Index

Dr. B N S Murthy takes over as Chairman, Coconut Development Board

Dr. B N S Murthy, Horticulture Commissioner, took over additional charge of Chairman, Coconut Development Board. He is a post graduate in Horticulture and is specialized in Fruit Crops Improvement. Formerly he was serving as Principal Scientist, (Horti) at Indian Institute of Horticulture Research. Dr. Murthy is a recipient of several national and international awards for his excellent works

From the desk of Chairman

It is a great privilege and honor for me to take over the additional charge of Chairman, Coconut Development Board, one of the best Commodity Boards serving for the integrated development of coconut cultivation and industry in the country. September 2nd 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 organizes programmes and events to promote the goodness of coconut. The day also marks the foundation day of Asian and Pacific Coconut Community (APCC), an intergovernmental organization of 18 coconut producing countries established 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 and the theme announced by APCC for this year's World Coconut Day is "A Healthy Wealthy life with Coconut."

In India, Coconut Development Board organizes various programmes to celebrate the World Coconut Day every year. To mark the 19th World Coconut Day, on 2nd September 2017, the Board is organizing a national level celebration at Vijayawada, Andhra Pradesh, which would be an ideal platform for educating and enlightening the coconut farmers on the latest technologies, developments and upcoming future potential of the Indian coconut sector. On this occasion, various workshops, exhibitions, seminars, release of publications on coconut etc. are also being be organized. The demand of coconut products have increased manifold as a result of the sustained promotional activities of Coconut Development Board. India continues to be the global leader in coconut production which is a glad news for the coconut farmers when we are observing the 19th World Coconut Day. Coconut is now gaining importance as a food crop contributing health, nutrition and well being of human beings. The multiple medicinal and nutraceutical properties has also added to the unprecedented increase in the demand of coconut products in domestic and international markets.

The price of coconut and coconut products are now on an increasing trend since the beginning of 2017. The retail price has recorded an all time high of Rs. 45 per kg. Export of coconut products also show an increasing trend touching a value of Rs. 2078 crores during 2016-17.Thus coconut has now emerged as a crop that adds to the wealth as well as the health of human beings. Under these circumstances APCC has aptly chosen the theme "A Healthy Wealthy life with Coconut" for celebrating the 19th World Coconut Day.

I request all of you to include coconut and coconut products in your daily diet for a healthy and wealthy life, especially in the wake of the several nutritional findings on coconut.

I extend warm greetings to all for a successful World Coconut Day!

With regards

Dr. B N S Murthy
Chairman

19th WORLD coconut DAY

2nd September 2017

A healthy wealthy life with Coconut

R. Jnanadevan
Deputy Director, Coconut Development Board, Kochi-11

September 2nd is designated as World Coconut Day by Asian and Pacific Coconut Community (APCC) in 1998 in commemoration of its foundation day. People across the world every year acknowledge the importance of coconut, the most useful tree to human being in the plat kingdom by celebrating World Coconut Day since 1999. APCC was formed in the year 1960 as an intergovernmental organization under the aegis of Economic and Social Commission Asia and Pacific (ESCAP) for strengthening the regional cooperation among the coconut producing countries. Starting with only three member countries India, Indonesia and Philippines the community is now composed of 18 member countries. This organization works for improving the socio economic status of coconut growers, processors, traders and all those who depend on this crop in the Asia and Pacific region. It was in 1998, APCC in its 25th ministerial meeting took a decision

> "APCC has aptly chosen the theme "A healthy wealthy life with coconut" for celebrating the 19th World Coconut Day"

to observe its foundation day on 2nd September every year as World Coconut Day. Since then all member countries are celebrating world coconut day. The first coconut day was celebrated on 2nd September 1999. We are celebrating the 19th coconut day during 2017.

The objective of observing coconut day is to create increased awareness on the goodness of coconut, focus national and international attention on this crop and to enhance its potential to alleviate poverty, encourage investment in the sector and promote the total development of coconut industry in the coconut producing countries. This occasion

recalls the significance of coconut in human life and its relationship with the social, cultural and economic well being of humans. Coconut is described as 'The tree of life 'or 'Heavenly tree 'or 'Tree of abundance' because of its unique property by providing food, nutrition, drink, health, aesthetic value and other useful household materials. As a natural and eco friendly choice, coconut has a future potential to score on carbon credit also. On World Coconut day, the importance of this tree is propagated and its value is made aware in the life of human being. Every year APCC is celebrating the World Coconut Day with a theme message to improve the socio economic status of coconut industry. The message given by APCC in the first coconut day in 1999 was **Plant coconut, Eat coconut, Drink coconut and Use coconut.** This message is very much relevant in the present context also. APCC wishes to continue its focus on the daily benefits and usefulness of coconut to the health and wealth of families and very aptly has announced the theme of World Coconut Day 2017 as **A Healthy Wealthy Life with Coconut**. Being a nutrient rich food and an economically and ecologically sustainable crop, coconut is having wide demand all over the world.

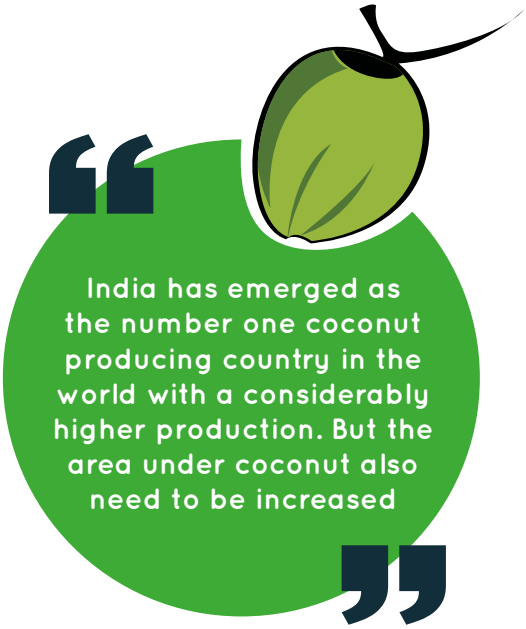
Coconut is an important food crop for a major group of Indian population. Coconut and coconut products are gaining global importance as a contributing factor to the health, nutrition and wellness of human beings. This is due to its multiple medicinal and nutraceutical properties being revealed day by day. Coconut palm is the attribute of health and wealth of people wherever it grows. Our ancestors in Kerala had a long life span of 100 years when they used coconut oil and the products of coconut palm. This new development in health sector brought an unprecedented increase in the demand of coconut products both in the domestic and international markets.

Coconut is an important crop of economic importance to many of the Asian and Pacific countries in the world. The price of coconut and coconut products shows an increasing trend since the beginning of 2017. Thus APCC has rightly chosen theme for current year Coconut day as a Healthy Wealthy Life with Coconut.

In India, coconut farming sustains the economic well being of nearly 12 million families. The country shares 17% of area and 31% of production of total production of coconut in the world. India tops in production of coconut in the world contributing 22.23 billion nuts from an area of 2.95 million ha. with an impressive productivity of 10,611 nuts per ha (2016-17). Contribution of coconut to the GDP of the country is around Rs.250 billion. Export of coconut products including coir from India grew to Rs. 34.77 billion during the year 2016-17, which is 43.26% higher than that of the previous year. India consumes almost 95% of its production indigenously. Successful implementation of schemes like, demonstration of integrated farming system in farmers' field for productivity improvement, production and distribution of high yielding variety planting materials, Technology Mission on Coconut, training for palm climbing and coconut management, formation of coconut farmers' organizations, coconut palm insurance, skill

