0.48% at national and state level, respectively.

Productivity of coconut in Kerala in 2013-14 was 7322 nuts/ha which is 28% lower than the national average (10122 nuts/ha). It is also to be noted that the coconut yield in Kerala during 2000-01 was 86 % of national average which has fallen to 72%. The fact that productivity of coconut in Tamil Nadu (14872 nuts/ha) is almost double than that of Kerala clearly highlights the importance of improving the productivity of the crop in Kerala which is almost stagnant with a low growth rate of 1.4%, lower than half of the national growth rate.

Table 1. Trends of coconut production in Kerala state

State/All India	Particulars	Area ('000 ha)	Production (million nuts)	Productivity (nuts/ha)
All India	2000-01	1823.9	12678.4	6951
	2013-14	2140.5	21665.2	10122
	Change (%)	17	71	46
	ACGR(%)	1.15	3.90	2.72
Kerala	2000-01	925.8	5536	5980
	2013-14	808.6	5921	7322
	Change (%)	-13	7	22
	ACGR(%)	-0.96	0.48	1.46
	Share in 2000-01 (%)	51	44	86
	Share in All India 2013-14 (%)	38	27	72

### Challenges confronted

Constraints such as high level of market fluctuation/ price crash in coconut, changes in the demographic characteristics of coconut growers with a shift towards absentee landlordism, predominance of senile and unproductive palms, predominance of small and marginal holdings, over populated stands of both coconut and

other trees in the homesteads, low level of adoption of crop management practices resulting in low productivity, depletion of natural resources in coconut gardens and soil related constraints, inadequate irrigation facilities, lack of availability of quality planting materials, lack of skilled labour and high wage rate, crop loss due to incidence of various pests and diseases, especially huge loss due to root (wilt) disease, low level of product diversification etc. adversely affects coconut farming in the state. As such coconut has become a neglected crop in the 'land of coconut' without getting adequate care and management.

### Policies and developmental interventions

The trade policies with respect to the edible oils at national level to a great extent affect the coconut oil prices of Kerala. This is slightly tricky wherein Kerala is the only state in our country which predominantly depend on coconut oil for culinary purposes and the elasticity of substitution to other cheaper oils like palm oil is very high in the hotel and confectionery industry as well as the households falling under lower economic strata. Hence liberal import policies adopted at the national level straight away affects the demand-supply equations of the state. Since our country does not produce enough quantity of edible oil to meet the requirements it is our policy to facilitate import of edible oils. Palm oil is the major edible oil being imported to India. During the oil year ended by October 2015 a total of 14.4 MT of edible oil was imported of which the major item (9.5 MT) was palm oil. Palm Oil seems to be the major competing oil for coconut oil in the domestic market.

Policy environment facilitating import of palm oil at reduced tariffs and distribution through public distribution system (PDS) at subsidized prices results in low price of palm oil in the domestic market. Hence, competitiveness of coconut oil compared to palm oil in the domestic market gets adversely affected and the excessive import of palm oil would trigger price crash of coconut. There is a need to re-calibrate the import duty structure and it is essential that within the framework of permissible limits, the tariff rates for the import of palm oil, both crude and refined are enhanced to protect the interests of Indian coconut growers.

The ASEAN-India Free Trade Agreement (AIFTA) is likely to have detrimental impact on Indian coconut sector, especially since ASEAN countries represent the major coconut producing region and are more competitive compared to India in respect of export of coconut products. The agreement is evolving one and the tariff rates fixed are ceiling rates, thus providing adequate flexibility to fix the tariff rates to lower levels. Although coconut and coconut oil are in the exclusion list of AIFTA, there is general commitment under AIFTA to review the exclusion list every year with a view to



improve the market access. Therefore, there always exists a threat in the case of coconut, seeing that, the existing price difference may facilitate the cheap imports in case of coconut is removed from the exclusion list.

Since 2009 Coconut Development Board has been designated as the Export Promotion Council to facilitate the export of coconut products (except coir and coir products). Since then many companies have been registered for exporting coconut products. South East Asian nations are far ahead of India in the export of coconut oil and other products. Support and incentives for the export of coconut products from India should be enhanced further taking into account the limitations of our country in the export front.

Coconut prices in India have been historically integrated with the coconut oil prices. Therefore, indubitably the coconut prices received by the farmers are integrated with the minimum support price (MSP) of copra. In general the coconut farmer prefers to sell fresh coconut when the price of coconut is attractive, as he receives a remunerative sum in his hand immediately and he can get rid of processing and transportation charges. Contrary to this if the copra and oil prices are lucrative; farmer prefers to do at least primary level processing which would augment farm level copra production. Therefore, the MSP for copra fixed at higher levels would certainly influence and act as an incentive for the primary value addition in coconut. The copra procurement system should be in such a fashion that the MSP ensures an incentive for processing to the coconut farmers when compared with that of selling fresh coconut. Other pertinent factors in this context of discussion are lack of effectiveness and efficiency in copra procurement by the agencies and inadequate infrastructural facilities for the storage of copra. It is noteworthy that for the most part of the year copra is

traded below MSP. In order to create an impact in the market and for the benefits of MSP to reach the genuine coconut farmers, adequate quantity of copra should be procured.

The studies on pattern of distribution of annual yield of coconut indicates that the number of nuts harvested varied from harvest to harvest and 60% of the production of a coconut palm is harvested during the peak production period i.e. the first six months of the calendar year, and hence a stable price during these periods is of utmost importance for achieving profitability in coconut based farming system. Hence, the copra procurement scheme should be designed keeping view of this important aspect of coconut production in the country.

In Kerala, the coconut procurement system through Krishi Bhavans in association with KERAFED introduced in 2012-13 as a market intervention by state government has been beneficial to the coconut growers. However, to be effective, necessary logistics are to be arranged for procurement of coconuts through all Krishibhavans along with facilities for safe storage of nuts and also for primary processing of nuts into copra. Steps are also necessary to avoid delay in payment of prices to the coconut growers for the nuts procured. In this context it is encouraging to note the decision of state government to enhance the procurement rate from Rs.25 per kg of coconut to Rs. 27 per kg as declared during the last budget presentation.

#### **Need for a comprehensive coconut rejuvenation scheme**

The foremost strategy for improving the coconut production in Kerala should be focused on massive cutting and removal of root (wilt) disease affected coconut palms which are beyond recovery, removal of over aged palms; regulating the palm density and replanting with high yielding planting materials along with adoption of suitable agro-management practices in farmer participatory cluster mode. Major reason for non-adoption of improved varieties of coconut is lack of availability of quality seedlings. For a sustainable growth of coconut sector it is recommended to have tall, dwarf and hybrid varieties cultivated in the ratio of 60:20:20. However, the field level scenario indicates a different story; tall cultivars constitute more than 90 per cent of coconut palm population.

Replacing old palms will require enormous quantity of seedlings. In Kerala on an average 28-30 lakh coconut seedlings are required annually. But as per the official statistics of coconut seedling supply for the year 2014, State Department of Agriculture, the major agency involved in coconut seedling distribution in the state, could supply only about 6.5 lakh seedlings, revealing a huge gap between demand and supply.

Since most of the existing seed gardens in Kerala



have been established more than 25 years back, the existing mother palms (especially dwarfs) in such seed gardens are nearing senility. Hence, urgent action should be initiated for replanting such seed gardens with parental lines of new and improved varieties recommended for the respective regions. Further, to increase the capacity for hybrid seedling production, a decentralized production mechanism is to be envisaged by maintaining a centralized pollen storage and supply mechanism.

The important long term strategy to meet the growing demand for coconut seedlings is to establish new seed gardens in suitable locations. Besides, rejuvenation of existing seed gardens and replanting with planting material of newly released varieties for different agro-ecological zones also needs much attention. Utilisation of superior genetic resources of coconut available in farmers' gardens is the most important short term strategy to meet the demand for coconut seedlings. Identification of superior mother palms with farmer participation and its validation by seedling progeny testing as well as molecular markers assumes much significance.

Decentralized approach for enhancing production of seedlings of improved varieties should be promoted by establishing more number of nucleus seed gardens. Such seed gardens may be encouraged in marginal and small farmer holdings. Public sector agencies including Coconut Development Board and State Department of Agriculture are having programmes for procuring seednuts from farmers' gardens. Recently in Kerala, State Department of Agriculture has implemented 'Kerasamrudhi' scheme which envisaged identifying mother palms of dwarf coconut varieties in farmers' garden and collecting seednuts. Inventory with GPS based photo tags of available mother palms in farmer's garden can be prepared by all agencies involved in

coconut planting material production. To augment seedling production in the root (wilt) disease prevalent tract, selection and identification of disease-free mother palms in 'disease hotspots' should be given more emphasis rather than large scale procurement of seed nuts from other areas.

#### **Enhancing productivity in existing coconut gardens**

The second strategy for revitalising coconut sector in Kerala needs to revolve around interventions for ensuring adequate care and management of coconut palms in the existing gardens to enhance productivity.

The study funded by Kerala State Planning Board on fertility of soils of Kerala has revealed that soil related constraints viz., very strong soil acidity, extensive deficiency of secondary nutrients calcium and magnesium and wide spread deficiency of micro-nutrient boron are among the important factors for low productivity of coconut in the state. Hence, appropriate interventions are to be formulated and implemented to enable coconut growers to alleviate these constraints through appropriate inputs and crop management practices to enhance productivity of coconut in the state. Simple technology for vermicomposting of coconut leaves as part of on-farm organic matter recycling in coconut gardens is very relevant in the context of growing awareness about organic farming/eco-friendly farming in Kerala.

Rainfed cultivation of coconut is another important reason for low productivity in Kerala. Water scarcity experienced by the palms during summer from December to May months adversely affects coconut production. The problem is more severe in northern Kerala where rainfall distribution is highly skewed. In water scarce areas drip irrigation is to be promoted to irrigate coconut palms to achieve higher water use efficiency. If there is drip



irrigation facility, then the water soluble fertilizers can be applied to coconut palms along with drip irrigation (fertigation) for higher fertilizer use efficiency.

Crop loss due to pests and diseases is a major constraint experienced by coconut growers. Annual loss of 968 million nuts was estimated as the loss due to root (wilt) disease in Kerala. Community/group approaches ensuring active participation of farmers are needed for the effective implementation of integrated pest/disease management in coconut. There are success stories of local self governments effectively implementing decentralized participatory approach for pest/disease management in coconut especially control of bud rot disease, red palm weevil etc. Support of development/research institutions like CDB and CPCRI can be made available by the LSGs for the effective implementation of such schemes. Crop surveillance and timely forecast of disease incidence should be carried out by the research and development agencies in endemic areas.

#### **Popularizing coconut based multiple cropping/integrated farming**

Systematic coconut based cropping/farming system as a strategy to make coconut farming economically viable in small holdings needs to be highlighted. This strategy is highly relevant since presently coconut growers in Kerala are more exposed to economic risks and uncertainties owing to the high degree of price fluctuations. In spite of the obvious benefits of coconut based farming system over the traditional monoculture, the extent of adoption of the recommended cropping/farming systems is not at a satisfactory level. However, there are cases of farmers who are highly successful in field implementation of multiple cropping/integrated farming in coconut. Similarly, some grama panchayats also have successfully implemented interventions related to coconut based farming system under the peoples' campaign for decentralized planning programme. The potential for strengthening food and nutritional security through the adoption of appropriate coconut based intercropping/mixed farming also need to be effectively utilized.

#### **Value addition through product diversification**

Traditionally the post harvest processing of coconut has been confined to the production of edible and milling quality copra, coconut oil and coir and coir based products. Technological research has been successful in evolving appropriate processing technologies for the profitable utilization of products and by-products of the coconut palm including tendernut, coconut kernel, coconut water, coconut wood, shell and leaves. To cope with the market fluctuations, there is a need for product diversification and byproduct utilization. Hence, promotion of farm level and community level processing of diversified products and byproducts obtained from coconut palm are highly imperative. Tender coconut marketing is one of the profitable activities which need to be promoted in the state. Farmer's collectives as well as enterprising youths are to be supported in organizing marketing outlets in potential areas for tender coconut. Of late, virgin coconut oil is also getting popular as a value added product in the domestic and export markets.

Another strategic area which has raised lot of expectation is the potential for production and marketing of neera. Various value added products like coconut palm sugar, palm jaggery, coconut honey and coconut syrup can also be made from neera. Technologies are now available for preserving and packing coconut inflorescence sap as 'neera' or sweet toddy as non-alcoholic health drink. The Government of Kerala has amended the abkari act and coconut producer federations are issued license to produce, process and market neera. Many of such federations have started producing and marketing neera. Constraints such as lack of skilled workers for neera tapping, high rate of drop out of neera technicians, cumbersome process involved in extraction of neera, non-availability of middle aged palms are reported to adversely affect the neera production and marketing. Further, efforts are needed to assess and refine the technologies made available for neera production so as to standardize the technologies for scaling up neera production on a commercially viable basis.

Encouraging more entrepreneurs in coconut sector by establishing 'Coconut Parks' by state government for organized processing for value addition will help coconut farmers to de-link the over dependence on coconut oil in determining coconut price.

#### **Promoting group approach**

Vast majority of coconut gardens in Kerala are small and marginal holdings which experience resource limitations. In general, the income from coconut farming in such fragmented holdings does not provide enough for meeting the requirements of farm families. Though technology options for enhancing income from coconut farming do exist, the fragmented holdings do not render themselves viable for the optimum utilization of



resources and the adoption of improved technologies by the cultivators. Group management of resources is suggested as a viable strategy to overcome the inherent weaknesses of the fragmented holdings. CDB has initiated the formation of Coconut Producer Societies (CPS) by associating 40-100 coconut growers in a contiguous area with a consolidated minimum of 4000-5000 palms. The objective is socio economic upliftment of the farmers through productivity improvement, cost reduction, efficient collective marketing and processing and product diversification. So far 7114 CPSs, 451 Coconut Producers Federations and 29 Coconut Producers Companies have been registered. State Department of Agriculture and LSGs also promote community approach among coconut growers at grass root level. Effective mechanism should be evolved to utilise these farmer producer organisations at grass root level as a platform for effective implementation of coconut development initiatives by agencies such as CDB, Department of Agriculture and LSGs ensuring active participation of coconut growers.

#### **Making available skilled climbers**

Lack of skilled palm climbers for undertaking timely plant protection operations as well as harvesting is another serious concern. CDB has facilitated training of

rural youth on palm climbing using mechanical device under the popular scheme 'Friends of Coconut Trees (FoCT)'. They are also trained on crop management practices including pest/disease management. LSGs can play a role in linking trained skilled palm climbers and coconut farmers by promoting labour bank concept under decentralized people's planning to address the problem of shortage of labour and high wage rate.

#### **Participatory research/ extension and linking institutions**

2016 is the centenary year of coconut research in the country. Kerala state is blessed with the renowned coconut research institutions including ICAR-CPCRI and research stations under KAU. Though large number of technologies has been generated for the improvement of coconut by these research institutes and various agencies are involved in the transfer of technologies in coconut in Kerala by implementing various extension activities and development programmes, the extent of utilization of the available technologies at farmers' level is not at a satisfactory level. The present scenario of technology adoption in coconut calls for the technology generation and dissemination programmes based on a viable extension strategy with the active participation of stakeholders. Further, effective linkage is to be established among different research, extension and development agencies and coconut farming community through well co-ordinated participatory research/ extension programmes for ensuring a meaningful technology generation and transfer in coconut. ICAR-CPCRI has implemented many initiatives on coconut in Kerala which have clearly demonstrated the efficacy of participatory community extension approaches for technology refinement and utilization. Efforts are needed to scale up these successful models for coconut development in Kerala.

#### **Conclusion**

Coconut sector in Kerala state faces challenges of various dimensions and effective steps are to be taken up on a priority basis to regain the past glory of coconut prosperity. Strategies emphasizing implementation of a comprehensive coconut rejuvenation programme, enhancing productivity through better technology integration and value addition through product diversification are needed besides a congenial policy environment. Community action should be facilitated among the small and marginal coconut growers at grass root level to revitalize the coconut sector in the state. A well developed sectoral innovation system of coconut in the state wherein effectively coordinated research and developmental activities with favourable policy outcomes along with participatory farmer initiatives, would certainly place the coconut sector of the state in forefront position among plantation crops. ■

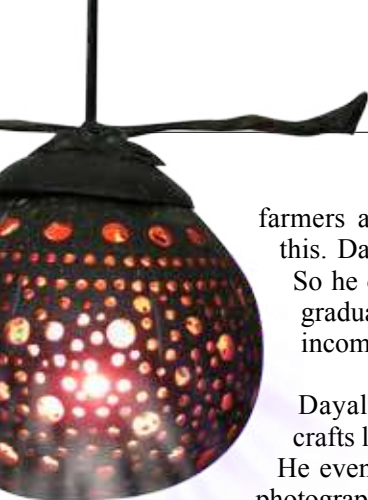
# Crafting wonders out of coconut shells

● Abe Jacob, CDB, Kochi.

For 37 year old Dayalu, a gifted craftsman from Varapuzha, Ernakulam, Kerala, any coconut shell is a potential material for making beautiful decorative objects. His craftworks include, lamp shades of different shapes and sizes and many other decorative items made out of coconut shells. “Craft is an exciting way for me to spend my leisure time and it is generating a decent revenue,” said the skilled craftsman-cum-farmer. Carving coconut shell is very difficult and time consuming, he said. An aluminum fabricator by profession, Dayalu was working in Dubai. It was during the Dubai festival that he came across handicraft items made out of coconut shell. Craft persons from Thailand, Indonesia and Sri Lanka had displayed various varieties of craft items which were sold as hot cakes in the show. Dayalu decided to try his luck in designing and creating crafts from coconut shell.