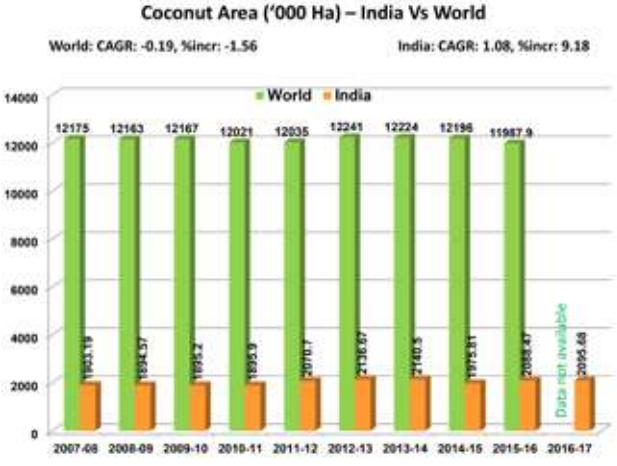
Country	('000 ha)	(Million Nuts)	(Nuts/h
India	1975	20440	
Philippines	3517	14735	
Indonesia	3571	14804	
Srilanka	440	3056	
Brazil	250	2893.57	
Papua New Guinea	221	1483	
Thailand	202	809	
Mexico	169	1116.02	
Vietnam	162	1434	
Tanzania	128	553.88	
Samoa	99	267	
Vanuatu	92	378.27	
Malaysia	82	538	
Mozambique	81	241.93	
Fiji	64	165	
Myanmar	48	491.29	
Solomon Islands	38	100	
Ghana	27	385.07	
Jamaica	15.9	99.2	
Others	806	3051.44	

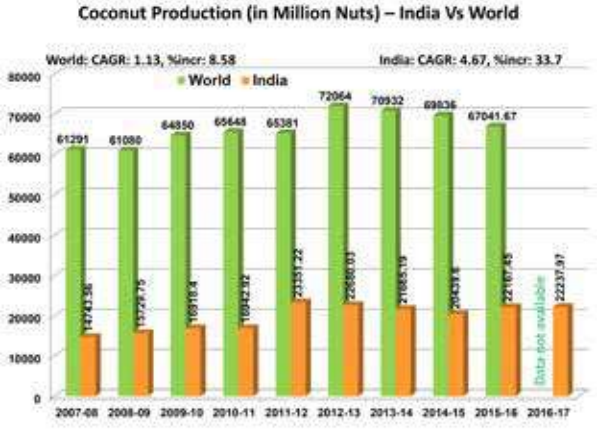
development for green color jobs to rural youth, development of processing technology for neera and its products etc. has brought much benefits to the small and marginal coconut farmers in the country. Organized functioning of farmer collectives facilitated by the Board ensured proper management of coconut gardens which also helped in increased production and productivity.

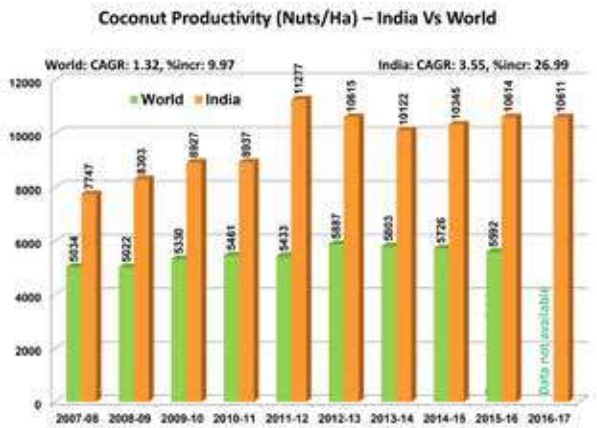


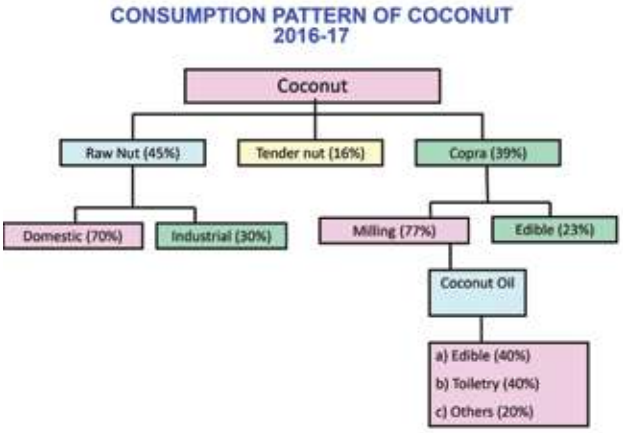
While celebrating 19th World coconut Day, India has emerged as the number one coconut producing country in the world with a considerably high productivity. Increase in production of coconut was due to the productivity factor but the area under coconut also need to be increased to bring about almost equal contribution of both the factors to coconut production. Area under coconut need to be expanded to non coconut growing states. India is yet to become a prominent export earner in coconut sector. Possibly due to the good domestic demand and an assured market, serious attempts for export were not made so far. New strategies are being formulated by CDB for export promotion of traditional as well as innovative coconut products.

India consumes almost 95% of its production whereas other major coconut growing countries contribute lions share of their production to the export basket. As per the present consumption pattern estimated by the Board (2016-17) out of 22.23 million nuts produced in India (2016 – 17), 45% is used as raw nuts, 16% as tender coconut and the remaining 39% is converted to copra. 70% of raw nuts is used for domestic consumption and only 30% is used for industrial purposes for production of value added coconut products, ie out of the total production (22.23 billion nuts) only 12% (2.66 billion nuts) is now used for industrial purpose for production of value added products. CDB is giving more emphasis on this area since India is lagging behind in value addition even though tops in production. Considering the scope of expansion in this sector, production is to be increased to meet the future demand for processing & exports. Coconut and its products like coconut milk, coconut oil, virgin









coconut oil (because of its high content of medium chain triglrecide(MCT) and lauric acid(46%) have lots of health benefits. The tender coconut water is a unique energy drink which is having high demand in international markets. Now lot of research work carried out at different parts of the world has revealed the health benefits of coconut oil and VCO. Hence demand of coconut oil, and coconut based products is expected to increase in the years to come.

CDB is implementing various development programmes for enhancing the production and productivity of coconut in the country to meet the increasing demand. As per Coconut Development Board projection, the requirement of coconut both for domestic and export will be increased to 2500 million nuts by 2020. Production of quality coconut seedlings in private & public sector (50 lakhs seedlings annualy), demonstration of integrated nutrient and pest management practices, promotion of inter/mixed cropping in coconut garden and more diversion of production to value addition, ie from the current level of 12% to 20% and increasing the export earnings to Rs. 400 million are the thrust areas identified by the Board for coconut development in India.

This year, World Coconut Day celebration at the national level will be conducted at Vijayawada, Andhra Pradesh on 2nd September. State level celebrations will also be conducted in major coconut growing states. Coconut day is an occasion to find ways and means to make coconut sector a sustainable industry. Devoting one day to this crop is expected to help record tangible improvement in creating awareness about the goodness of coconut as a perspective crop for future. On the occasion of celebrating 19th World Coconut Day, let us once again commit ourselves to plant coconut, eat coconut, drink coconut and use coconut for the health, well being and overall development of millions of coconut farmers in the country. ■

CDB to celebrate 19th World Coconut Day 2017 at Vijayawada, Andhra Pradesh

Coconut Development Board is celebrating World Coconut Day on 2nd September at Vijayawada, Andhra Pradesh. Shri. Radha Mohan Singh, Hon'ble Minister for Agriculture and Farmer's Welfare will inaugurate the World Coconut Day at M/s Shubam Kalyana Vedhika, Ramavarappadu Ring Road, Vijayawada, Andhra Pradesh. Shri. Nara Chandra Babu Naidu, Hon'ble Chief Minister, Andhra Pradesh, is expected to preside over the function. The theme for this year's World Coconut Day is 'A Healthy Wealthy Life with Coconut'.