Traditionally, Dayalu and his family depend on agriculture. The main crop is “pokkali” is a unique saline tolerant rice variety that is cultivated in an organic way in the water-logged coastal regions like Varapuzha. The problem regarding pokkali is that it can only be cultivated from June to early November when the salinity level of the water in the fields is low. After harvesting the land may be used for some other purposes like prawn farming till next season. Most





farmers are not financially capable for this. Dayalu also face the same crisis. So he opted to work on shells, which gradually turn into his main source of income.

From his very childhood, Dayalu was interested in various crafts like drawing and clay modeling. He even took training under a famous photographer during his post college days.

After returning from Dubai, he purchased whole coconuts from the nearby market. With the self developed tools, he started transforming the coconut shells into beautiful crafts. Initially he created lamp shades. On enquiry he came to know that the product is having good demand which made Dayalu confident to stick on to this field and now this itself is his means of living. Each artifact of Dayalu is different in its own way. Eventhough he is making utensils like spoons and cups, he is more interested in developing craft items. Dayalu has registered a firm called Deepak Handicrafts and is creating diversified craft items. A craft of Lord Ganapathy designed by Dayalu has been recommended from Kerala for this year's national award of the Ministry of Textiles, Govt. of India. Dayalu's unique craft piece of frogs and mushrooms in coconut shell with light up facility is displayed in the Coconut Museum of Coconut Development Board. The crafts with light up facilities look very beautiful in the night.

Most of the crafts are made from the straitened coconut shell. The coconut shell is straitened by heating. This is a traditional but very complex skill, which needs high expertise to practice. He is very selective in taking the raw material also. Dayalu never takes the discarded coconut shells. Instead he purchases big coconuts based upon its size, shape and colour. He cuts the nut as per his requirement, removes the flesh from the nut with his own self designed tools and the shell is utilized for making the curios. The kernel is being sold as copra and the water is used for making vinegar. Dayalu is even planning to make virgin coconut oil from the kernel.

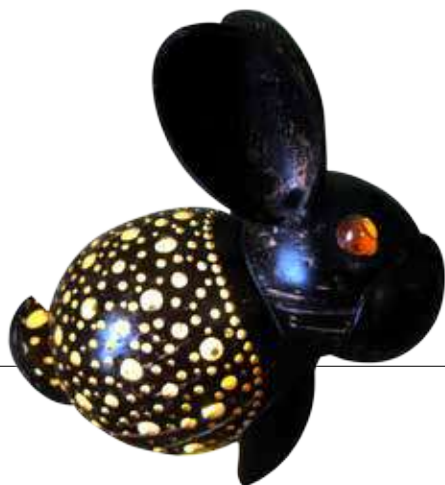
Deepak Handicrafts is not an industrial unit. Here



the employer and employee is Dayalu himself. He works hard from early morning till mid night. He himself goes to the market and purchases coconut. He himself decides on the shape to be made and cut with his self designed tools. Alongwith this work he also attends to other works like arranging the sets for advertisement shoots, creation of paper sculpture and even welding and moulding.

Crafting with coconut shell is a passion to Dayalu. Once he starts the design of a craft, he works on it continuously until he finishes the same, no matter whether it is day or night. Various tools, machineries and dyes are used for this purpose. Dayalu is having stock of different types of artifacts ranging from Rs. 500 Rs. to Rs. 25,000. He is also having regular buyers for his products like handicraft merchants from many states. Dayalu regularly participates in melas and fairs where his products are now also sold as hot cakes. ■

*Dayalu can be contacted on 09895646870*



# Incidence and intensity of stem bleeding disease in northern Kerala - *status and strategies for integrated management*

● **Thamban. C, V. H. Prathibha and Chandran K. P.**

ICAR-Central Plantation Crops Research Institute, Kasaragod

Coconut is the major cultivated crop in the northern districts of Kerala which provides livelihood to lakhs of farm families. Farmers of this region experience various constraints in coconut farming crop loss due to incidence of various pests and diseases. Stem bleeding disease caused by the fungus *Theilaviopsis paradoxa* is widely prevalent in coconut orchards of northern Kerala, especially in districts like Kasaragod, Kannur and Kozhikode, which adversely affects the coconut production of this region. Even though earlier studies conducted by CPCRI revealed the intensity of the incidence of stem bleeding disease in northern Kerala and indicated the need for effective steps for the integrated management of the disease to avoid economic loss, no field level interventions in substantial terms have been implemented yet. Concerted efforts are required ensuring active participation of coconut growers and other stakeholders to control and prevent the spread of the stem bleeding disease of coconut in northern Kerala.

Stem bleeding is one of the major diseases causing heavy loss in coconut. First report of the disease from India was in 1922. Stem bleeding, a debilitating disease, is prevalent in almost all the coconut growing areas of the country. In the early stages of the disease, yield loss is limited. However, later on, there is a steady yield decline causing considerable loss which eventually leads to death of affected palms unless managed in time.

## **Symptoms of stem bleeding disease**

- Exudation of reddish brown gummy fluid from growth cracks on the trunk, which becomes black on drying.
- In the initial stages of infection, bleeding symptoms appears as one or two longitudinal cracks at the base and later spreads upward on the stem. The longitudinal patches may coalesce to form larger patches.
- In advanced stages of infection, the bleeding

patches may extend up to the crown.

- The tissue inside the lesions shows discoloration and decay. The internal damage is confined to the hypodermal region.
- In young palms under cooler conditions, the decay may extend into the deeper layers of central cylinder
- As a result of extensive damage in the stem tissue, the outer whorl of the leaves turn yellow, dry and shed prematurely.
- The trunk tapers and reduces the crown size.
- In the advanced stages, scolytid beetles like *Diocalandra* and *Xyleborus* infest the palms and further weaken the stem.



*Symptoms of stem bleeding disease*

## **Etiology**

Stem bleeding disease is caused by a fungus, *Theilaviopsis paradoxa*. It is a soil borne weak pathogen which enters the trunk through wounds/growth cracks. Growth cracks may develop after sudden heavy rains following prolonged dry period or after heavy manuring. Development of growth cracks, poor drainage, soil moisture stress, hard pan formation in soil, imbalanced nutrition, excessive soil salinity, stem injury, lightning attack and insect attack are the predisposing factors for disease development. The disease growth is faster during July- November when high humidity and optimum temperature prevail. Some of earlier investigations reveal that inoculum was high in red loam soil followed by



laterite soil and the least in the sandy soil. The pathogen also attacks intercrops, viz. arecanut, banana, pineapple and papaya.

#### **Integrated Disease Management**

- Removal and destruction of disease advanced and dead palms.
- Application of recommended dose of fertilizers in two splits, one third during April-May and two-third during September–October
- The affected tissues should be completely removed using a chisel and smear the wound with 10% Carbendazim50WP (10g in 100 ml of water) and basin drenching with 40 liters of 0.1% Carbendazim50WP at quarterly intervals up to one year.
- Root feeding with 100 ml of 5% Carbendazim50WP at quarterly intervals up to one year. Or
- Smearing of Trichoderma talc powder paste on the bleeding patches of the stem (The paste can be prepared by adding 50g of Trichoderma talc powder to 25 ml of water).
- Soil application of Trichoderma harzianum (CPTD 28) enriched neem cake @ 5 kg/palm at quarterly intervals up to one year and irrigating the palms once in a week followed by mulching around the palm basin.

#### **Status of incidence and strategies for IDM against stem bleeding in northern Kerala**

Recently, a study was conducted by ICAR- CPCRI with the support of State Planning Board, Government of Kerala, to assess the incidence and intensity of stem bleeding disease in Kasaragod and Kannur districts. The disease incidence was calculated by taking into account the number of palms infected to the total number of palms in the garden. Severity of the disease was computed using formula given by Jacob Mathew et al. (1989),  $1.81 + 4.3t$ , where  $l$  = lesion size (in 1000 cm<sup>2</sup>) and  $t$  = tapering of

palm ranging from 0 to 4. If the disease severity score is  $<10$  then it is considered as mild, if 10-25 then it is moderate and if it is  $>25$  considered as severe. The study showed that overall incidence of disease was 2.27% and 1.78% in Kasaragod and Kannur districts, respectively. In Kasaragod district, highest incidence (6.2%) was observed in Padanne panchayath followed by Delampady (5.6%) and Pilicode (4.8%) panchayaths. The incidence was lowest in Panathady (0.4%) and Puthige (0.6%) panchayaths. In Kannur district the disease incidence was high (3.3%) in Cheruthazham panchayath compared to other panchayaths included in the study. Study revealed that stem bleeding disease incidence is more prevalent in Agro Ecology Unit (AEU) 11 i.e. Northern Laterites. The region is characterized by more dry spells and higher temperature and hard laterite soils which favours the pathogen to infect the palm. Eastern high land region had fewer incidences.

Assessment of severity of stem bleeding disease of coconut in Kasaragod district revealed that incidence was severe in two third (66.52 %) of the palms affected by the disease, moderate in one fourth (24.67%) and mild in 8.81% palms. In Kannur district the incidence of disease was severe in 82% palms, moderate in 14% palms and mild in 4% palms. The results clearly indicate that incidence of stem bleeding disease of coconut in northern Kerala is mostly severe in nature and hence it is imperative that urgent necessary steps are taken up to implement integrated disease management strategies to prevent further crop loss. It was observed that in many cases coconut growers did not adopt any control measures. The seriousness of the disease incidence was not properly perceived by the farmers mainly because the palms affected by the disease do not perish quickly but only gradually. Further, most of the farmers fail to observe the bleeding patches on the tree trunk at the initial stages of the disease.

The practices adopted by farmers for managing the stem bleeding disease indicate that the level of adoption of integrated disease management package is very



*Conidia of Theilaviopsis paradoxa*



*Root feeding with 5% Carbendazim*



*No fresh bleeding patches after application of Trichoderma talc powder paste*

low. Only in 10% of affected coconut gardens, some kind of control measures were adopted against stem bleeding disease, that too mostly incomplete or incorrect adoption. Less than 1% farmers adopted the practice of removing the affected tissues completely using a chisel and smearing the wound with fungicide, the main component of the IDM practices recommended against stem bleeding disease.

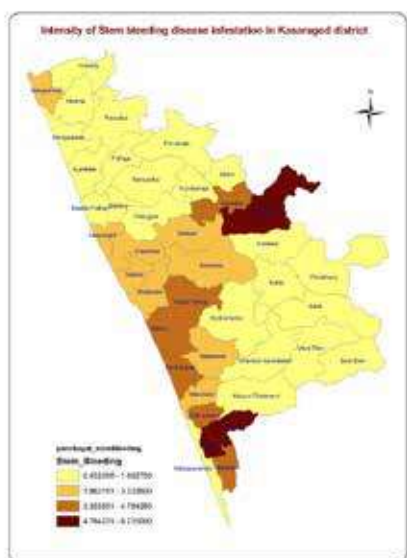
It was also revealed that farmers were not having adequate level of knowledge about the IDM package for managing stem bleeding disease. Some of the constraints farmers mentioned in adopting the recommendations included lack of availability of quality neem cake, lack of availability of fungicides, lack of labour etc. Even though stem bleeding disease was prevalent in most of the coastal and midland grama panchayaths, extension personnel from only few Krishi Bhavans perceived the need for implementing major interventions to manage stem bleeding disease. Compared to bud rot disease, palms affected by stem bleeding disease do not perish quickly and remain in the field for many years living with the disease but of course with visible decline in yield and health. The seriousness of the disease incidence was not properly perceived by the farmers mainly because the palms affected by the disease do not perish quickly. Hence, in most of the cases farmers did not adopt any control measures against the disease under the impression that it will not kill the palm.

Estimated loss due to stem bleeding disease in Kasaragod district alone amounts to Rs. 70 crores, which is almost half the loss due to all the pests and diseases in the district. Interventions in plant protection

implemented through Krishi bhavans were very few indicating that the importance given to the stem bleeding disease is very low as compared to its adverse impact by way of crop loss.

ICAR- CPCRI has made continuous efforts in creating awareness among the coconut farmers on the importance of managing stem bleeding disease and popularizing its integrated control measures, in addition to the development and refinement of IDM package. Under the IVLP programme during 1995-96, the effectiveness of integrated control of stem bleeding disease was assessed in field conditions in Pady and Nekraje villages of Kasaragod district. Farmers were of the opinion that the control measures were not effective after 50% of the stem got infected with visible symptoms. During 2006-07, off-campus training - cum - demonstration programme on 'Integrated management of stem bleeding disease of coconut' was organised in collaboration with the Madikkai grama panchayath. In addition, KVK, Kasaragod had conducted FLD on stem bleeding management in many of the farmer's fields in Kasaragod district over the period. Training programmes on stem bleeding management was also conducted in 2009 at Madikkai, Bedadukka and Ajanoor grama panchayaths where the severe occurrence of the disease was reported.

Despite the efforts from the research institutes and developmental agencies, incidence of stem bleeding disease is still alarmingly severe. Hence, it is suggested to implement appropriate interventions on a priority basis for the integrated management of stem bleeding disease to avoid crop loss. The interventions may include:



(i) Capacity development programmes including training programmes to enhance awareness and knowledge of farmers and labourers on identification and integrated management of the disease

(ii) Arranging demonstrations on Integrated Disease Management (IDM) practices for the control of stem bleeding in farmers' gardens which should also include demonstrations on management of nutrient deficiencies in coconut. These demonstrations can be taken up in selected localities as part of ongoing technology transfer initiatives under ATMA with technical support from research organisations like ICAR-CPCRI.

(iii) Making available service of skilled labour force who will be able to render their service to coconut growers for adopting IDM measures against stem bleeding disease through Agro Service Centres managed by Department of Agriculture. Location specific schemes can be implemented by LSGs through Krishibhavadans for supporting coconut growers for adopting the IDM practices. Grass root level interventions on farmer participatory disease management by Coconut Producer Societies/Federations with support from

Coconut Development Board can also be implemented. Availability of quality critical inputs including neem cake and Trichoderma is to be ensured.

(iv) A sustainable mechanism for disease surveillance needs to be evolved so as to streamline the field level implementation of interventions on IDM practices against stem bleeding disease.

(v) Efforts are to be made to ensure stakeholder synergy while formulating and implementing interventions for the management of stem bleeding disease in coconut gardens. Coordination among different stakeholders including coconut farmers organizations, local self governments, department of agriculture, CDB, CPCRI etc is to be ensured.

### Conclusion

Studies by ICAR-CPCRI have clearly revealed that stem bleeding disease caused by the fungus *Theilaviopsis paradoxa* is widely prevalent in coconut gardens of northern Kerala which adversely affects the coconut production in this region. Though technologies are available for the management of the disease, farmers are unable to adopt the IDM practices due to various socio-economic and other reasons. In spite of the widespread incidence of the disease, field level interventions in substantial terms have not been implemented yet to manage the disease incidence. Hence, it is necessary that appropriate interventions are formulated and implemented with the active participation of coconut growers for the integrated management of stem bleeding disease to avoid economic loss. Effective co-ordination among various stakeholders including coconut producer organisations, development/extension agencies like State Department of Agriculture, ATMA, Coconut Development Board and research organisations like ICAR-CPCRI would be a key element in ensuring the efficacy of such interventions. ■



# Stay healthy with virgin coconut oil

● **Sardar Singh Choyal**, Deputy Director & **Jyothi K Nair**, Food Processing Engineer, CDB

Virgin Coconut Oil (VCO) is growing in popularity as functional food oil and the public awareness of its immunable health benefits is increasing. It is expected that VCO will experience a dramatic growth in the market in the near future.

Virgin coconut oil is the naturally processed, chemically free and additive free product from fresh coconut meat or its derivatives (coconut milk and coconut milk residue), which has not undergone any chemical processing after extraction. It is the purest form of coconut oil, water white in color, contains natural vitamin E and has not undergone hydrolytic or atmospheric oxidation as attested by its very low free fatty acid content and peroxide value. It has a mild to intense fresh coconut scent depending on the type of process used production.

Virgin Coconut Oil (VCO) is extracted from fresh coconut milk obtained from matured coconut of 12 months old. VCO can be consumed in its natural state without for further processing.

Virgin coconut oil is known for its medium chain tryglycerides (MCTs). The most important

Table 1: Essential Composition and Quality factors of VCO as per APCC

Sl. No	Parameters	
1	Moisture (%)	Max 0.1
2	Matters Volatile at 1200 C (%)	Max 0.2
3	Free Fatty Acid (%)	Max 0.2
4	Peroxide Value meq/kg	Max 3
5	Relative density	0.915 – 0.920
6	Refractive index at 400 C	1.4480 – 1.4492
7	Insoluble impurities per cent by mass	Max 0.05
8	Saponification Value	250 – 260 min
9	Iodine Value	4.1 -11
10	Unsaponifiable matter % by mass	max 0.2 - 0.5
11	Specific gravity at 30 deg./30 deg. C	0.915 – 0.920
12	Polenske Value	min 13
13	Total Plate Count	< 0.5
14	Color	Water clean
15	Odor and Taste	Natural fresh coconut scent, free of sediment, free from rancid odor and taste

medium chain fatty acid found in VCO is lauric acid. VCO constitutes 48 % of Lauric acid. Lauric acid possess powerful anti microbial properties capable of destroying disease causing bacteria, fungi, viruses and parasites. Researches show that the presence of medium chain fatty acids in mother's milk is the primary ingredient that protects new born infants from infections for the first few months of their life, while their immune system is still developing. Dr. Jon J Kabara, Ph.D of Michigan State University has done pioneering studies on the antimicrobial properties of fatty acids in the 1980s. Two of his most important conclusions are that lauric acid is the most active antimicrobial fatty acid and that monolaurin is the most effective antimicrobial compound that can be derived from coco chemicals. According to him, medium chain fats in coconut oil are similar to fats in mother's milk and have similar nutraceutical benefits. VCO has considerable potential for therapeutic uses such as antimicrobial, anti-HIV/AIDS drug, for anti-cancer therapy and for the treatment of Alzheimer's disease.