Shri. Somireddy Chandramohan Reddy, Hon'ble Minister for Agriculture, Govt. of Andhra Pradesh; Sri Konakalla Narayana Rao,Hon'ble M.P(Lok Sabha), Shri. Kesineni Srinivas, Hon'ble M.P (Lok Sabha), Shri. Thota Narasimham, Hon'ble M.P (Lok Sabha), and Member CDB; Hon'ble M.L.As Dr Vallabhaneni Vamsi Mohan, Shri. Gadde Rama Mohan, Shri Bonda Uma Maheswara Rao; Shri Jaleel Khan: Shri. S.K. Pattanayak IAS, Secretary, Dept. of Agriculture, Cooperation and Farmer's Welfare, Government of India and Shri. Dr.A.K.Singh, Deputy Director General ICAR would be the Guests of Honour. Dr.B.N.S.Murthy, Chairman, CDB will deliver welcome address and Shri. Chiranjiv Choudhary IFS, Commissioner of Horticulture, Govt. of Andhra Pradesh will deliver the vote of thanks on the occasion.

Around 400 farmers from all coconut growing states will take part in the programme. A technical session on the theme will also be hald as part of the programme which will be chaired by Dr. P. Chowdappa, Director CPCRI, Kasargod. Dr.Vijayakumar, Professor of Cardiology, Amrita Institute of Medical Sciences and Research Centre, Kochi will speak on Health and Wellness of Coconut'. An exhibition on coconut will also be held as part of the programme wherein coconut product manufacturers, FPOs and Craftsmen from across the country will showcase their various value added coconut products and services.

Saturated Fats & CVD:

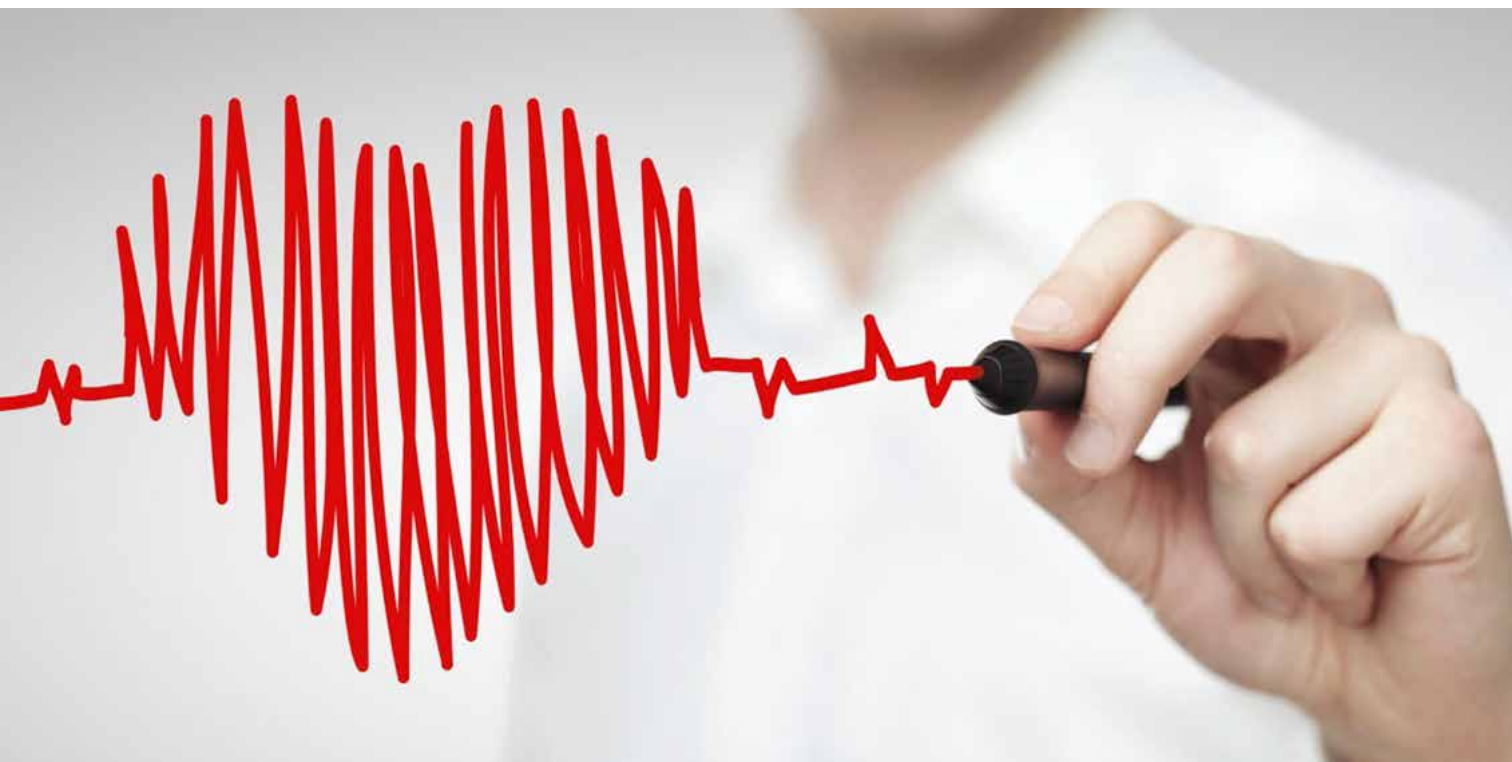
AHA Convicts, We Say Acquit

Nina Teicholz & Eric Thorn, MD

Nina Teicholz

"Coconut oil is bad for health!" announced headlines recently when the American Heart Association (AHA) issued a new Presidential Advisory on saturated fats, stating that these fats really do most definitely cause heart disease. As a writer who spent more than a decade researching the science, and as a cardiologist whose practice is based on the most updated findings, we can say that the AHA paper is an outlier, with at least nine other expert reviews finding weak to nonexistent evidence for this link. Who's right?

> "Coconut oil contains saturated fats, but if one relies upon the vast majority of available evidence, from teams of scientists worldwide, these fats will neither shorten life nor lead to heart disease."



What is striking about the latest AHA Presidential Advisory is that it's such an anomaly.

The official notion that saturated fats cause heart disease goes back to 1961, when the AHA published the world's first recommendations to avoid these fats, along with dietary cholesterol, in order to prevent a heart attack. This "diet-heart hypothesis" appeared as a windfall for a panicked public grappling with a disease that had risen quickly from the 1920s on to become the nation's leading cause of death. Yet the diet-heart hypothesis had never been tested in a clinical trial—the only kind of science that can establish cause and effect—meaning that the AHA advice, despite being adopted by most leading experts, lacked a firm scientific foundation.

Eric Thorn, MD

Eric Thorn

Recognizing the need for rigorous data, governments around the world, including National Institutes of Health (NIH), spent billions of dollars in the ensuing decades on some of the largest and longest human clinical trials ever conducted. Somewhere between 10,000 and 53,000 people were tested on diets in which saturated fats were replaced by unsaturated vegetable oils (the tally depends on which trials are counted). However, the results did not turn out as hoped, and so researchers, either unable or unwilling to believe the outcomes, largely buried the data. For instance, the leaders of one large NIH-funded study with findings unfavorable to the diet-heart hypothesis did not publish them for 16 years. When asked why, one reportedly replied that there was nothing wrong with the study; "We were just disappointed in the way it turned out."

Long-Buried Trials Reexamined

In recent years, however, work by us and others has shed light on these forgotten trials, prompting teams of scientists all over the world to unearth and evaluate this evidence. One set of files was literally hauled out of a basement, reconstructed, and reexamined.

And the results? None of these reviews could find any evidence that saturated fats had an effect on cardiovascular mortality or total mortality.

As quite a few of the authors state in their conclusions, the results clearly do not support the current national dietary guidelines which limit saturated fats to 10% of daily calories, or those by the AHA and American College of Cardiology, which further limit those fats to 5%-6% of calories for people with high cholesterol.

What is striking about the latest AHA Presidential Advisory is that it's such an anomaly. It concludes that swapping saturated fats for vegetable oils will reduce the risk for cardiovascular events by about 30%—as much as a statin! In the four other reviews with similar findings, the risk-reduction estimate did not exceed 19%, and in two cases, these results lost statistical significance when the authors applied more stringent criteria, conducting a sensitivity analysis in one case and removing trials that had been poorly controlled in another. When one examines only the statistically significant results from well-controlled trials, only two review papers had findings similar to the AHA's. All the others disagreed.

How could separate reviews of largely the same data draw such different conclusions? The disparity hangs mainly on the endpoint chosen for consideration. Looking at the more conclusive, so-called "hard" endpoints of myocardial infarctions, stroke, cardiovascular mortality or total mortality, seven reviews found that replacing saturated fats with polyunsaturated vegetable oils had no effect. Only by ignoring that data and looking instead at the less definitive composite endpoint of "cardiovascular events," a category that combines heart attacks with more subjective events such as angina, could the AHA arrive at its negative findings for saturated fats.

What's more, even these findings depend on which trials are chosen to include for analysis. A well-conducted trial requires that patients in the intervention and control groups receive the same amount and type of care. For instance, if patients on the intervention diet get all of their meals cooked for them, the control group must get the same (much like patients in drug trials receiving a placebo). Whether testing a drug or special diet, researchers must be careful to avoid the placebo effect, which occurs simply by virtue of receiving some special treatment.

Cherry Picking

Researchers have found that one diet-heart study from the 1970s, conducted in Finnish mental hospitals, was especially poorly controlled. The patients were not randomly assigned and as a result, significant confounding factors make it impossible to determine why cardiovascular event rates differed. For instance, the antipsychotic medication thioridazine, which was later found to cause sudden cardiac death, was dispensed disproportionately to the control arm on

the regular saturated-fat diet. Whether the drug or the saturated fats caused higher cardiac event rates, we can't know. For this reason, all of the major review papers on saturated fats since 2014 have excluded this trial. Yet the AHA chose to include it. This Finnish trial also happened to show an exceptionally large cardiovascular benefit from vegetable oils over saturated fats, which clearly drove that statin-like risk reduction of 30%. In fact, an analysis by an Australian researcher discovered that only by including this and other poorly controlled trials could "a suggestion of benefit" from vegetable oils be found.

The AHA advisory also deviated from other reviews in that it examined only four trials. The other nine reviews included an average of 10 (even after many excluded the Finnish study). And again, one has to question the AHA's selection choices. It excluded the Minnesota Coronary Experiment, based on the reasoning that the 9750 men and women who spent a year-plus on the intervention diet did not meet the AHA's standard of "at least two years of sustained intake of the assigned diets." Yet in 2013, the AHA issued a "strong" recommendation for the DASH diet while citing DASH studies on fewer than 1200 people, with no trial lasting longer than 5 months. Why the varying standards?

So much data refute the diet-heart hypothesis that it's a wonder the AHA can ignore it all.

The likely explanation is that the Minnesota Coronary Experiment found no benefit for restricting saturated fats, whereas the DASH trials appear to support the AHA's nutritional advice. As Andrew Mente, PhD, a nutritional epidemiologist at McMaster University, informed, the AHA's choices of what studies to include or not include amounted to "cherry picking."

We all have a tendency to resist seeing evidence that contradicts our preconceived views. After all, we have believed for more than half a century that cholesterol-lowering would inevitably benefit health. A mystifying aspect of most of the diet trials is that they did successfully lower total cholesterol by an average of 29 mg/dL, a sign that whatever the flaws in these studies, the participants achieved meaningful dietary changes. Yet lowering total cholesterol didn't reduce mortality. In the Minnesota Coronary Experiment, in fact, researchers later discovered that the more the men were able to lower their cholesterol, the more likely they were to die from a heart attack.

One possible explanation is that while it's true that saturated fats drive up LDL cholesterol a bit, they also raise HDL cholesterol, nullifying the effect on heart-disease risk. Another possibility is that LDL-C is less meaningful than we thought. One little-known reality is that trials lowering LDL-C by diet have failed to yield consistent cardiovascular benefit despite the apparent sustained benefits from LDL-C lowering that have been found in trials on drugs.

Regardless of what happens to cholesterol markers in the blood-a much-debated and still-evolving field-the far more meaningful outcomes are those "hard" endpoints of heart attack and death, and by this reckoning, saturated fats appear harmless.

So much data refute the diet-heart hypothesis that it's a wonder the AHA can ignore it all. In addition to the nine review papers of the clinical trial data, there have been at least four other review papers looking at all the epidemiologic evidence. Such observational data can only show associations, not causation; yet these review papers, on upwards of 550,000 people, have uniformly found no association between the consumption of saturated fats and coronary heart disease.

Other data stubbornly out of line with the diet-heart hypothesis include the fact that since 1970, Americans have cut their intake of animal fats by 27% while increasing consumption of polyunsaturated

vegetable oils by nearly 90%. Since the invention of these oils in a chemistry lab in the early 1900s, their consumption has risen more than any other foodstuff in America, to some 7%-8% of all calories by the year 2000. Meanwhile, cardiovascular disease remains a leading cause of death among men and women, killing more than 800,000 people each year. If replacing saturated fats with polyunsaturated fats were the answer, it seems that we should have seen results by now.

Crisco Conflicts

We believe that one reason for the AHA's resistance to this evidence is its significant, longstanding reliance on funding from interested industries, such as the vegetable-oil manufacturer Procter & Gamble, original maker of Crisco Oil, which virtually launched the AHA as a nationwide powerhouse in 1948. Just recently, Bayer, the owner of LibertyLink soybeans, pledged up to $500,000 to the AHA, no doubt encouraged by the group's continued support of soybean oil, which is by far the dominant type of oil consumed in America today. It is striking that the authors of the three review papers supporting the AHA's stance on vegetable oils all report receiving funding from one or more vegetable-oil companies. Indeed, the review paper that most favored these oils was written by a researcher who discloses serving on the scientific advisory board of Unilever, one of the largest manufacturers of vegetable oils in the world.

Which brings us back to coconut oil

There's no reason to single out this foodstuff, yet the AHA statement devotes a section to it. Yes, coconut oil contains saturated fats, but if one relies upon the vast majority of available evidence, from teams of scientists worldwide, these fats will neither shorten life nor lead to heart disease. Of course it's still possible that a very large, long-term clinical trial could ultimately demonstrate some harm from saturated fats. But over the past half century, the diet-heart hypothesis has been tested more than any other hypothesis in the history of nutrition, and thus far the results have been null.

Readers may charge that a team of top experts from a trusted public health institution have reached these conclusions, so who are we to question them? However, these trusted experts have been proven wrong—on dietary cholesterol caps and on the low-fat diet—such that the AHA has quietly backed out of some of this erroneous advice in recent years. We can again eat eggs, guilt-free (and avocados and nuts). And now, if the AHA were to reckon fully with these long-buried studies on the diet-heart hypothesis, there's every indication that the group should be backing out of the non-evidence-based limits on saturated fats as well. Lacking the evidence to convict, the right thing to do is acquit. Source : http://www.medscape.com/viewarticle/882564 ■

Retirement

Shri. N K Devarajan, voluntarily retired from the service of Coconut Development Board on 11th August 2017 . Shri. Devarajan joined the Board in June 1983 and has served the Board for more than 33 years.

Why Coconut Oil Won't Kill You

Diana Rodgers*

The part of the report of "Presidential Advisory" on dietary fats released from the American Heart Association (AHA) seems to be making the most news around the internet is that coconut oil is unhealthy. Headlines like "Coconut Oil is as Bad as Butter", "Coconut Oil is Unhealthy and Has Never Been Healthy cause increased confusion for the general population, for those who understand the nuances and politics behind the AHA's statement it's absolutely infuriating. Diana Rodgers writes a rebuttal and present some actual facts about why their latest advice, and their continued promotion of inflammatory foods like margarine .

Who is the American Heart Association?

The American Heart Association was founded by a group of cardiologists in 1924. Its purpose is to fight heart disease and stroke by funding research, promoting certain public health policies and providing education to the public. With heart disease being the leading cause of death in the United States, this is clearly an important work, but their effectiveness is clouded by politics and a questionable interpretation of science. They have repeatedly promoted the replacement of saturated fat with omega-6 (inflammatory) polyunsaturated fats in order to reduce heart disease risk, a recommendation that simply has not been supported by current research.