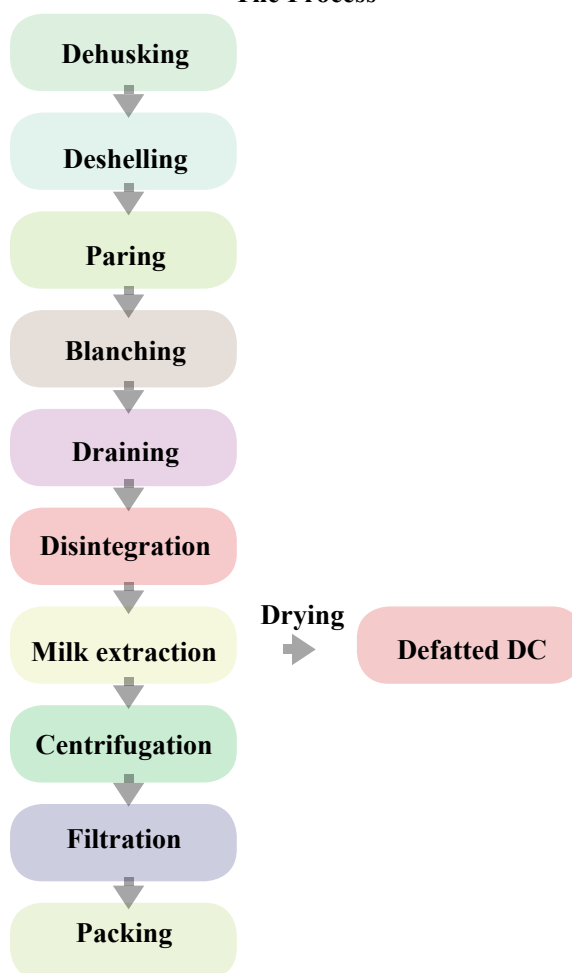
VCO is the best possible remedy to various skin ailments. Ms. Vermen M Verallo Rowell, Founder and program Director of VMV Skin Research Center + Clinic (VSRC), Philippine has opined that since year 2000, VCO was used at VSRC for patients with dry and often microbially colonized psoriasis, acne, atopic, contact dermatitis and rosacea lesion. VCO is the best skin care solution for babies as it is free from all chemical formulations and assures good protection to the baby skin.

Study by Department of Nutrition, University of Indonesia reveals that VCO helps to improve blood glucose and lipid profile of type 2 diabetics, due to its readiness to provide energy to body cells.

Table 2: Gas Liquid Chromatography (GLC) Ranges of Fatty Acid Components

Sl.No	Common Name	Composition	(%)
1	Caproic acid	C6:0	0.10-0.95
2	Caprylic Acid	C8:0	4-10
3	Capric Acid	C10:0	4-8
4	Lauric Acid	C12:0	45-56
5	Myristic Acid	C14:0	16-21
6	Palmitic Acid	C16:0	7.5-10.2
7	Stearic Acid	C18:0	2-4
8	Oleic Acid	C18:1	4.5-10
9	Linoleic Acid	C18:2	0.7-2.5

### The Process



### Raw Material Requirement

It is assumed that to produce 1 litre of VCO, 7 kg of dehusked coconut is required, which is around 17 coconuts.

### Processing Method

**Dehusking:** Husk is removed manually or with the help of coconut dehusking machine.

**Deshelling:** It is done to remove the shell of the coconut. This is done without breaking the kernel.

**Paring:** It is done to remove the brown skin of the kernel with the help of a paring machine.

**Blanching:** Pared coconuts are dipped in boiling water for few minutes in a blanching tank.

**Draining:** It can be done with the help of vibratory screener. This will remove the excess water present in the blanched coconuts.

**Disintegration:** Pared coconuts are fed into a disintegrator where pared nuts are cut into small pieces and will be ready for extraction.

**Milk extraction:** Shredded coconuts are put into

a milk extractor (screw press/ hydraulic press) and coconut milk oozes out of the extractor. Extracted milk is collected in vessels. Extracted coconut milk is then filtered to remove if any solids are present. Residue obtained after extraction is dried in an oven and packed as defatted desiccated coconut.

**Centrifugation:** This process is used to separate two immiscible substances. Coconut milk is the natural oil in water emulsion. After centrifugation, oil and skim milk is separated. Coconut oil is separated from coconut milk.

**Filtration:** The oil is passed through the filter and packed in consumer packs. Vacuum dehydration of oils will remove the excess moisture present in oils.

### Critical points to consider in VCO processing

#### Selection of Coconut

Maturity of coconut is a very important factor in the quality and recovery of VCO especially in processes involving the coconut milk route. Coconut kernels from fully mature coconut have the highest oil content and are relatively low protein content. Coconut milk is an emulsion of oil and water stabilized by protein. To release the oil from coconut milk, the protein bond has to be broken so that more oil can be recovered if the kernel from which the coconut milk is obtained has high oil content and lower protein content. As an indicator of maturity of nut, husk and shell is brown in color and gives sloshing sound when shaken.

Always ensure that the nut while fully mature do not have haustorium. The oil content of the kernel and quality of the oil starts declining once the haustorium is formed.

#### Sanitation and Handling of Equipments:

Coconut meat/kernel and coconut milk are low acid foods and hence are very susceptible to microbial contamination. Because of this, strict sanitation in the plant area, personnel and equipment should be practiced at all the times. Food grade stainless steel is the recommended material of construction for all parts of VCO process equipments that will come in contact with coconut kernel or milk. Water to be used as diluent or rehydrating agent should be of high quality, free from microbial contamination and from too much mineral content.

#### Handling of VCO product

Presence of water in oil will make the product's shelf life short. Water in oil will cause rancidity upon storage. Ensure that the water content of the virgin coconut oil is less than 0.1% and that any process container or packaging material to be used for VCO are thoroughly dried and clean.

#### By products of VCO units:

Major byproducts of VCO units are shell, parings (brown skin) and defatted desiccated coconut powder.



### Export Potential of VCO

The demand for VCO in the international market has increased considerably. In 2013-14, the export of VCO was to the tune of Rs 5 crore, which increased to Rs 25 crore and Rs. 26.22 crores in 2014-15 and 2015-16 respectively. The major export destinations are US, Japan, Australia, UK and UAE.

A total of 818.33 MT of VCO was exported during the year 2015-16 which comes to Rs.26.22 crores.

#### Export Promotion Activities

Government of India has provided promotional measures to boost India's exports under Foreign Trade Policy 2015-20. Entrepreneurs are entitled to receive the following incentives for exporting of coconut products:

##### (1) Merchandise Exports from India Scheme (MEIS)

Under the MEIS scheme, the Government of India provides incentive for exporting notified goods/products to notified markets. The rate of benefit ranges from 2-5% of the realized FOB value of exports.

##### (2) Duty Drawback Scheme

Duty Drawback has been one of the popular and principal methods of encouraging export. It is a method of refund of custom duties paid on the inputs or raw materials and service tax paid on the input services used in the manufacture of export goods. The duty drawback benefits are as stated in the table below.

Benefits Secured Under MEIS (Merchandise Exports From India Scheme) and Duty Drawback Scheme				
ITC HS Code	Products	MEIS benefits in percentage of FOB Value	Duty Drawback Scheme benefit in percentage of FOB Value	
			Drawback rate when cenvat facility has not been availed	Drawback rate when cenvat facility has been availed
15131900	Virgin Coconut Oil	—	1 %	0.15



Capital Investment Cost of the Project (5000 coconuts per day)

Sl. No	Item	Amount (Rs. in Lakhs)
1	Land (30 cents)	Leased/Own
2	Building (4000sq. feet @ Rs. 1000/sq. feet)	40
3	Machinery and Equipment	55.98
4	Electrification	3.00
5	Effluent Treatment Plant	5.00
6	Preliminary & Pre-op Expenses	2.11
7	Working Capital (Margin)	4.40
	Total	110.49

Plant and Machinery	
Sl. No.	Items
1	Coconut Deshelling machine
2	Blanching Tank SS 304
3	Primary Cutter
4	Disintegrator
5	Centrifuge Coconut Milk Extractor
6	Coconut Milk Extractor (Screw press)
7	Tubular Centrifuge Machine
8	Extra Bowl for Centrifuge
9	Oil Micro Filter
10	Overhead Tank SS 304
11	Defatted Coconut Powder Electrical Dryer
12	300 Liters VCO Storage Tank SS 304
13	500 Liters Milk storage Tank SS 304

### CDB Scheme for promotion of coconut industries

Coconut Development Board under Technology Mission on Coconut extends financial assistance to the limit of 25% of the eligible project cost limited to Rs. 50 lakhs per project. Under this scheme, CDB has supported 44 virgin coconut oil manufacturing units with a processing capacity of 161.85 million nuts per.

For technical enquiries and for availing subsidy, please contact [cdtech@gmail.com](mailto:cdtech@gmail.com). For export related enquiries please contact [epccdb@gmail.com](mailto:epccdb@gmail.com)

References: (1), Dr. P. Rethinam, Virgin Coconut Oil – Healthy Oil for all, Asian and Pacific Coconut Community, Indonesia ■



Students of Amritha School of Arts and Science, Kochi with Coconut Journals in the seminar conducted by Mathrubhumi Seed and Amritha School of Arts and Science

# Indigenous technical knowledge in coconut based coastal farming - Tamil Nadu

● **T.Raj Pravin**, Assistant Professor,

Dept.of Agricultural Extension, Annamalai University, Annamalai Nagar – 608 002

Tamil Nadu is blessed with a long coastal area of 1013 kms where coconut cultivation remains a predominant farm occupation. About 25 percent of Tamil Nadu population belonging to the most backward sections of the society reside and depend on coconut for their living. For generations, coconut and all its by products and value added products generate employment opportunities for the coastal farming community. Coconut products are sent to feed the main land and also to export markets to meet the dietary requirements of the huge Indian population, Non-Resident Indians (NRI) settled in many foreign nations and people of Indian origin (PIO) across the world. However the coastal farming system of Tamil Nadu suffers as a result of many natural vagaries. In 2004, tsunami destroyed thousands of acres of coconut plantations. The 2005 severe floods and the subsequent cyclones Nisha (2008), Neelam (2009), Thane (2011) and the recent floods (2015) have devastated the coastal farming of Tamil Nadu. In spite of this huge loss, coastal farmers in Tamil Nadu are able to continue their coastal farming activities as a result of their indigenous technical knowledge practices in coconut cultivation generated as a result of generations old farming experience. This indigenous technical knowledge being low cost in nature, developed with the available local resources using simple engineering skills needs to be documented for further refining and use as a scientific innovation. Keeping this in view, a study was undertaken with the financial assistance of Indian Council of Social Science Research (ICSSR) New Delhi to document the indigenous technical knowledge in coconut based coastal farming system of Tamil Nadu.

## Study Area

The study was undertaken in all the coastal districts of Tamil Nadu namely Kanyakumari, Tirunelveli, Tuticorin, Ramanathapuram, Pudukottai, Thiruvavur, Thiruvallur, Thanjavur, Nagapattinam, Cuddalore, Villupuram and Kanchipuram.

## Selection of coastal blocks

In each coastal district a block where huge quantum of indigenous knowledge in practice was selected on discussion with the extension functionaries of State Department of Agriculture, Non-governmental organizations and scientists of Agricultural Research Stations of respective districts.

## Selection of farmer respondents

The farmers were selected on the basis of their awareness and adoption of indigenous items in agriculture based on interview method. From the list of farmers practicing indigenous knowledge, twenty farmers were identified in different villages within a block in each district and selected for this study. The association of farmers with the development agencies working in their area was also considered as a criterion for selection.

## Collection of indigenous knowledge items

In the selected villages, the pre-tested interview schedule developed and designed for this study was used for collecting indigenous items from the identified farmers. Secondary source of information was also collected and added along with the list of indigenous items identified from different sources like extension functionaries of SDA, scientists of TNAU, field staff of NGOs and aged farmers of the study area.



## Rationality of selected indigenous knowledge items

Testing the rationality of the selected indigenous knowledge items is essential as it has been envisaged to test the awareness and adoption of such knowledge by the farmers. For this study 'rationality' refers to things or practices that are explainable with scientific reasons or established based on life time experience. Similarly 'irrationality' refers to things or practices which cannot be scientifically explained or supported with long time experience by the scientist community. A closed end questionnaire incorporating the identified indigenous practices was sent to 60 scientists of Tamil Nadu Agricultural University on the recommendation of advisory committee.

### Sample and sampling procedure

The farmer respondents were selected with criteria of practicing or knowing about indigenous farm technologies. Twenty farmers were selected by adopting random sampling method in each district of coastal farming. Thus a total of 240 farmers were selected from 12 coastal districts of Tamil Nadu for this research process.

### Findings and discussion

In coastal areas about 14 indigenous items on coconut cultivation were identified, collected and documented. They have sent to the scientists of TNAU, to test its rationality. On the basis of rationality the following indigenous technologies are identified in coconut cultivation.

#### 1. Cultivation of Java giant or Jaffna Giant – an indigenous coconut variety giving high yield

Java giant or Jaffna giant is an indigenous coconut variety cultivated in large tracts of coastal Tamil Nadu particularly in Kanyakumari and parts of Tirunelveli district. Bearing large sized nuts, it has the capacity to withstand periodical storms and cyclones and is high beneficial to coastal farming population. It takes 8 – 10 years for bearing and has a lifespan of 70 – 80 years. Farmers in coastal Tamil Nadu before generations has planted this coconut variety which has come floating from Srilanka or Java islands through the sea, to their coast. After years of care, they have realized its economic benefits for generations. The cultivation of this long duration variety with large sized nuts of superior quality has protected their economic and livelihood interests providing more economic remuneration than the newly introduced dwarf varieties.

#### 2. Application of common salt in coconut transplanting

During transplanting of coconuts, common salt is applied in the pits to reduce nutrient deficiency. It is mostly advocated in areas away from coastal area where nutritional disorder problems are experienced by the



farmers. In coastal areas near to sea shore the presence of sodium will be abundant and so this indigenous technique is practiced by inland farmers of coastal farming system.

#### 3. Coconut seedling planting with Agave species

To retain soil moisture and to control termite menace in coconut cultivation in coastal areas, the practice of planting coconut seedling with a leaf of Agave species is done as an indigenous management practice. Fresh water as a scarce resource is also need to be used effectively. Through this cultivation method, termite attack is also controlled as a result of this low cost indigenous management practice.

#### 4. Shading coconut seedlings with coconut or palmyrah fronds

To save the newly planted coconut seedling from the scorching sun, farmers protect it by providing shade through coconut or Palmyra fronds. This gives good germinability and also ensures good crop stand in coconut plantations. Being a low cost technology traditionally in practice for generations coastal farmers adopt it in their respective fields during planting of new crop. It is found to be rational by scientists of TNAU with a rationality score of 3.67.

#### 5. Fish waste ploughed in coconut fields to improve fertility and yields

The coastal areas of Tamil Nadu generate large quantities of fish waste rich in manurial status. It is ploughed into coconut fields to improve soil fertility to get high yields in coconut plantations. Being a low cost technology increasing the soil fertility and coconut productivity, fish waste ploughing as an indigenous technical knowledge protects the economic interests of coastal farmers and also ensures soil fertility.

#### 6. Intercropping banana with coconut as highly remunerative indigenous item

Cultivation of banana as intercrop during the



early stages of coconut crop is a highly remunerative indigenous practice for coastal coconut farmers. Irrigation, application of manures and fertilizers, weeding operations carried out in the coconut fields benefit banana crop also. So farmers of Kanyakumari, Tirunelveli and Ramanathapuram district follow this indigenous practice in their respective fields and gain more profits at less expense.

#### **7. Multiple cropping systems in coconut cultivation**

Cultivation of coconut with Arecanut, Pepper and Pineapple is found to be remunerative among coastal farmers of Kanyakumari and Tirunelveli districts. Being advocated as a method of cultivation from pre-independence era by the British rulers, farmers belong to this two coastal district follow this farm practice. The scientist of TNAU has found this method of cultivation to be scientifically rational and economically beneficial to the coastal farming community.



#### **8. Bee hives in coconut fields improve coconut productivity**

The coastal farmers allow tribals to place their bee hives made up of conventional materials in coconut plantations. Tirunelveli and Kanyakumari farmers follow this practice in regions away from coastal areas as the sea breeze restricts the active movement of honey bees. The honey bees pollination activity results in improved coconut productivity and the coconut farmers also get few bottles of honey also as their share or remuneration in coastal Tamil Nadu.

#### **9. Flooding of coconut fields to wash off termites**

Coastal areas with sandy soil face termite as a menace in coconut cultivation. Periodical flooding of coconut field with fresh water washes off the termites and reduces economic and productivity losses. So coastal farmers having termite problems use this indigenous pest control mechanism in managing their coconut farms.

#### **10. Control of rodent damage**

The branches of seemai karuvel (*Prosopis julifera*) a common weed in Tamil Nadu is tied around the trunk of coconut trees to prevent rodent damage. It also controls coconut theft in coastal areas. So this indigenous low cost plant protection technique is followed by coastal farmers to protect their economic interests and reduce economic loss due to rodents.

#### **11. Spraying of salt solution avoid button shedding in coconut**

The spraying of salt solution assists in correcting the micro nutrient deficiency in inland coastal areas. Being a low cost method, many coastal farmers facing this problem follow this indigenous practice in their respective coconut fields.