Additionally, as with any non-profit organization, the AHA needs money. The best place to get money is from corporate sponsors, which for them include Subway, Cheerios, and Bayer. In addition, the AHA allows companies to purchase a "seal of approval", known as the Heart Check Program, that can be put on certain food products that meet specific criteria. Some of these products include Honey Nut Cheerios, Orange Juice, and V8 Fusion. The products endorsed by this program are generally high in refined carbohydrates and contain a lot of sugar. Not to mention, only the companies who can afford to pay the fee for the "Heart Check" label are allowed to use it on their packaging. Even for a non-profit, that many corporate connections make me question the validity of their claims and how they are analyzing the available data on heart disease.

The Problem with Nutrition Research

It's not a surprise the AHA was able to spin the current research to match their overall message. Nutrition research is confusing because of a variety of problems with how research is conducted and analyzed. Here are some general reasons why it is almost impossible to conduct the type of double-blind, research study necessary to determine cause and effect in the area

of nutrition:

Funding for research is provided by government organizations or corporations. This influences the type of research that is funded and the types of findings that come out of research as a result.

People lie about what they eat. Unless you lock people up and control every aspect of their diet, it is impossible to determine exactly what someone is eating. Food records, food frequency questionnaires, and interviews are all inaccurate.

Most nutrition research is based on epidemiological data that can only show correlations, or connections, and cannot determine causation between two variables. For example, the number of films Nicolas Cage has been in correlates with the number of people who have drowned falling into a pool.

Saturated Fat and Heart Disease

In recent years, there have been 17 meta-analyses and systematic reviews conducted that have not found a clear link between saturated fat intake and heart disease. Of those that reviewed clinical trials on the subject, (instead of just epidemiological studies) not one found any connection between saturated fat intake, heart disease, and mortality. You can see a great summary of several of the studies on this topichere. Oddly enough, the AHA's "in-depth analysis" only utilized four studies, some from the 1960s, to draw their conclusions. In their paper, they state only these four were "good enough" to be included. One famous study is the Framingham Heart Study.

"In Framingham, Massachusetts, the more saturated fat one ate, the more cholesterol one ate, the more calories one ate, the lower people's serum cholesterol…we found that the people who ate the most cholesterol, ate the most saturated fat, ate the most calories weighed the least and were the most physically active." Dr William Castelli 1992 (Director of the Framingham Heart Study).

Regardless of the AHA cherry picking data to support their recommendations, the bottom line is that there's no strong data connecting saturated fat and cardiovascular disease. Therefore, demonizing coconut oil (or any other type of saturated fat) as the cause of heart disease is simply not supported by available research.

High LDL May Not be Harmful

The AHA based a lot of their recommendations on the effect saturated fats have on increasing LDL cholesterol. But, they make no differentiation in their article between the size of the particles. It has been shown that large LDL particles do not increase risk of cardiovascular disease, whereas small, dense particles do. Also, it has been repeatedly shown that an increase in saturated fat intake does raise LDL, but only the large, fluffy kind, not the harmful dense LDL. Also, when we eat saturated fat, HDL cholesterol levels go up, which is protective to our hearts, reducing the risk of heart disease.

The Benefits of Coconut Oil

There are several benefits outlined in the research about coconut oil in the diet, which are not mentioned in the AHA paper. Here are a few of the highlights:

• Coconut oil may actually help improve cholesterol and blood lipids • Coconut oil has been found to help people lose weight and reduce waist circumference. • Coconut oil has anti-microbial and anti-viral properties. • Coconut oil is anti-inflammatory, helping reduce the risk of heart disease.

The Sustainability of Coconut Oil

As a sustainability advocate, I do want to make one note about sustainability and coconut oil. Although there are benefits to health, there are other types of fats such as butter, lard, or other animal fats that may be from sources closer to you. Coconuts are generally shipped from Central or South America in order to arrive on our shelves here. In fact, it's a traditional food to many in Ecuador, who are now following the AHA advice and have swapped this nutrient dense fat for vegetable oils. Since this change and their adoption of a more Western diet, many who used to consume large amounts of coconut oil have seen a health decline. Consider including other, local and more sustainable sources of fat. For those of us in America, this means butter and other animal-based fats.

Overall, take the recommendations of the AHA with a grain of salt. Although I am not a fan of dumping expensive MCT oil in your coffee, I also don't think we all need to throw out our coconut oil. Focus on eating real food, including coconut oil, butter and other traditional fats. Please do not avoid healthy fats in favor of margarine, as the AHA recommends. Real, whole, environmentally sustainable food will always be healthy, regardless of what the latest report may claim.

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Source: http://sustainabledish.com/coconut-oil-wont-kill-listening-american-heart-association-might

In Botany and Mycology, a haustorium is a structure that grows into or around another structure to absorb water or nutrients. Anatomically, coconut is composed of four distinct parts; the outer fibrous exocarp or husk, the highly lignified endocarp or shell, the white solid endosperm or kernel, and a large central cavity filled with liquid endosperm i.e coconut water. On germination the basal part of embryo, which is embedded in solid endosperm near the germinating pore of coconut, enlarges to form a cotyledonary structure called haustorium. Haustorium enlarges and fills the entire water cavity in 20-24 weeks after germination. During this period it mobilizes nutrients in endosperm and nourishes germinating embryo. Coconut kernel, water and haustorium are edible parts of coconut. Analysis of coconut haustorium revealed that it contains proteins, minerals, alkaloids, polyphenols and growth promoting substances.

Most of the farmers are facing the problem of sprouting of edible coconuts due to long term storage. Most of the sprouted coconuts may fail to grow as seedling. With a view to improve the utilization of Coconut haustorium (Pongu), CDB Institute of Technology (CIT) has undertaken a study of processing of coconut haustorium to develop some novel value-added products which are having commercial value and extended shelf life. CIT has succeeded in making products like haustorium candy, haustorium instant stew mix and haustorium based health mix (Protein rich). The products developed were found to be organoleptically acceptable for their colour, appearance, flavour, taste, texture and overall acceptability on the nine point Hedonic scale by a panel of ten judges. Value addition of coconut haustorium will not only reduce losses but will also enhance the income of farmers.

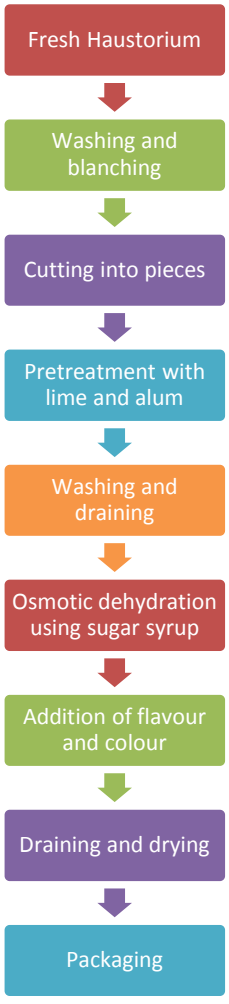
Nutritional analysis conducted at CIT, Vazhakulam revealed that coconut haustorium is rich in protein with around 2% protein content. So it has significance in the vegetarian diet as a rich source of protein.

Studies were undertaken by CIT to develop some novel value-added products namely Haustorium candy, Haustorium based health mix etc inorder to increase the utilization of haustorium

Preservation Techniques for Coconut Haustorium

Aneeta Joy (Food Technologist), **Praseetha.K.C**(Chemist),
CIT, Aluva, **Toffiya Sunil** (Student, CFRD, Konni)

Table I: Nutritional Value of Coconut Haustorium	
Parameter	Value
Ash	1.05 ± 0.2%
Soluble sugar	44.2 ± 4.6%
Starch	24.5 ± 3.2%
Protein	5.50 ± 0.3%
Fat	1.99 ± 0.9%
Soluble dietary fibre	5.72 ± 0.4%
Insoluble dietary Fibre	20.3 ± 1.9%
Phenolics	146 ± 14.3 mg
(Source: Journal of food Chemistry – October 2016 issue)	



Pre preparation of raw material

Sprouted dehusked coconuts were obtained from a coconut farmer and rest of the ingredients were purchased from open market. The nuts were cut open and haustorium was taken out, prewashed and blanched to sterilize the raw material. Haustorium is now ready for the preparation of candy and health mix.