#### **12. Controlling Thanjavur wilt**

The coastal coconut farmers control Thanjavur wilt by ploughing green manures (*Tephrosia purpurea*), Dhaincha (*sesbania spp*) and Neem cake in coconut fields. This plant protection mechanism is found to be rational by the scientists of Tamil Nadu Agricultural University in this study. This indigenous plant protection mechanism is mostly followed in Thanjavur, Pattukottai, Thiruvavur and Chidambaram areas of coastal Tamil Nadu.

#### **Conclusion**

The documented indigenous technical knowledge on coconut cultivation in coastal farming system is found to be rationale by the scientist of Tamil Nadu Agricultural University, Coimbatore. Being low cost and eco-friendly in nature using the available local resources they are rooted in the rural culture of Tamil Nadu. They need to be refined as appropriate technological inputs and disseminated through our extension system to safe guard the coastal farming system of Tamil Nadu from the periodical natural vagaries. ■

# Production of coir pith compost without adding urea

● **Murali Gopal, Alka Gupta and George V. Thomas\***

Microbiology Section, Division of Crop Production

ICAR-Central Plantation Crops Research Institute

Kudlu P.O., Kasaragod, Kerala- 671124

One of the important by-products coming out from the coconut based coir production units is the light-weight, non-fibrous, spongy and granular coir-pith biomass remaining after the extraction of long fibres from the fresh or retted mature coconut husks. The extracted fibres are then used for making yarns, mats, matting, mattresses, geo-textiles etc. The coir-pith acts as binding agent in the husk that keeps the fibres tightly packed. In order to release the fibre from the binding coir-pith, retting of the husks is usually carried out. Retting involves immersing large bundles of coconut husk in water bodies such as ponds, lakes or slow moving rivers for 6 to 12 months. Because of microbiological activity, the fibres in the husk are loosened from the cementing coir pith within the period. Long clean uncoloured coir fibres are then extracted from the retted husks using a mallet or mechanical extractor machines. Alternatively, coir fibre can be extracted from fresh unretted husk too using mechanical fibre extractor. During the extraction of fibre, large volume of coir dust or coir-pith is generated and gets accumulated posing environmental issues. This coir-pith residue can be used in agri-horti applications (Prabhu and Thomas, 2002), poultry farming (Maheswarappa et al., 2000), and for scientific purposes such as maintaining grubs of rhinoceros



beetle for culturing *Oryctes baculovirus* (now termed *Nudivirus*) (Gopal and Gupta, 2001) among other things.

The physical properties of high porosity and water holding capacity up to 500 to 600% (Evans et al, 1996) of coir-pith makes it a unique input as soil amendment. In addition it contains high concentration of potash which makes it more useful. However, high polyphenolic content makes raw coir-pith toxic to roots of many crops. Every year about 0.5 to 1 million tonnes of coir-pith waste is produced in India that can be recycled as input in agriculture after composting. Therefore, composting is



*Coconut husk made of fibres and coir-pith*



*Retting husk for coir production*



*Separating coir fibre from pith using mechanical extractor*

an ideal option for its beneficial utilization in agriculture as this can help in reducing the concentration of toxic phenolics and make the plant nutrients easily available.

#### Composting coir-pith with urea addition

Composting coir-pith is a challenge because it possesses high C: N ratio of anywhere between 52 to 112: 1 (Savithri and Khan, 1994), high lignin content varying from 30 to 54% as well as high phenolic concentration making it difficult to be decomposed by microorganisms. In order to make it amenable to microbial decomposition, the C:N ratio is reduced by addition of urea followed by addition of ligno-cellulose degrading mushroom fungi such as *Pleurotus sajor-caju* (Nagarajan et al., 1988). A *Pleurotus sajor-caju* based bioinoculant 'PithPlus' was developed by Central Coir Research Institute, Alleppey for composting of coir-pith with addition of urea (Ravindranath, 2008). The resulting compost was termed C-POM: coir-pith organic manure. The coir-pith compost produced by this technology is a good source



*Raw coir pith*



*Coir pith+poultry manure + lime + rock Composted coir pith*



*Phosphate heaps*

valuable plant nutrients to soil besides being used as plant growth medium for horticultural and field crops. However, this technology depends on regular supply of the mushroom fungal culture for composting the coir pith which at times becomes the limiting factor from farmer's point of view.

#### Co-composting of coir-pith without urea addition

Co-composting is a concept in which organic materials with high nitrogen content and low C:N ratio such as animal manures are mixed with



organic materials having low nitrogen and high C:N ratio such as coir pith. The mixing of the high C:N with low C:N material helps in improved microbial decomposition of the substrates. Co-composting of coir-pith using cow manure, rice-bran, molasses and coconut juice was attempted for coir-pith composting in Thailand (Tripetchkul et al., 2012). However, this involves several components that may not be easily available at a given time.

A more simple, farmer friendly technology was developed at ICAR-Central Plantation Crops Research Institute, Kasaragod for composting coir-pith that does not involve addition of urea as nitrogen source for reducing the C:N ratio or mushroom fungi (*Pleurotus* spp.) for substrate decomposition. This is a low-cost, simple and rapid co-composting technology based on local resources such as poultry manure, lime and rock phosphate (Thomas et al., 2013) that can be adopted easily by farmers and cottage-industry level entrepreneurs.

#### Co-composting of coir-pith using poultry manure

For production of coir pith compost on a large scale, a suitable place is selected that has good shade and is protected from direct rain falling on the composting site. Alternatively, greenhouse nets draped on wooden poles can be used to create a shaded area. The technology requires five main inputs i.e., coir pith, poultry manure, lime (calcium oxide), rock phosphate (available as Rajphos in local fertilizer stores) and water. Around 900 kg of coir-pith is mixed with 100 kg of good quality poultry manure along with 5 kg of lime and 5 kg of rock phosphate. After proper mixing, it is spread evenly in an area of 4 x 2 x 1 m (l x b x h) dimensions. Water is sprinkled regularly over this mixture. The watering helps

Table 1. Population of different microbial communities in coir-pith compost produced using poultry manure

Microbial community	Bacteria	Fungi	Actinomycetes	Phosphate solubilizers	Nitrogen fixers	Fluorescent pseudomonads
Population count (cfu/g compost; log <sub>10</sub> transformed)	7.8	5.9	7.4	5.6	4.6	4.4

the whole coir pith heap to remain sufficiently moist. Over wetting and drying should be avoided. The heap is covered with gunny bags or green house net or dry grass to prevent moisture loss. The whole heap is turned once in 15 days. Turning the heap enhances the speed of decomposition indicated by colour change of reddish brown raw coir pith to dark brown colour. After 45-60 days, the coir pith will become dark brown to black colour indicating the completion of composting process. The final product can be shade dried and packed for sale or farm use.

The urea-free coir-pith compost produced using this co-composting technology is available at ICAR-CPCRI under the brand name 'Kalpa Soil Care'.

#### Properties of urea-free coir pith compost

The coir-pith compost produced by urea-free technology is highly porous, dark coloured, odour free product, with pH in the range of 6.1 to 6.4 and having up to 500% water holding capacity. The final product possesses C:N ratio of 21 to 22 and organic carbon content of 28-30%. The total N, P and K content ranges between 1.3 to 1.4, 0.9 to 1.2 and 1.3 to 1.6 %, respectively. It is also a good source of plant micronutrients such as Fe, Cu, Zn and Mn. Microbiologically, the urea-free

coir pith compost is rich in plant-beneficial microbes such as free-living nitrogen-fixing and phosphate solubilizing bacteria (Table 1). It also has significantly high populations of actinomycetes which are known to produce antibiotics and help in suppression of soil pathogens.

#### Advantages of urea-free coir-pith compost

This easy to make urea-free coir-pith compost produced using poultry manure through co-composting technology can be an ideal input for organic cultivation of field and horticultural crops. It can be applied to coconut, arecanut, cocoa, rubber and oilpalm @ 20-25 kg/tree/year; about 2-4 tonnes/ha for vegetables and ornamental crops; and 2-2.5 tonnes for paddy. The addition of coir pith compost improves the physical properties and water holding capacity of soil. It increases the organic matter and carbon content of poor humid tropical soils. It also helps in better root formation and enhances crop growth. It also serves as an ideal medium for raising pot-tray seedlings.

\* Director CPCRI (Retd.), Vettimoottil House, Vakayar P.O, Konni - 689698, Kerala, India

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# Technology Mission on Coconut for accelerating value addition in coconut

Traditionally coconut is grown for making copra and coconut oil thus making these products controlling the price of coconut. Fall in price of copra and coconut used to adversely affect the price of coconut resulting in heavy loss to coconut farmers despite the Minimum Support Price (MSP) scheme of the government. The Price Support Scheme also could not make much impact in ensuring a fair, steady and reasonable price to the farmer. In this context, it was realized that product diversification and value addition would help the farmers to fetch better price for their produce. Thus new products were developed and commercialized through product diversification and value addition. These products would also have their role in controlling coconut price.

The coconut crop is also being affected by severe pests and debilitating diseases like root-wilt, ganoderma wilt, Thanjavur wilt and Tatipaka disease. It was realized that a major initiative is necessary for controlling the pests and diseases in coconut to improve its production and productivity and promote product diversification for better value realization from various coconut products. This will help the small and marginal farmers who depend on coconut for their livelihood to realize better income.

In this context, to protect the interest of the coconut growers, the then Prime Minister announced launching of Technology Mission on Coconut (TMOc) in 2001-02. The Mission converge and synergize all the efforts and address the problems and bridge the gaps through appropriate projects in a Mission Mode to ensure adequate, appropriate, timely and concurrent action for product diversification and value addition and increase the production and productivity of coconut. This would help develop a mechanism which makes coconut farming competitive and ensures fair, reasonable and steady price to the farming community and would open avenue for novel coconut products.

## Goals and Objectives

TMOc aims at coordinating with coconut farming community, industry, market and research organizations and work on a mission mode for product diversification and value addition, production and productivity improvement, market research and market promotion for the overall development of coconut cultivation and industry. To ensure adequate, appropriate, timely and concurrent attention to all the links in the production, post harvest and consumption chain and to disseminate technologies through demonstration, acquisition and promotion for adoption to address the problems of coconut producers, entrepreneurs and market are the prime objectives of this scheme. Promotion of economically desirable diversification and value addition to generate skilled employment and maximizing economic, ecological and social benefits from the investment and infrastructure in coconut is also aimed through the scheme.

## The Mission Approach

Mission approach is to evolve an approach for technology support which shall have synergy and convergence to address the existing gaps. Existing schemes of Coconut Development Board and other institutes will continue with existing pattern and shall be converged in a manner that vertical and horizontal integration are achieved. Issues which have not been addressed in existing schemes to meet the challenges and issues relating to development of technologies for management of insect pests



and disease affected gardens, product diversification and market promotion, its demonstration and promotion for adoption are covered under the scheme. Missing links in existing programs with focused attention to achieve the goals of the mission will also be addressed under the programme.

### **National Steering Committee (NSC)**

Technology Mission had a committee named National Steering Committee (NSC) at national level to guide and monitor the activities of TMOc and recommend suitable measures for improvement and effective implementation to the Govt. of India.

### **Project Approval Committee (PAC)**

The projects received by the Board for consideration under Technology Mission (TMOc) are examined, reviewed and approved for implementation by a Project Approval Committee (PAC) representing State Govt., research organization, banks, food processing and marketing fields.

### **Focus Areas**

1. Research and Development on product diversification, by-product utilization and value addition, production and productivity improvement and market development
2. Capacity building and participatory planning and implementation.
3. Infrastructure Development.
4. Integrated insect pest and disease management.
5. Quality, Quantity and Productivity Improvement.
6. Facilitating Credit Availability and Management.
7. Socially Acceptable and Ecologically Sustainable Schemes leading to large scale adoption and long- lasting effects.
8. Poverty Alleviation Linked with Sustained Natural Resource Management through judicious management of existing land use.
9. Post-harvest Processing, Product diversification and



Value addition.

10. Agri-Business in coconut.

11. Equitable Access of People to benefits and equitable sharing by actually involving people at all levels during the project implementation, thus ensuring the evolution of a proper usufruct sharing mechanism for them.

### **Components and programme**

Programme 1 - Development, Demonstration & Adoption of Technologies for Management of Insect Pests & Diseases Affected Coconut Gardens

Programme 2 - Development, Acquisition, Demonstration, Training and Adoption for Processing and Product Diversification

Programme 3 - Market Research and Promotion

Programme 4 - Technical Support, External Evaluation and Emergent Requirements.

Structure of the Technology Mission on Coconut

Processing & Product Diversification

Management of Insect Pests & Diseases

### **Technology mission**

Market Research & Promotion, Technical Support, External Evaluation & Emergent Requirements

### **Eligible Institutions/ Organizations/ Individuals**

SAUs, ICAR/CSIR Institutes, DEVELOPMENT OF TECHNOLOGIES, Any Research Organization having capability, NGOs, SAUs, ICAR/CSIR Institutes

### **Demonstration of technologies**

Any Research Organization having capabilities, NGOs, FPOs, Farmers

### **Adoption of technologies**

Entrepreneurs, Regd. Co-operative Societies/ Group of Farmers

### **Programme 1: Development, Demonstration & Adoption of Technologies for Management of Insect Pests & Diseases affected Coconut Gardens**

#### **A. Development of technologies**

##### *(i) Focus areas*

- Identification of root wilt disease free palms in the midst of disease affected gardens in 8 Districts of Southern Kerala and subjected to serological /ELISA tests and making use of these palms for seed production for raising quality seedlings.
- Identification of natural microbial antagonistic agents against eriophyid mite.
- Evaluation of biological agents for management of Ganoderma/Tatipaka diseases / Stem bleeding in Tamil Nadu, Karnataka, Andhra Pradesh and other areas.
- Studies on recycling of organic waste in reducing insect pests and disease incidence and increasing the production including the use of biological agents.
- Large scale synthesis of pheromones against red palm weevil and mass multiplication of pheromones.
- Any other aspects of insect pest and disease

management.

- Development of technology for insect, pest and diseases which are contrast to coconut products.
- Technology available outside the country could be imported with cost.
- Control insects, pests & diseases through improved cropping /farming systems, improved cultural practices including nutrient and water management.

*(ii) Eligible institutions*

- Indian Council for Agricultural Research (ICAR)
- State Agricultural Universities (SAU's)
- Non governmental organizations (NGO's)
- Any institution having capability to conduct research

**B. Demonstration of technologies**

Demonstration of all the proven technologies on management of insect pests and diseases.

*Eligible institutions :-*

- Indian Council for Agricultural Research (ICAR)
- State Agricultural Universities (SAU's)
- State Agriculture/ Horticulture departments
- Public sector/Non governmental organizations (NGOs)
- Registered cooperative societies/Individuals/ Group of farmers
- Any institution having capability to demonstrate technologies

**C. Adoption of technologies**

Adoption of all the proven technologies on management of insect pests and diseases as well as on improved cultural practices

*(i) Eligible institutions :*

- Indian Council for Agricultural Research (ICAR)
- State Agricultural Universities (SAUs)
- State Agriculture/ Horticulture departments
- Public sector/Non governmental organizations (NGOs)
- Registered cooperative societies/Individuals/ Group of farmers
- Any institute having capability to adopt technology

**Programme 2 : Development, Acquisition, Demonstration Training and Adoption of Technology for Processing and Product Diversification**

**A. Development of Technologies**

*(i) Focus areas*

- Convenience oriented coconut foods, Coconut oil based medicinal formulation
- Bio-diesel and Oleo-chemicals
- Coconut shell based chemicals and coconut water & skim milk based beverages
- Coconut timber processing
- Technologies developed at laboratory level shall be field tested at pilot plant level to assess the technical and economic viability of the technologies

- Technologies shall be transferred through demonstration and training of entrepreneurs in the appropriate areas

- Any technology available outside the country and could be imported.

*ii) Eligible institutions*

- Council for Scientific and Industrial Research (CSIR)
- Defence Food Research Laboratory (DFRL)
- Central Food Technological Research Institute (CFTRI)
- Regional Research Laboratories (RRL)
- State Agricultural Universities (SAUs)
- NGOs, Individual entrepreneurs
- Public sector and other research organizations
- Any institution having capability for conducting research

**B. Acquisition Training & Demonstration of Technologies**

All the proven technologies in processing / product diversification

*Eligible institutions*

- Council for Scientific and Industrial Research (CSIR)
- Defence Food Research Laboratory (DFRL)
- Central Food Technological Research Institute (CFTRI)
- Regional Research Laboratories (RRL)
- State Agricultural Universities (SAU's)
- NGO's/ Registered cooperative societies/Individual entrepreneurs
- Public sector and other research organizations
- Any institute / organization having capability

**C. Adoption of Technologies**

All the proven technologies in processing / product diversification

*Eligible institutions:* Registered co-operative societies/ individual / entrepreneurs / NGOs / Any institutions having capability to adopt technology

**Programme 3. Market Research and Promotion**

*(i) Focus areas*

1. Review the present situation of coconut development in particular area / State
2. Develop primary/secondary data of various aspects on coconut
3. Identify constraints and suggest their remedial measures
4. Develop short term and long term strategies for systematic development of coconut
5. Provide consultancy services, expert services & establishing labs etc. in pursuance thereof
6. All other aspects related to promotion and utilization of coconut products in India and outside
7. Potential technologies available abroad.



8. Assessment of consumer preference, assessment of value added products and trend analysis

9. Awareness campaign on health aspects of coconut products

10. Providing support for establishment of parlours for coconut products, media support, literature, participation in exhibition / trade fairs, etc. within and outside the country

(ii) *Aspects of Studies / Surveys:*

a. Techno Economic Feasibility Studies for development of coconut in States/UTs/Belts/Zones etc

b. Market Studies/special problems/Area Commodity based study/other aspects

c. Expert Services for project identification, formulation, implementation, monitoring & evaluation etc

d. Multi-disciplinary and specific studies as approved by PAC

(iii) *Eligible institutions*

1. All the Govt. agencies, NGO's, Registered cooperative societies and individuals

2. Any institute/organization having capability

#### **Programme 4 : Technical Supports, External Evaluation and Emergent Requirements**

When emergent requirement arises, technical and financial support is given for coconut cultivation, industry and market promotion on project basis and projects are approved by the PAC.

#### **Pattern of assistance**

(I) *Development of technologies for management of insect, pests and diseased affected gardens:*

#### **(A) Development of technologies:**

The projects received for the development of technologies for management of insect, pests and diseased affected gardens from

(a) Central/State Government organizations, public sector organizations and cooperative sector are given the assistance of 100% of the project cost limited to 50.00 lakh and

(b) NGOs and other organization assistance is 50% of the project cost limited to Rs. 25.00 lakh.

#### **(B) Demonstration of the technologies:**

The projects received for the demonstration of the technologies from

(a) Central / State Governments Organizations/Public Sector Units / Cooperative Societies- the assistance is 100% of the project cost limited to Rs. 25.00 lakh per project

(b) individuals / group of farmers / NGOs/ Private Companies assistance is 50% of the project cost limited to Rs. 10.00 lakh.

#### **(C) Adoption of the technologies:**

The projects received for the adoption of these technologies from the group of farmers/NGOs/ other organization are assisted at the rate of 25% of the project cost.

(2) *Development of technologies for processing and product diversification:*

#### **(A) Development of technologies:**

The projects received for the development of technologies for processing and product diversification from

(a) Central/State Government organizations, public sector organization and cooperative sector are given the assistance of 100% of the project cost limited to 75.00 lakh and

(b) NGOs, individual entrepreneurs and other research organization to the tune of 75% of the project cost limited to Rs.35.00 lakh.

(B) Acquisition, training, demonstration of the technologies: The projects received for the Acquisition, training, demonstration of the technologies from

(a) All the Governments and Cooperative Societies- the assistance is 100% of the project cost

(b) NGOs, individuals entrepreneurs and other organizations to the tune of 50% of the project cost.

(C) Adoption of technologies: The projects received for the adoption of the technologies from

(a) NGOs, individual entrepreneurs and other organization, projects are assisted by 25% of the project cost limited to Rs. 50.00 lakh.

(b) SC/ST women farmers are assisted by 33.3% of the project cost limited to Rs. 50.00 lakh.

(c) high value agriculture in Union territory of Andaman and Nicobar and Lakshdweep are assisted by 50% of the project cost limited to Rs.50.00 lakh.

(3) Market research and Promotion:

(A) Market research: The projects received for market research from

(a) Government agencies and Cooperative Societies are given the assistance by 100% of the project cost limited to 25.00 lakh

(b) individuals, NGOs and other Organization are assisted by 50% of the project cost limited to Rs. 12.50 lakh.

(B) Market promotion: The projects received for market promotion from

(a) Government agencies and Cooperative Societies are given the assistance of 100% of the project cost limited to 25.00 lakh

(b) Federation of CPS (FPOs) are assisted by 50% of the project cost limited to Rs. 6.00 lakh

(c) NGOs and private institutes are assisted by 50% of the project cost limited to Rs. 15.00 lakh.

4) Technical Support, External Evaluation and Emergent Requirement: Support is extended on need basis as decided by the Project Approval Committee of TMOc.

### **Submission of Projects**

a. The projects on research for development of technology for product diversification and value addition, insect, pest and disease control and market research may be submitted by the eligible organizations / institutions for consideration of the PAC.

b. The projects on demonstration, acquisition and training may also be submitted by the eligible organizations / institutions for consideration of the PAC.

c. The projects on adoption of technology for processing and product diversification needs to be submitted in the form of Detailed Project Report (DPR) along with prescribed application form. The projects on adoption are supported by back –ended subsidy so promoters must avail a minimum of 40% of the project cost as term loan from any nationalized / scheduled bank and submit the project along with bank term loan sanction and appraisal report to the Board.

Conditions for subsidy under Adoption of Technologies for processing and product diversification

(i) Back ended capital investment subsidy per project shall be provided under the scheme to those projects which are found technically and financially viable.

(ii) Subsidy would be sanctioned and released under the scheme on the pattern approved by PAC and MoU executed among entrepreneur, Bank and Board.

(iii) Subsidy will be released in the subsidy reserve fund account of the promoter in three installments of 50%, 40% and 10% on submission of documents as per MoU.

(iv) The back ended subsidy credited in the subsidy reserve fund account will have a lock in period of five years reducible to 3 years as per conditions in MoU.

(v) On completion of lock in period and liquidation of entire term loan (except amount equivalent to subsidy in the subsidy reserve fund account) and submission of documents as per MoU the subsidy will be adjusted in the term loan account of the promoter.

(vi) The entrepreneurs who have availed Coconut Development Board's subsidy will not be entitled to avail any other Central Government Subsidy. However,

they may avail State Government Subsidy as per the rule of State Government and the Board.

### **Projects on Adoption of Technologies for processing and product diversification :**

Under adoption of technology for processing and product diversification projects may be submitted on the following:

(i) Processing and preservation of Neera and value added products

(ii) Processing and preservation of Tender coconut water

(iii) Manufacturing of desiccated coconut powder, virgin coconut oil, vinegar, nata-de-coco, coconut chips, coconut milk, milk cream, spray dried coconut milk powder, coconut shell powder, coconut shell charcoal, coconut shell based activated carbon etc.

d. The projects may be submitted on market research and market promotion by the eligible institutions / organizations / FPOs/ other eligible individuals for undertaking various market research, promotional activities for the consideration of the PAC.

### **Impact of Technology Mission**

Many projects on research, adoption and market promotion have been assisted under Technology Mission on Coconut. Out of these 377 projects under adoption of technologies are assisted for establishment of various units for manufacturing coconut and coconut-based value-added products. These units are utilizing around 8% of the total coconut production of India for producing various value added coconut products. Consumption of coconut for producing value added products play a vital role in arresting the lead role being played by coconut oil and copra deciding the coconut price. The product diversification and value addition of coconut have supported coconut farmers and government to ensure a fair, reasonable and steady price to coconut farming community.

### **Technologies available for entrepreneurs**

1. Hygienic harvesting, preservation and processing of Neera and value-added products

2. Processing, preservation and packaging of tender coconut water

3. Manufacturing of virgin coconut oil

4. Blending of coconut oil and other edible oils

5. Coconut milk, cream and spray dried milk powder

6. Technology for manufacturing of vinegar, coconut chips and nata-de-coco

7. Minimal processing of tender coconut

Contact:

For more information, please contact:- Coconut Development Board, TMOc Cell, Kera Bhavan, SRV Road, Kochi – 682011, Ph: 0484-2376265, 2377267, 2377266. Email : cdbtech@gmail.com

# Bio control of coconut black headed caterpillar in Andhra Pradesh

● N.B.V Chalapathi Rao, A. Nischala, G. Ramanandam, Snehalatharani and H.P. Maheswarappa

AICRP on Palms (Horticultural Research Station), Ambajipeta, (Dr. YSRHU), East Godavari, Andhra Pradesh.

The leaf eating black headed caterpillar *Opisina arenosella* is a serious pest of coconut palm causing significant yield loss in all the coconut growing tracts of India. It attacks coconut of all age groups and is a prolific feeder of coconut leaves. On the adult palms, the infestation start on the outer whorls of leaves and due to the feeding damage, the photosynthetic efficiency especially of the lower fronds will be impaired and in severe cases, whole plantation presents a burnt up appearance due to the drying of leaves. In case of severe out breaks, the attacked leaves droop, bunches buckle and the immature nuts are shed heavily, in extreme cases feeding by the caterpillar on the green nut surface is also observed. The other hosts for this pest are palmyrah (*Borassus flabellifer*), talipot (*Corypha umbraculifera*) and wild date (*Phoenix sylvestris*). Feeding damage on oil palm (*Elaeis guineensis*) is also recorded on lower intensities under out break conditions.

## Severe incidence of *O. arenosella* in coastal Andhra Pradesh during 2015-16

East Godavari, West Godavari, Srikakulam, Visakapatnam and Krishna districts are the main coconut growing coastal districts in Andhra Pradesh (Total area 1.04 lakh ha). In East Godavari, West Godavari and Krishna districts coconut is grown as a sole crop, with inter crops viz., cocoa and banana and also on fish pond bunds. In 2015-16 (October to May) a high infestation of black headed caterpillar was observed in all the coastal districts of Andhra Pradesh and incidence ranging from 42.82 to was 62.86 per cent was recorded. An outbreak of black headed caterpillar was recorded in Allavaram mandal (approximate acreage affected is 675 ha) and a medium intensity damage was observed in other coconut growing mandals viz., Katrenikona, Razole, Uppalaguptam mandals (approximate acreage affected is 300 ha) in Konaseema region of East Godavari district of Andhra Pradesh. The coconut gardens affected here comprised both fish pond bund coconut trees and sole coconut gardens

### Biocontrol

In order to contain the outbreak from spreading to neighboring coconut growing mandals and to reduce the pest population in affected villages, Horticultural



*Severe incidence of O.arenosella at Dwarapudi village*



*Black headed caterpillar on nuts*

Research Station, under AICRP on palms Ambajipeta (Dr YSR Horticultural University); Department of Horticulture, Government of Andhra Pradesh and M/s Noveel Coconut Producer Company together planned to manage the outbreak with the financial assistance of Coconut Development Board, Kochi under community based plant protection activities LODP scheme. Under this scheme an amount of Rs 15.58 lakhs was sanctioned for Allavaram mandal and farmers from other mandals on their own generated an amount of Rs 4.48 lakhs



*Parasitoid breeding laboratory HRS., Ambajipeta*



*G. nephantidis parasitoid multiplied in the laboratory*

for procuring the larval parasitoids of black headed caterpillar *O. arenosella* viz., *Bracon hebetor*, *Goniozus nephantidis*. From October 2015 to April 2016 about 37,88,650 of these parasitoids were produced in bio-control lab. at HRS., Ambajipeta for distribution and release in pest affected gardens in the affected mandals.

#### **Release technique**

Usually the parasitoids *G. nephantidis* are to be released at the rate of 10 parasitoid/palm and *B.hebetor* at the rate of 20 parasitoid/palm in at least ten percent of the infested palms in each village at fortnightly intervals in case of low (few damaged leaflets here and there) to medium (2–3 damaged fronds with clear drying) intensity damage. But as there is high intensity (all the lower whorls of leaves or entire crown damaged) inundative release of parasitoids was taken up. With the assistance of department of Horticulture and Coconut Producer Societies formed under the Noveel Coconut Producer Company the farmers were sensitized on pest identification, nature of damage and management of black headed caterpillar through bio-control and parasitoid release through field visits, village meetings, group discussions and press coverage. Regular field

visits to pest affected villages and dissemination of information on larval stage based parasitoid release created awareness in the farmers community on effective monitoring and scheduling of parasitoid release in the affected gardens. A total of 8-12 release of parasitoids were made in each affected villages.

#### **Parasitoid establishment and pest regulation**

The parasitoid recovery studies were also undertaken randomly in the pest affected areas (10% sample palms) to ascertain the establishment and build up of these natural enemies in the pest affected gardens. Data on parasitoid establishment after third and six months of bio agents release revealed that the natural enemies established well in the affected gardens and bio-agents effectively paralysed *O. arenosella* caterpillars. The pest population showed a sharp decline after the parasitoid release. The larval population of *O. arenosella* in the affected gardens decreased by 34.1 to 75.9 per cent after three months and up to 59.6 to 100.0 per cent after six months of release of parasitoids and no leaf damage and pest population was recorded in the newly emerged leaves. The pupal population of the pest has also decreased by to 33.3 to 94.5 per cent and up to 92.8 to 100.0 after six months. In the random leaflet samples collected the percentage of paralysed larval population recovered was 8.3 to 26.9 per cent after three months increased to 18.68 to 34.6 per cent after six months of release of parasitoids. After six months of release the impact of inundative release of bioagents in the suppression of the pest was clearly visible.

#### **Eco-friendly and monetary benefit**

The impact of biological control was clearly evident in the pest affected villages after six months. The inundative release of bio-control agents successfully regulated the



*Fig.5. Demonstration and distribution of Parasitoids to farmers*



*Release of bio agents by farmer Sri M. Krishna Murthy, Dwarapudi*

larval stage of pest and the population dwindled and came down substantially in all the black headed caterpillar affected gardens. The self perpetuating parasitoids prevented the spread of the outbreak to other mandals and the joint efforts of the government organisations weaned and prevented the farmers from resorting to the use of hazardous insecticides monocrotophos and dichlorovas in the coconut ecosystem. The cost involved in bio-control was Rs. 20.06 lakhs and the assumed cost of chemical intervention if resorted is Rs 63.18 lakhs (for 975 ha area). There was a saving of Rs. 43.12 lakhs with compounded benefit of undisturbed natural ecosystem with self regulating biological control in operation. In the days where hazardous pesticides usage is becoming a matter of concern, this success of biological control as alternate system, gives impetus to sustainable agriculture. ■

## CDB celebrated Independence day



*Dr. A.K Nandi, Secretary, CDB hoisting the National Flag at CDB premises on Independence day*



# The online Tiptur market - for better efficiency and transparency

● **Anu Peter V**, Probationary Executive, Rashtriya e-Market Services, Bangalore 560001

The existing 2477 principal regulated primary agricultural markets in the country governed by APMC (Agricultural Produce Market Committee) Acts can often create segmentation and lead to inefficiencies in price discovery except in the states of Kerala and Bihar where the act hasn't come into existence. Often grumbles of vested interests of commission agents (arhatiyas) and other middle-men cause a wedge between the farmers and the traders, the buyers of the commodities.

The Agricultural reforms structured in the state of Karnataka have succeeded to the extent that an autonomous body, ReMS (Rashtriya e-Market Services, Bangalore) has taken upcharge of the entire process of unification and is proceeding according to a definite plan. To get on with this, Karnataka government transformed the traditional agricultural systems into Unified Market Platform trade. One of the finest examples of this implementation model can be seen in APMC market at Tiptur in Karnataka.

The trading at Tiptur copra market turned online on February 22, 2014. The then honourable Chief Minister of Karnataka launched the operations of online market in Tiptur APMC under the Unified Market Platform (UMP). The market lies 140 km away from Bangalore. Tiptur is a market yard in 24. Ha. All days in a month are working days except Sundays and second Thursday. It's a single commodity market which deals with the trade of commodity copra. With the primary goal of bringing efficiency and transparency in agricultural marketing system in APMC for efficient price discovery to benefit farmers and other market participants, the market was converted online. The online platform was established precisely to unify different stakeholders involved in copra trade.

UMP technology seamlessly covers all operations of markets starting from goods entering the market till its exit from the market and beyond. Platform uses state of the art technology and highly available data centres designed for more than 99% uptime. Systems are accessible from any web-enabled devices; mobile app and desktop applications offering best connectivity

solutions for locations with low bandwidth.

Implementation of e marketing at Tiptur faced a huge opposition from traders and commission agents in the market, fearing their loss in control over the prices at market due to outside participation. Amidst huge protest of traders and commission agents who stopped trading for few days, demand for online trading received astounding support from Tiptur farmers and farmer associations. Surprisingly, even advocate association of Tiptur protested by not working for one day in support of implementing online markets. Media supported by writing articles on the advantages of e-markets. Tiptur market slowly gained momentum and now local traders and outside traders are transacting on UMP platform.

A major chunk of the commodity arriving in the market are getting exported to North India. This is used in house hold preparations, Indian traditional poojas/dhans, gifts, extraction of oil, etc. Ball copra has a golden brown colour and is sweet in taste. It is usually a perfect, well dried whole of the coconut kernel. This copra fetches double the price than usual ones.

Tiptur ball copra is unique and distinct in its own way as it is formed naturally by storing matured coconuts with husk for 9 to 10 months for natural desiccation. Sun drying yards/ structures are constructed ensuring pertinent aeration for storing is the traditional way of making ball copra. Desiccation is followed by de-husking and deshelling to recover the ball copra. The commodity is available for trade all around the year in Tiptur. August to January is the peak arrival season but as per the demand, it would be sold out by the farmer.

UMP aids automated price discovery mechanisms and post auction process inside the market yards including weighing, invoicing, market fee collection, accounting, payment of sale proceeds directly to farmers and e permit generation. The farmer bringing copra to the market is done with lot wise entry of his commodity and for this a lot ID is created. It would be then taken to commission agents who will trade it on behalf of the farmer and update inventory details.

Copra brought to the market shall be categorised as

Tiptur Ball Copra Large, Tiptur Ball Copra Medium, Tiptur Ball Copra Small and Tiptur Ball Copra Mixed. The lot brought by the farmer in packed form or in gunny bags will be stacked or heaped for sampling procedure and samples would be drawn for farmer/trader for his reference, APMC for display to traders for inspection, dispute resolution and assaying agency to analyse. The sampling parameters are applicable to large, medium, small and mixed variety of ball copra. The parameters include minimum diameter in millimetres, maximum mouldy and black kernels by count (%), maximum wrinkled kernels by count (%), maximum chips by weight (%) and maximum moisture content by weight (%).

It will be then displayed to the traders for examination. The e-tendering process gets started then. The traders will do e-bidding based on the unique lot ID. The highest quoted modal price will be declared as the winner and the same information will be communicated to farmers through mobile SMS.