Haustorium candy

Haustorium candy is a jelly like product obtained by treatment of haustorium in sugar syrup. The washed haustorium is sliced into 1 inch sized pieces. Pretreatment with 1 % calcium hydroxide solution followed by 1 % alum solution is required for giving firmness to the meat. The pre treated haustorium slices are washed in running water and drained. The slices are then dipped in 50^{o} brix sugar solution for 2-3 hours.

The mixture is boiled by adding citric acid until the solution attains 650 brix and is kept for 24 hours. Osmotic dehydration will takes place and the brix will come down to about 45^{o}. This is again reheated to bring the brix level to 70^{0}. Next day, a decrease in the brix level is observed which is again reheated to bring the brix level to 70^{0}. The mixture is then cooled, followed by addition of food flavours and colours into the sugar solution. Flavours like lemon, litchi, pineapple, guava, strawberry, mango, chilli, chilli-pepper, lemon-mint etc were tried and are found suitable for the candy. The mixture is then kept for 10-12 hours for the absorption of flavour and colour.

The treated haustorium slices are removed from the syrup and drained completely. The drained slices are finally dried in hot air oven at 70-80^{0}C temperature until it attains 3% moisture level. The novel product, haustorium candy has an excellent taste and appearance. It is sweet, chewy and is in a ready to eat form.

Packaging

Haustorium candy is hygroscopic in nature. Therefore selection of high moisture barrier packing materials is essential. Since the candy has an attractive appearance, transparent packaging materials are preferred.







Table II: Conversion ratio of fresh haustorium to candy			
Wt. of Raw haustorium	Weight with respect to raw haustorium		
	Sliced haustorium	Slices after Osmotic Dehydration with sugar syrup	Haustorium candy
99.2 g	96 g (96.7%)	121.7 g (122.6%)	91.66 g (92.4%)

Table III: Nutritional evaluation of Haustorium Candy		
S.no:	Parameter	Value (%)
1	Moisture	3
2	Fat	Nil
3	Total ash(Minerals)	0.3
4	Carbohydrates	94.2
5	Protein	0.2
6	Crude fibre	0.7
(Data generated at CIT, Aluva)		

Protein Health Mix

Health mix has been formulated using coconut haustorium and VCO residue as major ingredients. Freshly harvested haustoriums are washed, sliced and blanched in 0.05% KMS solution. Ingredients used are arrow root powder (22%), Haustorium powder (20%), Virgin Coconut Oil residue (20%), Sprouted green gram powder (8%), Milk powder (10%), Sugar (20%), flavor and salt. All the ingredients were dried separately at 90^{o}C for 1-2 hours in a hot air oven dryer. The dried ingredients are then powdered and packed in laminated aluminium foil pouches.

Table IV: Nutritional evaluation of Protein health mix		
S.no:	Parameter	Value (%)
1	Moisture	6
2	Fat	4.5
3	Total ash(Minerals)	2.71
4	Carbohydrates	68
5	Protein	17.5
6	Crude fibre	0.9
(Data generated at CIT, Aluva)		

Coconut haustorium can be used as a source of dietary protein due to its nutritional significance. More studies need to be undertaken at pilot scale level for identifying the possibilities for commercial exploitation of this product ■

Hybrid bajra napier -
as intercrop in coconut garden

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In India which is basically an agricultural country, nearly 58% of the population depends on agriculture and 70% of the total agricultural holdings are owned by small and marginal farmers. Since ancient times livestock is an integral part of agriculture as it accounts for a sizeable share of agricultural income as well as employment opprotunity and poverty alleviation of small and marginal farmers. It also acts as a shield against crop failure due to natural calamities. Hence, livestock is instrumental for future growth and development of the agriculture sector. There is an increasing demand for live stock products like milk (3.95% of growth rate per annum) and meat (2.99% per annum) (IGFRI, 2015). Thus livestock population is increasing and accordingly its feed requirements are also increasing. Considering the increase in the price of feed concentrates, green fodder is a comparatively an economical source of nutrients for livestock. In India the green fodder requirement is 622 million tonnes in comparision to the availability of 224 million tons indicating approximately 63% shortage of green fodder (Velayudham, et al., 2011). This is a major constraint in achieving the desired

> "Livestock is an integral part of agriculture as it accounts for a sizeable share of agricultural income as well as employment opprotunity and poverty alleviation of small and marginal farmers. It also acts as a shield against crop failure due to natural calamities."

level of livestock production. This deficit of fodder has to be met either from increasing productivity within the available area or by increasing the area under grass cultivation. The later option may not be possible due to the reduced land availability for agriculture and due to diversion of available land for infrastructure projects. Other option for increasing the production of green fodder is to utilize area under widely spaced plantation crops.

Coconut is highly amenable for intercropping

Among the plantation crops, coconut with wider spacing of 7.5 m x 7.5 m can accommodate many crops in the interspaces. Studies conducted at CPCRI have showed that growing of crops in the coconut garden has benefitted farmers in terms of increased economy apart from improving the soil health. Growing grass in the interspace of coconut can increase production of green fodder which can boost the livestock production. The availability of more green fodder will also increase the profit from livestock by reducing the expenditure on costly feed concentrates. This will encourage coconut based mixed farming system for doubling the income of farmers apart from ecologically sustainable farming model.

Performance of Hybrid bajra Napier (var. CO4) at ICAR-CPCRI Kasaragod

The selected fodder grass should have certain desirable qualities viz., minimal competition with coconut for resources such as plant nutrients and soil moisture, ability to withstand shade, good response to fertilizer application and relished by cattle. Bajra hybrid napier grass is one such potential perennial source of green fodder with high yield, palatability and adaptability to varying soil and climatic conditions. Among the many, CO4 is found to tiller profusely and yield more than other varieties. In this context, an experiment was conducted for three years to study the performance of CO4 variety of Hybrid Bajra Napier in the interspaces of coconut under sandy loam soil. The fodder grass was grown with different nutrient management practices viz., 100% organic, integrated nutrient management and 100% chemical. The average yield of three years revealed that the grass responded well to the integrated nutrient management (120 t/ha/year) and organic application (107 t/ha/year) compared to chemical fertilizer alone (104t/ha/year). The green fodder requirement of one milch animal is 10t/year @ 30kg/day. So it clearly shows that fodder grass intercropped in 1 ha of coconut garden could meet the requirement of 12 milch animals. The detailed package of practices for cultivation of hybrid bajra napier var. CO4 is described here under.

Field preparation, Planting and Manuring

The best time of planting is the onset of SW monsoon (June) or NE monsoon (October). It can also be planted through out the year with irrigation. Planting during heavy rains should be avoided. The field should be provided with good drainage during the rainy season, as the crop cannot withstand water stagnation. The land need to be ploughed 2-3 times to obtain a good fine tilth. Farm yard manure @ 15t/ha need to be applied before planting. Fertilizers NPK @ 45:30:24 kg/ha should be applied as basal dose and covered with soil. Potassium should be applied @ 24kg/ha at yearly interval. Three budded stem cuttings should be planted in a slanting position with a spacing of 60 cm x 60 cm. The cuttings should be planted in such a way that two nodes are in the soil and one node is above the soil surface. It is observed that, in many places farmers fail to get the expected yield mainly because of the poor plant population. Thus for successful production, plant population need to be maintained at optimum level. For this, approximately 10% of the planting materials need to be maintained in separate nursery for gap filling. Generally it is advised to go for staggered planting depending on the number of cattle to be fed to avoid wastage of grass with continuous supply of fodder. The entire area is divided into 5 equal parts (20% of area) to follow staggered planting. Planting has to be done at an interval of 10 days. For example, if a farmer is having 1 ha of garden, he has to plant 50 cents of area initially (1st day) and there after planting has to be taken up at 10 days interval. Farmer can complete the planting in 50 days. Earthing up should be done after planting.