Even the physical presence of farmer is not mandatory for an efficient trade of his produce. Unless he is satisfied with the highest quoted price in the auction, trade does not get finalized. Anticipated price by a farmer as per his cost plus pricing strategy can fix a benchmark price for his produce. If less price than this is quoted, the bidding can be postponed or stopped for the day. UMP has brought transparency in market operations by making available real time information of the produce to market participants and by providing equal chance for every lot for being bid by a wider participation of buyers.

The UMP strengthens the farmer to say 'no' to traders unless the value of his produce is considered. On satisfactory trade, the farmer need not wait for the trader or any APMC official to get his payment done since the cash gets transferred from the trader's account to the farmer's account on the same day of bid finalization. Net amount payable to farmer is made clear by providing a computerised settlement slip. UMP enables quick payment to the farmer. Tiptur is a market where farmer registration process has been successfully done. It consists of 17,458 registered farmers, 311 registered commission agents and 329 registered traders. It supports commodity funding to benefit all stakeholders.

Final electronic weighment of the produce will be done and details will be noted to add in the sales going to be generated. The online payment procedure would be carried out, which requires verified bank account details of commission agents, traders and farmers. Payment from the buyer's account to the farmer's account would be done. The trader has to pay the net obligation amount including the bid amount of farmer, commission

agent fee and market fee which are determined by the Unified Market Platform. These swipes off the burden of a farmer to pay to the commission agent's fee and mandi fee to get his produce traded. In case of holding on the traded copra, warehouse facilities are made available inside the Tiptur market yard. Centrally verifiable 'anytime anywhere' e-permit is required by the trader for transporting the produce out of APMC.

Ball copra is known as the star commodity of 2014-15 due to the success which it has gained in Tiptur market. Comparative analysis shows that the total arrival of copra in Tiptur market has come down by 39% in 2014-15 as compared to 2013-14. Even though the arrival had gone down due to reduction in coconut production, a significant increment of 47% was seen in the trade value in the market.

Copra at Tiptur was sold at an average modal price of Rs.14,000 per quintal in the year 2014-15. But, the price trend analysis reveals more than double the price. Modal price has significantly increased by 142% which is double the price ever experienced in the history of any copra markets. Basic economics of market that price is inversely proportional to supply at market failed to be proved in case of the year 2014-15.

In comparison to the previous year's trade, the total volume traded was down by 38% whereas the total value realized by the market was up by 56%. This resulted in the market earning Rs. three crores more market fee, the commission agents getting Rs. 4 crores more commission and the farmer fraternity getting nearly Rs. 200 crore extra value with 38% lower production. E-bidding by traders and greater transparency through online trading platform has mainly contributed in breaking into the price cartel managed by middleman. An efficient system to provide farmers with best prices for their produce has been achieved through online trading at Tiptur market.

Imparting necessary skills to the producer is essential for taking informed decisions. Stakeholders in the market have been exposed to the characteristics and structure of the new marketing system. Opportunities and facilities available in markets, duties and responsibilities of stakeholders, determinants of demand and supply, price discovery, accessing and using market information services, importance of assaying, contract farming and its provisions etc. are given prime importance.

Art forms, hand drawn eye catching illustrations developed by professional artists, brochures to answer all the frequently asked questions, awareness videos on reform process, role and responsibility of the farmers, post-harvest methods and the new market structure using animated illustrations are made to disseminate "effective one message to all". The market functions in a perfect tandem. ■

## Agricultural Costs and Prices Commission visited CDB



*CACP delegation in meeting with CDB officials and other representatives*

A delegation of CACP team headed by Prof. Vijay Paul Sharma, Chairman, Commission for Agricultural Cost and Prices (CACP) and Shri. S. R. Joshi (Advisor, CACP) visited Coconut Development Board and held discussion with Dr. G. R. Singh, Chief Coconut Development Officer and other senior officials of Coconut Development Board along with other stakeholders in coconut sector, on price policies for arriving at MSP for milling/ball copra and raw coconut for the season 2017.

Senior officials from Coir Board, Kerafed, State Agricultural Department, Scientist from CPCRI and representatives from NAFED and State Agricultural Prices Board participated in the meeting.

Government of India announces Minimum Support Price (MSP) for ball copra and milling copra every year based on the recommendations of the Commission for Agricultural Costs and Prices (CACP). Whenever prices fall below MSP, the Government machinery intervenes and procures copra from farmers at MSP through national level nodal agencies of Government of India. This procurement under the Price Support Scheme is intended to provide relief to the coconut growers during the period of price fall below MSP.

The team visited the coconut processing unit of M/s Al Malabar Coconut Products Pvt. Ltd., Thrithalloor, Thrissur, M/s Kerasuraksha Federation of Coconut Producers Societies, Marancherry and M/s Nirmal Industries, Irinjalakuda and observed the processing activities.



### Retirement

Shri. M P Joseph, Driver ( Grade - 1 ) retired from the services of Coconut Development Board from the Head Quarter on 31<sup>st</sup> July 2016 on superannuation. He joined the Board in 1984 in DSP Farm, Mandya and further served in Regional Office Bangalore.

## Agri Intex - 2016



View of Board's stall in Agri Intex- 2016



CDB participated in Agri Intex 2016 organized by the CODISSIA at Coimbatore during 15 to 17 July 2016. Hon'ble Union Minister for Micro, Small and Medium Enterprises, Sri Kalraj Mishra inaugurated the fair on 15<sup>th</sup> July 2016. CDB took part in the exhibition and displayed various coconut based value added products. Various Coconut Producer Companies and prospective coconut based entrepreneurs had their display cum sales counters in the show.

Pure Tropic the manufacturers of flavoured coconut milk, Pollachi CPC, Vinayaka CPC and Coimbatore CPC displayed coconut chips, coconut milk, jaggery and coconut sugar. Palakkad CPC displayed Neera, Neera biscuit, Neera honey, M/s. Kera Tech Pvt Ltd exhibited VCO, cream, VCO capsule and coconut oil, Wetree of Pollachi exhibited VCO, Jupiter wood works,

Cherthala exhibited handicrafts made out of coconut wood, coconut shell and Shakthi coco products exhibited various products from DC, packed tender coconut water, coconut jaggery, VCO capsule etc.

Hon'ble Union Ministers Shri.M.Venkaiah Naidu, Shri.Giriraj Singh and Hon'ble Minister for Finance, Government of Kerala, Dr. T.M.Thomas Issac visited the Coir Hall. Hon'ble Minister of Agriculture, Tamil Nadu, Thiru R. Doraikkannu, and Hon'ble Minister for Municipal Administration & Rural Development, Tamil Nadu, Thiru S.P. Velumani visited CDB stall

Various enquiries pertaining to Board's schemes, value addition on coconut and information on machineries for manufacturing value added products were attended by CDB officials. B to B meet was also held as part of the programme.

## Workshop on coconut based business ventures

ICAR-CPCRI, Kasaragod and Coconut Development Board, Kochi is jointly organizing a two-day workshop on Coconut Based Business Ventures during 9-10 September 2016 at CPCRI, Kasaragod, Kerala.

One of the sessions in the Workshop would be presentations of business plans of shortlisted CPCs contesting in 'dream big kalpa business plan competition', a programme envisaged as part of agri-business promotional activities of ICAR-CPCRI Agri-business incubation Centre (ABI).

The objective of the workshop is to promote development of business models most appropriate to the newly established Coconut Producer Companies and to

conduct a workshop for the office bearers/members of CPCs for identifying ventures, risks and equipping them to formulate marketing strategies.

The workshop will be having three technical sessions and a B2B meet. In the session on Innovative Business models selected CPCs will present their business models submitted for the Dream Big Kalpa Business Plan Competition. Brief presentation on constraints/solutions and areas where support required by the CPCs will be covered in the session on Business Aspirations. Experts from different fields (research, development, industry, credit, and marketing) will address the issues flagged in the session on Enhancing Competitiveness. B2B meet



with CAMPCO, CPCRI and CPCs will also be held as part of the programme.

A network of Indian Agri-Business Incubators is established by the Indian Council of Agricultural Research (ICAR) to catalyze agri-business and to promote entrepreneurship. The Agri-Business Incubation Centre at ICAR-CPCRI focuses on coconut business ventures by providing structured and formal entrepreneurship programmes, technology backstopping, financial guidance and technical consultancy for establishment of processing units. The ABI centre extends facilities for the production of Virgin Coconut Oil, Desiccated Coconut, Coconut Chips, Coconut Sugar, and Activated Carbon to its incubates. The Institute has so far commercialized over 15 technologies to 92 licensees.

In recent times, the Indian coconut sector is witnessing an organizational shift subsequent to the

formation of Coconut Producer Societies, Federations and Companies (CPCs) that had opened new vistas for the coconut farmers of our country. To sustain the re-invented enthusiasm in the sector, an appropriate business system has to be created. The need of the hour is to put on place a robust institutional framework to support the newly established CPCs to turn their business activities into success. Besides capital, these start-ups are also to be provided with tools and techniques for marketing and customer-management. This is the background in which ICAR-CPCRI, Kasaragod and Coconut Development Board, Kochi is jointly organizing the two-day workshop.

Office bearers/members of Coconut Producer Companies registered with Coconut Development Board can participate in the Workshop. Nominations of the participants should be made by the Chairman/Secretary of the respective CPCs. A maximum of four members from a CPC can participate. Those who are interested to participate may contact Dr. K Muralidharan, Principal Investigator, Agri-business Incubation Centre, ICAR-CRPCRI, Kasargod 671124, Mobile 9446169526, 9037100283, Email - bpdcpcr@gmail.com ■

## KAU develops device to collect coconuts

Kerala Agricultural University (KAU)'s Agricultural Research Station (ARS) at Mannuthy has come up with a solution to help farmers harvest coconuts. A coconut cradle, designed by the KAU, can collect and store coconuts at crown itself. Farmers often find it difficult to get coconut climbers in time as they are few in number. Their major worry is about coconuts falling on passers-by. The coconut cradle has an octagon-shaped collection basket, two pulleys with bracket that fixes the cradle to the coconut palm and a roller assembly to wind the plastic rope. The collection basket is 2.5 m in diameter and 75 cm depth. It is made up of 50 mm x 50 mm and 3.17 mm thick GI wire mesh and has capacity to hold 50 coconuts. The basket has a 50 cm x 65 cm size door through which coconuts can be dropped. The climber can enter the cradle through this door and clean the palm crown and collect coconuts.

A bracket with two pulleys is fixed at the top of the palm. A plastic rope runs through the pulley, which can lift the basket up and down. The basket is positioned 1.5 m below the palm crown. The drop down end of the rope is tied to the roller fixed at the base of the palm. When the basket is full, it can be brought down by unwinding



the roller and nuts can be collected. Thereafter the basket can be lifted to the top by winding the roller rope.

This device is now priced at approximately Rs.9,000. It was developed by the R&D team at ARS, Mannuthy. The research team, led by U. Jaikumaran, Professor & Head, ARS, consists of Shyla Joseph, A. Latha, P.S. Preman, C. Unnikrishnan, Sinjuraj and C.J Joseph. Those interested may contact Dr. Jaikumaran on 9447530673.

# 47<sup>th</sup> APCC COCOTECH Conference to be held during 26-30 September 2016



Asian and Pacific Coconut Community (APCC) is organising the 47th APCC COCOTECH Conference during 26-30 September 2016 in Bali, Indonesia. The theme of the Conference is “Innovations that Promote Inclusive Growth and Sustainability of the Coconut Sector” The event is jointly hosted by the Government of Indonesia through the Ministry of Trade and APCC.

COCOTECH is the technical panel of APCC held every two years. It is a forum where researchers, scientists, farmers, processors, marketers, equipment manufacturers and other important stakeholders and players in the coconut sector converge to interact, exchange and learn the positive developments and progress in the coconut sector. The 18 member countries of APCC will be represented by the Plenipotentiary Delegates nominated by the respective Governments of the member countries. Dr. Anand Kumar Singh, Chairman, Coconut Development will represent Government of India at the Conference.

The participants of the Conference include stakeholders from the major coconut growing and consuming countries. Increased participation from the research and private sector and the farming community in COCOTECH leads to a productive interaction between the different stakeholders for the sustained development of the sector. The recommendations of the Conference will provide the base on which the developmental activities and programs of the Community are planned for the benefit of the global coconut sector.

The Conference will have nine major Sessions based on the theme of Innovations. The opening session will be on “Policies and Programs Promoting Growth and Sustainability of the Coconut Sector”. It includes

keynote presentations from Indonesia and Kenya on the important policies and programs implemented for sustainable development of the coconut sector. The strategies and recommendations for the promotion of coconut oil, based on the International Conference on Coconut Oil (ICCO) in Thailand in 2015 and the need for International Collaboration on Clinical Studies into the Nutrition and Health Benefits of Coconut Products will be presented during the opening session. Philippines, the leading exporter of coconut products will present their experiences on the market performance of high value products of coconut.

The second session is on “Progress with Clinical Studies on Nutrition and Health Benefits of Coconut Products” wherein clinical researchers will speak on the dermatological, cardiological and antiviral benefits of coconut products and the proposed clinical studies on multi-country and multi-ethnic populations. Dr. Vijayakumar from Amrita Institute of Medical Sciences, Kochi, India will be presenting the results of the recently published study “A randomised study of coconut oil versus sunflower oil on cardiovascular risk factors in patients with stable coronary heart disease”.

The third session on “Technological Advancements in Rapid Multiplication, Varietal Improvement and Production of Planting Material” will mainly focus on discussions and deliberations on the technological advancements for rapid multiplication through tissue culture and varietal improvement in coconut. Scientific experts and eminent researchers from Australia, France, Indonesia, Malaysia, Sri Lanka and Mexico have been invited as well as private sector participation. DeeJay Farms in India will be presenting the potential

## National Award distribution and World Coconut Day celebration 2016

Coconut Development Board is distributing its National Award on 2<sup>nd</sup> September, the World Coconut Day at Bhubaneswar Odisha. Shri. Radha Mohan Singh, Hon'ble Minister for Agriculture and Farmer's Welfare will distribute the national awards at Kalinga Institute of Industrial Technology, Bhubaneswar. Coconut Development Board has instituted the scheme of National Awards to recognize and promote excellence in coconut cultivation, innovative methods in coconut farming, product development, product improvement, quality improvement, product diversification and marketing, export and skill development. Shri. Naveen Patnaik, Hon'ble Chief Minister of Odisha is expected to preside over the programme.

Shri. Dharmendra Pradhan, Hon'ble Minister of state for Petroleum and Natural Gas (Independent charge, Govt. of India), Shri. Prassana Kumar Patasani MP, Shri. Thotta Narasingham MP and Member CDB, Shri. S K Pattanayak IAS, Secretary, Agriculture, Department of Agriculture and Co-operation, Government of India and Dr. Trilochan Mohapatra, Secretary, DARE and Director General ICAR will be the Guests of Honour. Around 300 coconut farmers from all coconut growing states will also take part in the programme. An exhibition will also be held as part of the programme. The inaugural session will be followed by a technical session wherein experts will be making presentations. Board is honouring 14 awardees under various categories.



for commercial production of elite planting material. Umapathy farms in India will also be presenting their experiences with the Coconut Hybrid Centre.

The Session on Integrated Pest Management and Climate Change will discuss on the emerging threats in pests and diseases with presentations from eminent scientists from Australia, Indonesia, Jamaica, Philippines and Sri Lanka. The relevance of Biosecurity is also included for discussion. The second part of the Session will be chaired by Dr. A.K. Singh, Chairman CDB.

The exponential growth in demand for Virgin Coconut Oil will be discussed in the Session on "Potential Growth and Sustainability of Virgin Coconut Oil and Related Products". Papers on quality processing of VCO and its potential for growth will be presented. Private sector participants would contribute to providing insights on what the consumer demands in relation to product quality.

The importance of ensuring compliance with and adherence to quality standards in coconut products will be highlighted in the Session on "The Importance of Quality Standards, Product Certification and Consumer Requirements for Coconut Products" along with the discussion on the emerging technologies for the production, diversification and their respective market performance. Eminent speakers from Singapore, Malaysia, Indonesia and the USA have been invited to provide updates on areas of importance.

The Session on "Product Development for Growing and Emerging Markets" will discuss product

diversifications for niche markets, global market trends for coconut beverages, coconut product utilization, the prospects and opportunities of coconut biofuel and innovative coconut processing technology. The experience of product diversification through Farmer Producer Organisations would be presented by Mr. Vinod Kumar, Chief Executive Officer, Palakkad Coconut Producer Company Limited, Kerala, India.

In each Conference, a session on local stakeholder interaction is arranged for presentation and discussion coming from the Indonesian Coconut Sector that would include local governments, processors, farmer cooperatives and private sector organisations.

The last session is on "Interaction Session with Equipment manufacturers" wherein five major machinery manufacturers would present on their machinery and equipment for coconut processing. Three companies from India viz., T&I Global Ltd, Gem Allied Industries Pvt Ltd and Essar Engineers will be making presentations from India.

There will be an exhibition adjoining the Conference hall to show case diversified products from coconut and processing machinery. The opportunity is utilised mainly by host country processors and producers. It usually provides the avenue to observe and learn from others. Around 25 exhibitors from the different member countries are expected to participate.

The details for registration at the Conference is available at [www.apccsec.org](http://www.apccsec.org). ■



*Dr. A.K. Singh, Chairman and senior officers of Coconut Development Board watching the demonstration of orchard harvester developed by TAFE, Chennai at CDB Headquarters, Kochi on 19-8-2016*

## Amazing benefits of coconut water one should know

Naturally fat-free, coconut water is super hydrating and an excellent choice for the body. Benefits of coconut water extend beyond just hydrating the body. The delicious coconut water can help battle a series of conditions like hangovers, kidney stones, fever, infection, and a lot more.

Unlike sweetened drinks, coconut water is sans the calories. It is rich in vital minerals and nutrients so it nourishes the body without adding fat. Athletes are often seen endorsing the benefits of coconut water. Rich in natural nutrition, coconut water helps restore energy levels of the body. One of the big benefits of coconut water is that it helps in weight loss. The water keeps the body hydrated and makes feel full as well. It cleanses the body of toxins and gives glowing skin. Daily drinking coconut water can help get rid of blemishes, marks and other skin troubles.

Coconut water is also a good hangover remedy. It replenishes the lost nutrients of the body and helps you get back to senses. This water is also high in fiber content. So, if you have daily digestion problems shift to drinking coconut water daily. Coconut water is a healthy drink that takes care of a major chunk of the body's nutrition. In some countries, coconut water is also used as a supplement of human plasma. The concentration of this water is very similar to the plasma in the body. When administered intravenously, it hydrates the body. A key benefit of coconut water is that it is a health tonic for the heart because it works well to lower cholesterol. The composition of coconut water also helps treat headaches. You can also use this drink as a supplement to the regular water. Even if your thirst is quenched, drinking coconut water encourages you to drink more fluids which is actually healthy for your body. It's a wholesome meal because you drink the water and eat the tender part of the coconut on the inside as well.

*Source: <http://www.healthaim.com>*



## Indian Coconut products export registered 16.60 percent increase

● **K.S. Sebastian**, Assistant Director, Export Promotion, CDB.

Export of coconut products during the first four months of the financial year 2016-17 touched Rs. 572.74 crores. Compared to the export during the corresponding period of the previous year an increase of 16.60% was recorded in coconut product exports. Significant increase was recorded in the export of desiccated coconut, coconut oil, fresh coconut and copra. Export of coconut products from India during the first four months of the financial year 2016-17 is given in table 1.

Table 1

Export of coconut products from India during April to July 2016									
		July 2015		July 2016		2015 (April to July)		2016 (April to July)	
		Qty (in MT)	Value (Rs. In lakhs)	Qty (in MT)	Value (Rs. In lakhs)	Cum. Qty (in MT)	Cum. Value (Rs. In lakhs)	Cum. Qty (in MT)	Cum. Value (Rs. In lakhs)
1	Activated Carbon	5050.67	5434.76	5307.77	5496.05	21641.39	22681.97	21021.38	21724.78
2	Coconut Fatty Soap		252.54		340.37		950.38		1118.49
3	Hair Cream		59.45		44.02		303.13		175.16
4	Coconut Oil	402.29	841.75	2509.62	2505.28	2571.38	5454.70	5218.17	6382.10
5	Coconut Hair Oil				204.38				783.81
6	Coconut Water		13.75		38.57		200.66		143.09
7	Copra	678.44	552.80	3093.97	2000.02	1295.53	1148.11	7050.94	4642.33
8	Desiccated Coconut	90.06	159.00	1124.65	1110.74	921.71	1401.83	5264.95	5335.63
9	Dry coconut	2004.71	1916.02	905.44	908.64	7072.08	7290.99	4908.72	4784.61
10	Fresh coconut	2704.01	1009.68	7652.38	1756.18	11350.83	4185.67	23311.65	5806.33
11	Grated/sliced coconut	193.99	431.99	129.37	219.86	638.30	1375.75	677.59	1219.64
12	Oval coconut shell	125.51	101.33		110.96	459.06	324.20	0.00	434.58
13	Shell charcoal	701.90	247.93	2823.45	779.13	2454.99	832.37	5934.06	1543.15
14	VCO	29.38	133.06	100.10	293.24	393.99	1300.26	191.17	603.31
15	Misc coconut products		348.29		401.61		1668.48		2576.87
	Total		11502.35		16209.04		49118.51		57273.87

### Activated Carbon

The export of activated carbon from India during April to July 2016 was 21021.38 MT. United States was the major importer of Indian Activated Carbon, followed by United Kingdom. Details of export of Activated Carbon from India during the period April to July 2016 is given in table 2



Country wise export of Activated Carbon during April to July 2016			
Sl. No.	Country	Qty (in MT)	Value (Rs in lakhs)
1	United States	4462.11	4802.75
2	South Korea	1625.30	1778.30
3	United Kingdom	1474.25	1497.84
4	Sri Lanka	1240.58	1075.08
5	Germany	1202.75	1317.20
6	Russia	1116.74	1123.17
7	Turkey	864.83	696.98
8	Canada	810.16	824.81
9	Netherlands	777.06	761.10
10	Belgium	656.81	620.50

11	Philippines	567.80	578.80
12	South Africa	531.80	546.39
13	China	497.51	719.34
14	Italy	415.00	346.33
15	Japan	405.32	540.84
16	Estonia	378.00	384.47
17	France	349.10	377.42
18	Tanzania	339.20	366.99
19	Ghana	327.00	387.22
20	Thailand	315.96	327.27
21	Taiwan	264.55	236.58
22	Australia	216.00	215.17
23	Latvia	192.00	194.72
24	Sudan	162.00	161.49
25	Sweden	138.80	140.61
26	Papua New Guinea	132.00	139.51
27	Brazil	117.90	124.23
28	Malaysia	107.15	134.51
29	Finland	105.40	79.33
30	Surinam	88.00	91.37
31	Peru	80.00	79.60
32	Singapore	67.72	65.13
33	Argentina	60.00	58.08
34	Iran	57.20	58.16
35	Others	875.38	873.49
	Total	21021.38	21724.78

(quantity in %)

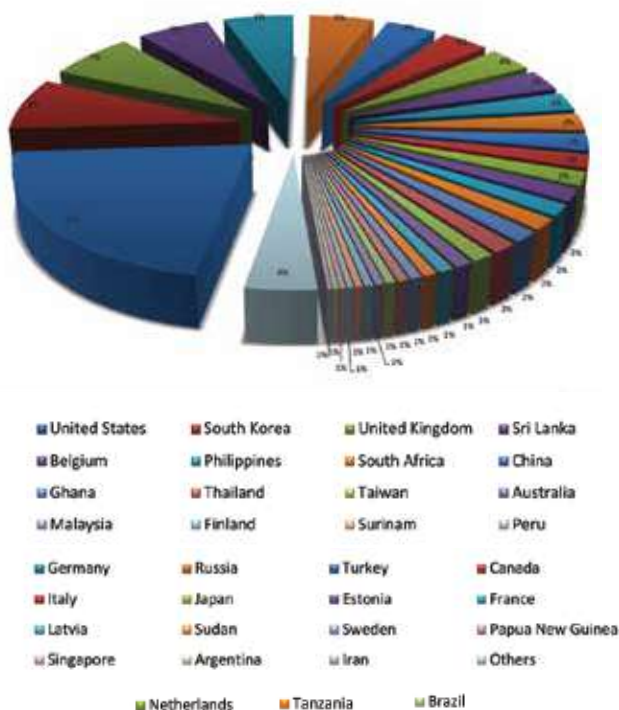


Table 2

## Fresh Coconut

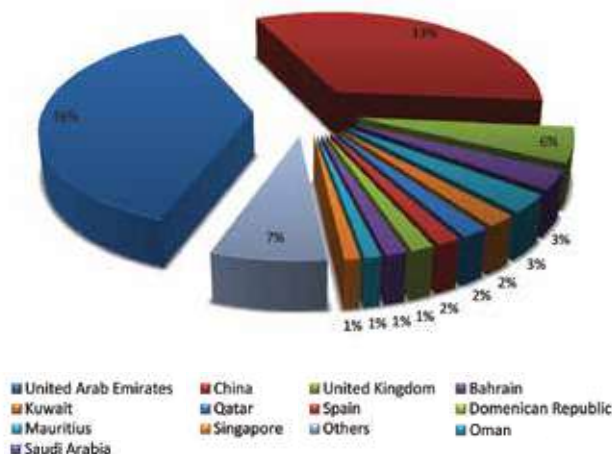
Export of husked coconut from India during the period April to July 2016 was 23311.65 MT. Countrywise export of fresh coconut from India during this period is given in table 3.

Export of fresh coconut during April to July 2016		
Country	Quantity (in MT)	Value (Rs in lakhs)
United Arab Emirates	8754.96	2374.97
China	7768.74	1516.43
United Kingdom	1322.35	458.77
Bahrain	706.29	192.82
Oman	687.93	237.04
Kuwait	447.77	139.87
Qatar	419.39	126.20
Spain	348.74	164.76
Domenican Republic	344.46	78.84
Saudi Arabia	314.89	145.20
Mauritius	245.85	65.74
Singapore	236.36	47.00
Others	1713.93	258.69
Total	23311.65	5806.33

Table 3



(quantity in %)

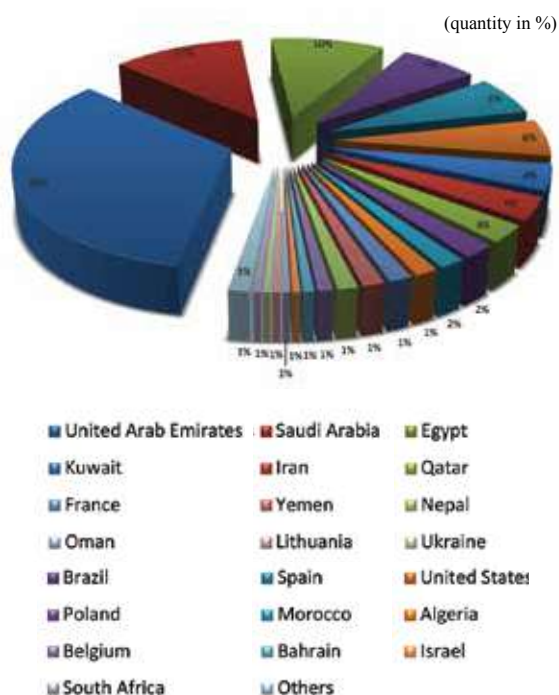


## Desiccated Coconut

Export of desiccated coconut powder during the first four months of the financial year 2016-17 was 5264.95 MT which was 471 % more than the desiccated coconut export during the corresponding period of last year. Country wise export of desiccated coconut powder during the period of April to July 2016 is given in table 4.

Table 4

Export of DC from India during April to July 2016		
Country	Qty(in MT)	Value(Rs in lakhs)
United Arab Emirates	1773.31	1774.12
Saudi Arabia	616.98	633.69
Egypt	535.00	528.60
Brazil	364.00	401.01
Spain	330.00	326.00
United States	310.18	303.39
Kuwait	217.00	230.52
Iran	188.00	165.34
Qatar	145.53	157.70
Poland	112.00	111.98
Morocco	89.00	90.70
Algeria	77.00	75.79
France	77.00	86.28
Yemen	73.96	75.78
Nepal	67.19	75.39
Belgium	50.00	53.99
Bahrain	36.63	44.66
Israel	26.00	26.45

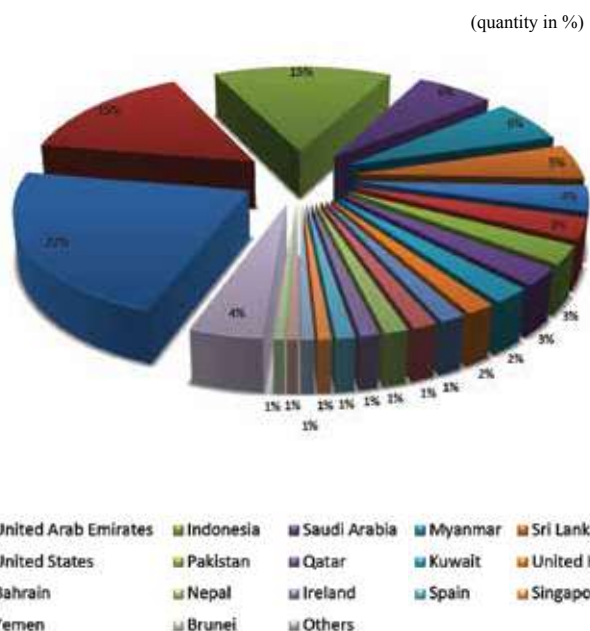


Oman	26.00	24.15
Lithuania	25.00	26.39
Ukraine	25.00	28.75
South Africa	25.00	25.85
Others	75.18	69.10
Total	5264.95	5335.63

## Coconut Oil

Export of coconut oil from India during the first four months of the financial year 2016-17 was 5218.17 MT, which is 103 % higher compared to 2571.38 MT recorded during the corresponding period of last year. UAE alone imported 2571.38 MT of coconut oil from India during this period.

Coconut oil was also exported to Malaysia, UAE, Indonesia, Saudi Arabia, Myanmar, Sri Lanka etc. Export of coconut oil from India during the month of April to July 2016 is given in table 5.



United Arab Emirates	Indonesia	Saudi Arabia	Myanmar	Sri Lanka
United States	Pakistan	Qatar	Kuwait	United King
Bahrain	Nepal	Ireland	Spain	Singapore
Yemen	Brunei	Others		

Table 5

Export of coconut oil during April to July 2016		
Country	Qty (in MT)	Value (Rs in lakhs)
Malaysia	1155.74	1034.01
United Arab Emirates	787.60	1030.37
Indonesia	775.14	683.22
Saudi Arabia	334.64	430.64
Myanmar	333.63	445.93
Sri Lanka	272.23	292.33
Oman	195.12	249.86
United States	165.79	390.85
Pakistan	143.10	201.25
Qatar	131.33	187.89

Kuwait	118.24	160.07
United Kingdom	89.78	179.28
Brazil	77.93	136.81
Bahrain	74.92	97.59
Nepal	74.18	95.18
Ireland	59.21	98.20
Spain	58.31	58.21
Singapore	41.31	88.72
Taiwan	39.78	46.85
Yemen	32.90	62.59
Brunei	32.45	40.80
Others	224.85	371.46
Total	5218.17	6382.10



During the first four months of the financial year 2016-17, India imported Rs 127.06 crores worth coconut products. Copra expeller cake and coconut fatty acid were the major items imported during this period. Details of import of coconut products into India during the period April to July 2016 is given in table 6.

Table 6

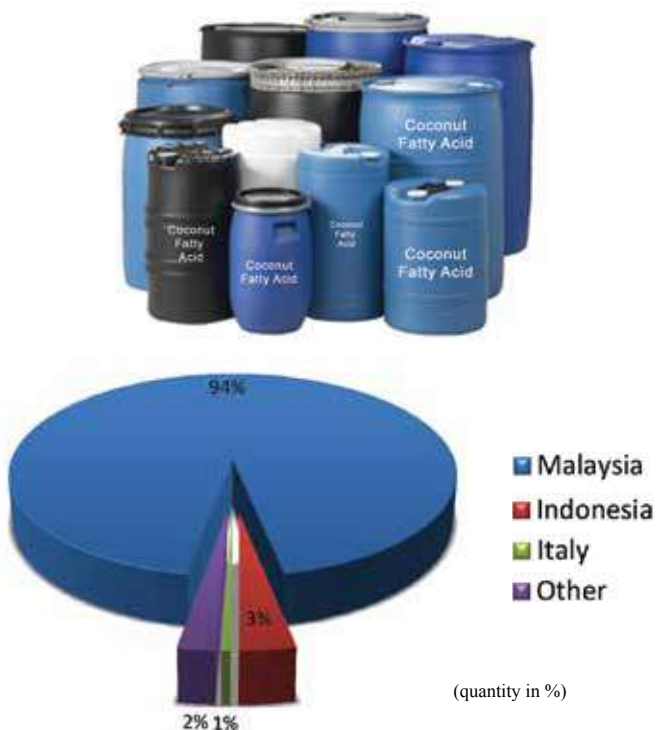
Import of coconut products to India during the period April to July 2016								
Item	July, 2015		July, 2016		April to July 2015		April to July 2016	
	Quantity (in MT)	Value (Rs. In lakhs)	Quantity (in MT)	Value (Rs. In lakhs)	Cum. Quantity (in MT)	Cum. Value (Rs. In lakhs)	Cum. Quantity (in MT)	Cum. Value (Rs. In lakhs)
Coconut fatty acid	2679.83	2320.70	764.66	736.55	2679.83	2320.70	2882.48	2593.19
coconut oil	1313.90	1213.09	0.04	0.04	1313.90	1213.09	0.25	0.23
Copra oil cake	41372.27	6502.52	20646.92	3427.79	41372.27	6502.52	54666.97	8414.14
Coconut shell charcoal	5685.70	1769.53		0.25	5685.70	1769.53	324.62	96.67
Cream-milk-powder		486.99		320.02		486.99		1196.62
Copra	123.27	92.79	0.00	0.00	123.27	92.79	0.00	0.00
Misc coconut products		536.32		138.33		536.32		405.16
Total		12921.93		4622.98		12921.93		12706.01

## Coconut Fatty Acid

Import of coconut fatty acid into India during the first four months of the financial year 2016-2017 was 2882.48 MT, out of which 2710.34 MT was from Malaysia. Import of coconut fatty acid during the corresponding period of last year was 2679.83 MT. Details of import of coconut fatty acid to India from April to July 2016 is given in table 7.

Import of coconut fatty acid during April to July 2016		
Country	Qty (in MT)	Value (Rs. In lakhs)
Malaysia	2710.34	2448.15
Indonesia	94.40	77.21
Italy	15.00	29.97
Other	62.74	37.87
Total	2882.48	2593.19

Table 7

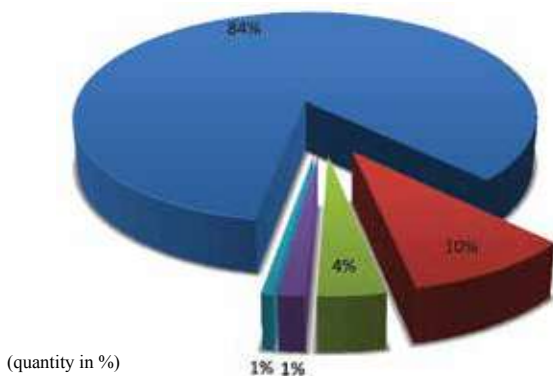


## Copra expeller cake

In terms of quantity and value copra expeller cake is the major coconut product imported to India. During the first four months of the financial year 2016-17, the quantity of import of this product was 54666.97 MT of which 46150.00 MT is from Indonesia. Details of import of this product during the period April to July 2016 is given in table 8.