Water management and inter cultivation

During summer season it is necessary to irrigate the crop with sprinkler irrigation system for efficient

utilization of water. Frequency of irrigation depends upon the rainfall and weather condition. During the rainy season if there is more than a week gap in the receipt of rain, irrigation need to be given. During the post monsoon season or summer season irrigation should be given once every three days or when ever the moisture falls below 50% of available soil moisture. Earthing up can be done after 2 cuttings and weeding has to be done as and when necessary. It is desirable to take up replanting after every 3 years since the yield starts declining after three years. It is always advisable to grow one leguminous crop before replanting.

Harvesting

The crop will be ready for first cutting in 70-80 days after planting (DAP). Cutting should be done at 5-10 cm from the ground. After every cutting 45kg nitrogen in the form of cow dung slurry or in the form of chemical fertilizer urea should be applied as top dressing. Subsequent cutting can be taken up at an interval of 45-60 days depending on the management of the crop. In a year, six to seven cuttings can be taken up (even 8 cuts can be obtained per year with better management) per year with an average yield of 120 t/ha/year.

Conclusion

Growing of fodder grass with scientific management in coconut garden helps in alleviating the problem of fodder scarcity. It helps in developing an ecologically sustainable integrated farming system which enables the farmer to realize more income, employment throughout the year and good soil health. Based on the study it can be grown with integrated nutrient management practices or organically through recycling of organic material generated from mixed farming system. In the present scenario where organic cultivation is gaining importance, this system will help the most as the maintenance of dairy generates FYM, an important input in organic farming.

Reference

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Shri. R. Jnanadevan, Deputy Director, Coconut Development Board hoisting the National Flag at the head quarters of Coconut Development Board, Kochi as part of Independence Day celebration 2017. Officials of CDB are seen.

Region specific technologies for doubling income of coconut farmers: in Maharashtra

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Coconut is a major irrigated horticultural crop in Konkan region of Maharashtra, where agro-climatic conditions are very much congenial for its cultivation. Government of Maharashtra has launched an ambitious Employment Guarantee Scheme (EGS) for fruit crop cultivation in 1990, which led to the expansion of the total area under coconut cultivation to 22,750 ha by 2015-2016 with productivity of 9,775 nuts/ha. In Maharashtra 95 per cent area under coconut is concentrated in Konkan region and most of the orchards are situated near the seashore, majority of them are sole coconut orchards.

In Maharashtra coconut farmers are facing problems like fragmented holdings, scattered production, homestead nature of cultivation, lack of skilled manpower, incidence of pest and diseases, lack of adoption of scientific cultivation practices, lack of appropriate mechanization for harvesting and small scale processing and lack of awareness about improved technologies.

> **Regional Coconut Research Station Bhatye contribute to the farming community through development of improved varieties of coconut along with evaluation and dissemination of location specific crop production and protection technologies.**

To address the problems faced by farmers, the Indian Central Coconut Committee established a Regional Coconut Research Station in Bhatye. The objective of this station is to carry out research in coconut for catering to the needs of coconut growers in this region. The Research Station is situated on

RCRS, Bhatye

the coast of the Arabian sea of village Bhatye near to Ratnagiri town and is located at 17.00^0 N Latitude and 73.40^0 E Longitude and 3 m above mean sea level. The station was established on 1st July, 1955 under the administrative control of the State Department of Agriculture. The centre was under Mahatma Phule Krishi Vidyapeeth, Rahuri up to 1969 and presently it is under the Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli. The station has an area of 25.84 ha for conducting research on mandate crops i.e., coconut and spices.

Pratap

The station undertakes research and extension programmes under ICAR- All India Coordinated Research Project (AICRP) on Palms and National Agricultural Research Project (NARP). This research station contributed to the farming community through development of improved varieties of coconut along with evaluation and dissemination of location specific crop production and protection technologies.

Research Achievements of the Station

Crop improvement

Coconut varieties/hybrids released

Pratap: A high yielding tall coconut variety, pratap was released in the year 1987, which was a selection from Banawali. It is having green colour round shaped nuts and an average yield of 140-145 nuts/ palm with dry copra yield of 120-160 g/nut and 68% oil content. The variety is recommended for cultivation in Konkan region of Maharashtra.

Konkan Bhatye

Konkan Bhatye Coconut Hybrid 1 (GBGD x ECT): The hybrid was released in the year 2007, with an average yield of 120-122 nuts/palm and copra content of 160-169 g/ nut with 67.1% oil content. Nuts are green coloured, oval shaped with tender nut water content of 330 ml/ nut. The hybrid is resistant to stem bleeding disease and is moderately resistant to leaf blight and bud rot. This hybrid is also recommended for cultivation in Konkan region of Maharashtra.

Based on the performance, varieties/ hybrids like Chandra Kalpa (Laccadiv ordinary), Kera Sankara (T x D), Kera Chandra (Philipines ordinary), Chandra Sankara (DxT), Kera Bastar (Fiji Tall) and Godavari Ganga (ECT x GBGD) have been recommended for cultivation in Maharashtra.

Nucleus seed gardens for released varieties

Nucleus seed gardens for released varieties were established in the centre for ECT, Gautami Ganga (GBGD) and Kera Bastar, which will cater to the needs of quality planting material in the region.

Crop Production

Fertilizer requirement: A fertilizer dose of 1 kg Nitrogen, 0.5 kg phosphorus and 1 kg potash per palm in three splits (June, October and February) was recommended for coconut in sandy soils of Konkan region of Maharashtra. The dose should be applied in three splits i.e. 1/3 N and full dose of P2O5 along with FYM in June and remaining 2/3 N and K2O in splits in October and February.

Micronutrient application: Application of recommended dose (1:0.5:1 kg NPK/palm/year) with 1.5 kg Ormichem micronutrient mix (Zn 3.15 %, Mg 1.8 %, Cu 0.65 %, Fe 1.97 %, Mn 2 %, Mo 0.05 % and B 0.68 %) recorded the maximum nut yield in

coconut and also the percentage increase in yield was higher in post treatment period yield when compared with pretreatment period.

Drip irrigation: Water requirement through drip irrigation for coconut was 30 litres/palm/day during October to January and 40 litres during February to May with six drippers placed at a distance of 1 m away from the coconut bole in the sandy loam soils of Konkan region.

Drip fertigation: Application of 1 kg N, 0.5 kg P2O5 and 1 kg K2O per palm per year was recommended through drip irrigation in eight splits from October to May.

Effect of water quality on survival and growth of coconut seedling: An experiment was conducted to assess the influence of quality of irrigation water on growth of one year old newly planted 'West Coast Tall' coconut seedling in coastal sandy soil. Irrigation with sea water had detrimental effects, at any growth phase throughout the duration of the experiment, due to primary salt stress, which was responsible for membrane disintegration and disturbance in metabolic process. The dilution of seawater with sweet water reduced the extent of primary stress injury but imposed salt injury causing decrease in uptake of mineral elements, which resulted into poor growth of seedling.

Coconut based cropping/ farming system:

Intercropping system of spices in coconut: On the basis of the net economic returns realized, it is recommended to plant nutmeg, cinnamon and clove as intercrops in well spaced coconut garden in the Konkan region of Maharashtra state. Excellent growth and good bearing capacity of cinnamon, nutmeg, black pepper and clove planted in coconut as intercrops proved that these crops can be cultivated on commercial scale in the Konkan region of Maharashtra. After planting spice crops as intercrops in coconut plantation, the average yield of coconut per palm has increased from 25 to 93 per cent at the end of 26th years as compared to the average yield of previous 4 experimental years. Nutmeg (at 22 years age) proved as the best intercrop in coconut plantation. Nutmeg and coconut together gave Rs. 1,23,970 as net returns per hectare, whereas only nutmeg gave Rs. 47,240/ha. Coconut as a monocrop recorded net profit of Rs. 31,349/ha only (based on 2004-09 data).