Import of coconut cake during April to July 2016		
Country	Qty (in MT)	Value (Rs. In lakhs)
Indonesia	46150.00	6981.18
Philippines	5250.00	836.23
Sri Lanka	2101.11	399.23
Papua New Guinea	808.51	140.38
Others	356.57	57.12
Total	54666.97	8414.14

Table 8



■ Indonesia ■ Philippines ■ Sri Lanka ■ Papua New Guinea ■ Others

# Market review – July 2016



## Domestic price

### Coconut Oil

The price of coconut oil in Kochi, Alappuzha and Kozhikode market expressed a similar trend during the month of July. The prices showed a downward trend during the first three weeks of July and from the last week the prices picked up. The monthly average price of coconut oil at Kochi market was Rs.8160 per quintal and that of Alappuzha market was Rs.8156 during the month of July. At Kozhikode market the monthly average price of coconut oil was Rs.8350 per quintal. But at Kangayam market in Tamil Nadu, the prices expressed a highly fluctuating trend with a monthly average of Rs.7183 per quintal. In all the markets, prices closed with a slight upward trend which gives a positive note to the farmers.

Table1: The weekly average of price of coconut oil at major markets Rs/Quintal)

	Kochi	Alappuzha	Kozhikode	Kangayam
03.07.2016	8200	8200	8400	7067
10.07.2016	8100	8113	8260	7011
17.07.2016	8150	8150	8233	7100
24.07.2016	8150	8150	8400	7183
31.07.2016	8208	8183	8483	7478
Average	8160	8156	8350	7183

The prices of Kochi, Alappuzha and Kozhikode market were 3 percent lower than that of the previous month and 22-28% lower than the prices prevalent in July 2015.



### Milling copra

The prices of milling copra at major markets moved in tune with the prices of coconut oil. The prices expressed a downward trend during the first two weeks but picked up slightly from the third week onwards. At Kochi market, the monthly average price of FAQ copra was Rs.5237 per quintal. The monthly average prices of copra at Alappuzha market was Rs.5152 per quintal and at Kozhikode market was Rs.5188 per quintal. The prices of Kochi, Alappuzha and Kozhikode market were marginally lower than that of the previous month and 27-30 percent lower than the prices prevalent in July 2015.

At Kangayam Market in Tamil Nadu, the price of milling copra expressed a highly fluctuating trend. The monthly average price was Rs.4690 per quintal which was marginally lower than the previous month.

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

	Kochi	Alappuzha (Rasi Copra)	Kozhikode	Kangayam
03.07.2016	5200	5150	5150	4900
10.07.2016	5135	5125	5080	4792
17.07.2016	5250	5150	5100	4900
24.07.2016	5250	5150	5225	4992
31.07.2016	5292	5175	5333	5175
Average	5237	5152	5188	4960

### Edible copra

The price of Rajapur copra at Kozhikode market was almost steady throughout the month. The price opened at Rs.6600 and remained same till 22nd, then declined to Rs.6550 per quintal on 23rd. On 26th it rose to Rs.6600 and closed at same price. The monthly average price of Rs.6596 per quintal was 7 percent lower compared to previous month price.

Table3 : The weekly average of price of edible copra at Kozhikode market (Rs/Quintal)

03.07.2016	6600
10.07.2016	6600
17.07.2016	6600
24.07.2016	6592
31.07.2016	6592
Average	6596

### Ball copra

The price of ball copra at Tiptur market expressed a highly fluctuating trend. The monthly average price of ball copra at this market was Rs.7579 per quintal which was marginally higher compared to previous month price and 42 percent lower compared to price prevalent in July 2015.

At Arsikere APMC market in Karnataka, the price of ball copra expressed a fluctuating trend throughout the month. The monthly average price at this market was Rs.7142 per quintal, which was 5 percent lower compared to previous month's average price.



Table 4 : The weekly average of price of Ball copra at major markets in Karnataka (Rs/Quintal)

	Tiptur	Arsikere
03.07.2016	7450	7105
10.07.2016	7438	7023
17.07.2016	7433	7026
24.07.2016	7588	7212
31.07.2016	7735	7328
Average	7579	7142

### Dry coconut

At Kozhikode market the price of dry coconut were constant during the first two weeks, but declined slightly during the beginning of third week and then maintained the same level throughout the month. The price opened at Rs.5500 per quintal, ruled at same price till 10th and then declined to Rs.5400, which remained steady thereafter. The monthly average price was Rs.5425 per quintal which was 4 percent lower compared to previous month price.

Table5 : The weekly average of price of Dry Coconut at Kozhikode market (Rs/1000 coconuts)

03.07.2016	5500
10.07.2016	5500
17.07.2016	5400
24.07.2016	5400
31.07.2016	5400
Average	5425

### Coconut

The price of coconut at Nedumangad market remained same at Rs.7000 per thousand nuts throughout the month which was marginally lower when compared to the price prevalent in June 2016.

The market price of partially dehusked coconut at Arisikere market expressed a fluctuating trend throughout the month. The monthly average price at this market was Rs.8253 per thousand nuts.

At Bangalore APMC market the price of coconut expressed a slight declining trend. The monthly average price at this market was Rs.8281 per thousand nuts which was 19 percent lower than that of the previous month and about 50 percent lower than that of corresponding month last year.

At Mangalore APMC market the price remained same throughout the month at Rs.13000. The monthly average price at this market at Rs.13000 per thousand nuts was 9 percent lower than that of the previous month and about 24 percent lower than that of the corresponding month last year.



Table 6: The weekly average of price of coconut at major markets (Rs /1000 coconuts)

	Nedumangad	Arsikere	Banglore	Mangalore (Grade-1)
03.07.2016	7000	6586	9750	13000
10.07.2016	7000	8900	8875	13000
17.07.2016	7000	8600	8750	13000
24.07.2016	7000	7960	7708	13000
31.07.2016	7000	8444	7500	13000
Average	7000	8253	8281	13000

### Tender coconut

The price of tender coconut at Maddur market expressed a declining trend during the first three weeks of the month. The monthly average price of tender coconut at Maddur APMC market in Karnataka was Rs.9767 per thousand nuts, which was 5 percent lower than that of the previous month and 3 percent lower than that of the corresponding month last year.

Table 7 : The weekly average of price of tender coconut at Maddur market (Rs/1000 coconuts)

03.07.2016	11000
10.07.2016	10167
17.07.2016	9500
24.07.2016	9286
31.07.2016	9667
Average	9767



## International price

### Coconut oil

The price of coconut oil at different international markets also expressed a fluctuating trend during the month. The domestic price of coconut oil in India was competitive compared to the prices quoted at all other market. The domestic price of coconut oil opened at US\$ 1217 and closed at US\$1231 per MT. The price of coconut oil quoted at different international markets is given below.

Table 8: Weekly average Price coconut oil in major coconut oil producing countries July 2016

	International Price(US\$/MT)	Domestic Price(US\$/MT)		
		Philippines	Indonesia	India*
	Philippines/ Indonesia (CIF Europe)	Philippines	Indonesia	India*
01.07.2016	1523	1497	1568	1217
08.07.2016	1482	1495	1373	1209
15.07.2016	1472	1438	1493	1214
22.07.2016	1487	1413	1485	1213
29.07.2016	1475	1439	1471	1231
Average	1488	1456	1478	1271

\* Kochi Market

### Copra

Price of copra in major copra producing countries also expressed a fluctuating trend during the month. Compared to the prices quoted in all other markets, the domestic price of copra in India was competitive. Price of copra in Srilanka market was highest among all the markets.

Table 9: Weekly average Price of copra in major copra producing countries July 2016

	Domestic Price(US\$/MT)			
	Philippines	Indonesia	Srilanka	India*
01.07.2016	974	806	-	772
08.07.2016	931	839	1300	766
15.07.2016	932	839	1300	782
22.07.2016	910	788	1008	781
29.07.2016	926	810	1300	794
Average	935	817	1227	779

\* Kochi Market



### Desiccated coconut

The domestic price of desiccated coconut in India during the month of July was competitive compared to the international prices and FOB prices of major DC exporting countries. The domestic price of desiccated coconut in India expressed an upward trend during the month. Price of desiccated coconut in Philippines market appears to be much higher than the other major desiccated coconut manufacturing countries.

Table 10: Weekly average price of desiccated coconut in July 2016

	Domestic Price (US\$/MT)			
	Philippines	Indonesia	Srilanka	India*
01.07.2016	2497	2125	-	1410
08.07.2016	2475	2125	2177	1417
15.07.2016	2475	2125	2148	1437
22.07.2016	2479	2125	2157	1458
29.07.2016	2479	2120	2110	1530
Average	2481	2124	2148	1451



### Coconut

The price of dehusked coconut in Philippines showed a declining trend during the month, whereas in Indonesia and Srilanka market the prices expressed a mixed trend. The domestic price of dehusked coconut in India expressed an upward trend. Srilanka quoted the lowest price compared to other major countries.



Table 11: Weekly average price of dehusked coconut with water during July 2016

Date	Domestic Price (US\$/MT)			
	Philippines	Indonesia	Srilanka	India*
01.07.2016	202	206	--	204
08.07.2016	200	206	190	205
15.07.2016	197	206	190	208
22.07.2016	195	213	175	216
29.07.2016	195	206	190	225
Average	198	207	186	212

\*Kozhikode market

### Coconut shell charcoal

The domestic price of coconut shell charcoal in India was competitive compared to the price quoted at all other markets during the month. Prices quoted by Srilanka market was the highest among all other markets.



Table 12: weekly average price of coconut shell charcoal during July 2016

Date	Domestic Price(US\$/MT)			
	Philippines	Indonesia	Srilanka	India
01.07.2016	342	368	--	282
08.07.2016	342	368	551	283
15.07.2016	342	368	551	284
22.07.2016	338	370	488	286
29.07.2016	338	370	551	288
Average	340	369	535	285

# Monthly operations in coconut gardens - September

**Andaman & Nicobar Islands:** Plough in the green manure crop and incorporate it into the soil. Apply organic manure such as dried compost /cow dung/ poultry manure @ 25 kg/tree in the basin taken around the palm. Cover the manure with soil. New planting of quality seedlings can be undertaken now. Prevent accumulation of rain water in the seedling pits. Clove, nutmeg, cinnamon, pepper and banana can be planted in the inter spaces. Control rhinoceros beetle by adopting IPM package consisting of extraction of beetle using a beetle hook from the affected palm, proper disposal of breeding materials of the beetle and biological suppression using microbial agents like Baculovirus of *Oryctes* and *Metarhizium anisopliae*. Incorporation of the weed plant *Cleodendron infortunatum* in the breeding grounds has been found effective as it disrupts larval development and finally reduces pest population. Fill the youngest three leaf axils with a mixture of 250g powdered marotti/neem cake with equal volume of sand or deposit 10 gm naphthalene ball (4 balls) per palm and cover with sand.

**Andhra Pradesh :** Plough the land and sow cowpea or any pulse crop or vegetable crops. If stem bleeding disease is noticed: (1) remove the affected bark tissues on the stem and apply 5 per cent calixin on the wound and apply warm coal tar, (2) root feed the affected palms with 5 percent calixin @100ml solution at quarterly intervals, (3) apply 5 kg neem cake per palm per year along with organic manure; and (4) provide drainage during rain and irrigate during summer. 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 commercial botanical pesticides containing azadirachtin 0.004 per cent @ 4ml per litre of water on bunches, especially on the perianth region of buttons and affected nuts or root feed neem formulations containing azadirachtin 5 per cent @ 7.5 ml with equal volume of water.

**Assam :** Apply the second dose of fertilizers @ 334 g urea, 666 g single super phosphate(SSP) and 666g muriate of potash(MOP) with neem cake @ 5 kg/palm/year in coconut basin. Remove ungerminated nuts and dead sprouts from the nursery. Slow growing and late germinated seedlings are to be removed from the nursery. Apply vermicompost/cowdung @ 25-50 kg for each adult coconut palm. Gap filling can be done during this month.

**Bihar / Madhya Pradesh :** Search for bud rot



disease. If found infected remove all the affected tissues in the crown and apply bordeaux paste. Check for the incidence of stem bleeding. If stem bleeding disease is noticed : (1) remove the affected tissues on the stem and apply 5 per cent calixin on the wound and also apply warm coal tar (2) root feed the affected palms with 5 percent calixin @ 100 ml solution per root at quarterly intervals, (3) apply 5 kg neem cake per palm per year along with organic manure during the post monsoon period; and (4) regulate optimum field moisture by providing drainage during rains and irrigating the palms during summer. New planting of selected quality seedlings can be continued during this month. Support the newly planted seedlings by providing suitable props. The gaps caused by the death of seedlings of previous/current year planting should be filled up preferably with polybag seedlings.

**Chhattisgarh :** Drench the basin of the transplanted seedlings with 0.05 per cent chlorpyrifos twice at 22-25 days interval against the attack of termite. Remove excess soil from the collar region of the seedlings for preventing collar rot. If the palm shows the symptom of stem bleeding, (a) remove the affected bark tissues on the stem and apply 5 per cent calixin on the wound and also apply warm coal tar, (b) root feed the affected palm with 5 percent calixin @100ml solution at quarterly intervals, (c) apply 5 kg neem cake per palm per year along with the second dose of fertilizer ;and (d) provide drainage during rainy season and irrigate during summer. Mulch coconut basin with coconut wastes and green matters.

**Karnataka :** Ideal time for planting of new seedlings, opening of basins, digging of pits and gap filling if any in the existing plantation. Mulch coconut basins with suitable green leaves. Continue to procure quality seed nuts from the identified mother palms and sow in the nursery. Intercultural operations have to be undertaken

to keep the plantation free of weeds. Suitable intercrops like banana, vegetables, tuber crops etc. can also be raised in the coconut gardens to increase the income per unit area. Search for bud rot disease and remove infected tissues in the crown and treat with bordeaux paste. As a prophylactic measure spray 1 per cent Bordeaux mixture on the healthy palms in the vicinity of affected palms. Apply Phorate 10 G @ 100 g/ palm or drench the root zone with chlorpyrifos 20EC @ 2.5 ml/litre to control white grubs in case of its incidence. Control rhinoceros beetle by adopting IPM package consists of extraction of beetle using a beetle hook from the affected palm, proper disposal of breeding materials of the beetle and biological suppression using microbial agents like Baculovirus of *Oryctes* and *Metarhizium anisopliae*. Incorporation of the weed plant *Cleodendron infortunatum* in the breeding grounds has been found effective as it disrupts larval development and finally reduces pest population. Fill the youngest three leaf axils with a mixture of 250g powdered marotti/ neem cake with equal volume of sand or deposit 10 gm naphthalene ball (4 balls) per palm and cover with sand.

**Kerala/Lakshadweep :** In low lying areas, plant coconut seedlings in shallow pits or on raised mounds. Apply the second dose of fertilizers in rainfed garden and one-fourth of the recommended dose in irrigated gardens. Apply cattle manure or green manure @ 25-50 kg to each adult palm if not done during previous months. Apply magnesium sulphate @ 500 gm per palm along with second dose of fertilizers and cover the basin completely. Dig out or plough the garden. Fill the youngest three leaf axils with a mixture of 250g powdered marotti/ neem cake with equal volume of sand



or place naphthalene balls 10g/ palm and cover them with sand against rhinoceros beetle and red palm weevil. 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 commercial botanical pesticides containing azadirachtin 0.004 per cent @ 4ml per litre of water on bunches, especially on the perianth region of buttons and affected nuts or root feed neem formulations containing azadirachtin 5 per cent @ 7.5 ml with equal volume of water.

**Maharashtra/Goa/Gujarat :** Apply second dose of fertilizers in basins dug around the palms. Apply green leaves at the rate of 25kg per palm. Give a third round of prophylactic spraying with bordeaux mixture to all palms. Remove ungerminated nuts and dead sprouts from the nursery. Discard seedlings exhibiting poor growth and delayed germination.

**Odisha :** Sow green manure crop seeds in the coconut basins. Keep the nursery free of weeds. Clean the crown from pest/ disease attack. Undertake all plant protection measures. 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 commercial botanical pesticides containing azadirachtin 0.004 per cent @ 4ml per litre of water on bunches, especially on the perianth region of buttons and affected nuts or root feed neem formulations containing azadirachtin 5 per cent @ 7.5 ml with equal volume of water.

**Tamil Nadu/Pondicherry :** Start intercultural operations like taking basins, ploughing etc. Apply second dose of fertilizers, 500 g urea, 800 g single super phosphate and 800 g muriate of potash per adult palm under rainfed conditions. 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 commercial botanical pesticides containing azadirachtin 0.004 per cent @ 4ml per litre of water on bunches, especially on the perianth region of buttons and affected nuts or root feed neem formulations containing azadirachtin 5 per cent @ 7.5 ml with equal volume of water. Strengthen bunds of the pit of the newly planted seedling to avoid rain water accumulation in the pit. Take adequate care of the newly planted seedlings by providing support/ irrigation etc.

**Tripura :** Clean the crown to protect the palm from any pest/disease attack. The entire crown should then be sprayed with one per cent bordeaux mixture. Second dose of fertilizers should be applied during the month. After application of fertilizer if there is no rain, irrigation should be done.

**West Bengal :** Hand-weed the nursery and provide partial shade to seedlings. Continue harvest of matured nuts. ■