Intercropping of fruits and tubers in coconut: Crops like turmeric, banana, pineapple, amorphophallus and tapioca were recommended as intercrops in coconut plantation.

Lily as intercrop in coconut

Heliconia as intercrop in coconut

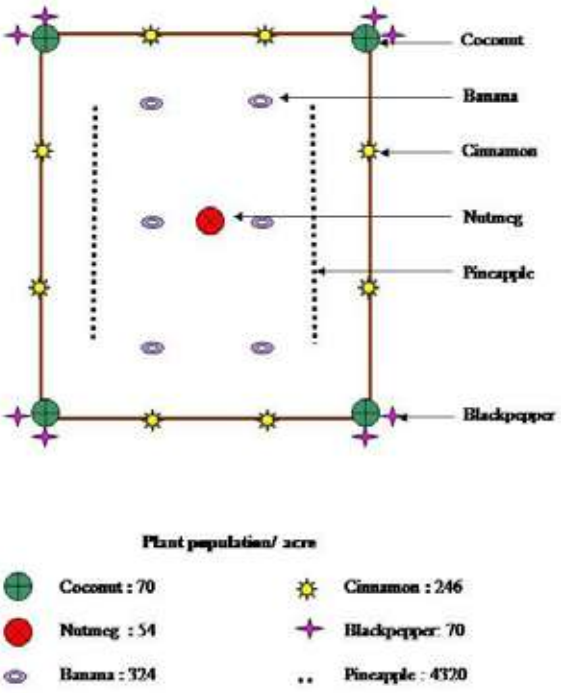
Flower crops as intercrops in coconut: When five flowercrops viz., Jasminum sambac, J. multiflorum, Lily spp., Heliconia spp., and Michelia champaka were evaluated as intercrops in the coconut garden, the yield of coconut was significantly higher in coconut + lily followed by coconut + J. multiflorum and coconut + M. champaka with net returns of Rs. 4,79,975/ ha, Rs. 3,37,501/ha and Rs. 2,18,905/ha respectively, compared to coconut monocrop (Rs. 1,30,705/ ha) (based on 2012-16 data).

Medicinal and aromatic plants in coconut garden

Vegetables as intercrops in coconut: Cultivation of chilli (variety "Jwala" and "Konkan Kirti") is recommended due to its higher yield and increased net returns as intercrop in coconut orchard. On the basis of economic returns obtained per man days per hectare, dolichos bean could be used as the most remunerative vegetable crop, whereas tomato

cultivation provided better employment opportunities and gave attractive yield. Rainfed vegetables such as ridge gourd, cucumber, snake gourd and bitter gourd are recommended in coconut plantation during rainy season. Four intercrops viz. turmeric, banana, pineapple and tapioca has recommended in coconut plantation in Konkan region of Maharashtra for getting more economic returns.

Lakhi Baug: On the basis of mixed cropping experiment on spices and coconut, University has propagated the 'Lakhi Baug' concept, which is a high density multi storied (HDMS) cropping model including spices (nutmeg, cinnamon and black pepper) and annual fruit crops (banana and pineapple). This model has a potential to earn profit of more than Rs. one lakh per acre and hence popularized as Lakhi Baug. By following this system, gross return of Rs. 1,84,010/ acre and net return of Rs. 1,25,760/ acre was obtained within 10 years of planting in Maharashtra. The model of the system is given below.



Biomass recycling through vermicomposting in HDMSCS:

The dried biomass obtained from coconut in the form of leaves and spathe and fresh/dry biomass of annual/ biennial intercrops after their harvest and fresh biomass from pruning of perennial intercrops can be used for vermicomposting. It can be done with the help of earth worm, Eudrilus sp. and the biomass can be recycled in the system. The vermiwash can also be collected during the process of vermicomposting and applied to coconut and intercrops. Recycling of biomass minimized the application of inorganic fertilizer and there by reduced the cost of production per acre. In Lakhi Baug model, coconut palms gave maximum recyclable biomass productivity of 2 t per acre which was followed by nutmeg (740 kg), banana (738 kg), pineapple (432 kg), cinnamon (142 kg) and black pepper (14 kg). Hence the total biomass available from one acre of Lakhi Baug was around 4t which produced approximately 2 t of vermicompost.

Crop Protection

Bio-control lab for large scale production of parasitoids

Release of parasitoids in the field

Identified and documented occurrence of insect pests in different coconut growing regions of Maharashtra.

Red Palm Weevil: The use of PO29 Ferro lure 400 mg per trap at an interval of three months is recommended for the management of coconut red palm weevil. For the monitoring and mass trapping of coconut red palm weevil, economically feasible and eco-friendly attractant pheromones lures (Ferrolure)

developed by CPCRI were field tested. The NPR CPCRI lures developed by CPCRI were also continuously evaluated for two years and were found superior to PCI lures available in the market both in terms of efficacy and longevity.

Rhinoceros Beetle: The dead and decaying organic debris in the coconut gardens may be properly disposed off. Removal of beetles with iron or aluminum hooks from the palm crown without causing injury to the growing point particularly during peak period of population build up. Attraction and trapping using false breeding material trap by digging of ten pits per hectare of the size 2 x 2 x 2 feet filled with breeding material is very effective in trapping the pest in coconut gardens. Release of Baculovirus infected adults of rhinoceros beetle @ of 10 to 15 per acre was found to be effective.

Black headed caterpillar: The hotspot areas for black headed caterpillar were earmarked in Thane, Kolhapur, Solapur and Pune districts. Parasitoids

Drenching of Eriophyid smash

were multiplied and released in the garden for effective management of the pest. A larval parasite Goniozus nephantidis should be released at the rate of 3,500 adult parasitoids per hectare. Need based spraying with 0.05 % Dimethoate in severely affected areas would give satisfactory control of the pest. Root feeding with systemic insecticides Azadirachtin 10000 ppm @ 10 ml in 10 ml of water per palm were effective in controlling black headed caterpillar.

Eriophyid Mite: Root feeding of Azadirachtin 50,000 ppm @ 7.5 ml + 7.5 ml water or Azadirachtin 10,000 ppm @ 10 ml + 10 ml water is found effective. Spraying with Azadirachtin 10,000 ppm @ 4 ml per litre of water on fourth bunch onward reduces pest population. Drenching of Eriophyid smash (Azadirachtin 0.03 per cent + micronutrients) at the rate of 250 ml in 20 lit of water per palm at an interval of three months is recommended for the management of coconut eriophyid mite.

Extension activities

The Regional Coconut Research Station, Bhatye disseminated improved technologies in coconut cultivation to 3440 tribal families through Tribal Sub Plan (TSP) programme in Nandurbar and Palghar district. Supplied seedlings and disseminated improved technologies with respect to coconut cultivation for providing better income and livelihood for tribal people. The station organized trainings and field days, published leaflets, booklets and extension folders and celebrated World Coconut Day every year for awareness creation and skill development of the community.

Nursery seedling production

Along with the research and extension activities, the station is producing quality coconut seedlings and supplying to the farmers. Seedlings of Pratap, D x T, T x D and Dwarf varieties/hybrids are available from the station.

For further information, contact : Regional Coconut Research Station (ICAR-AICRP on Palms) Bhatye, Ratnagiri, Maharashtra - 421 612, Phone: 02352-255077, e-mail: aicrpratnagiri@gmail.com, Website:http://www.aicrppalms.res.in. ■

Good planting depth for coconut

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Coconut palm (Cocos nucifera L) is a perennial tree crop with a life-span of 100 years. It is a versatile palm, capable of providing more products of use to mankind than any other tree crop. It is rightly eulogised as the Kalpavriksha – the wish fulfilling 'Tree of Heaven'. Coconut palm provides food and livelihood security to 12 million people in India.

Coconut palm, being a perennial crop and committed to the land for decades, utmost care and attention should be taken at the time of establishment of new coconut gardens. Any mistake / omission committed at the initial stage of garden establishment would continue for ever, throughout the life-span of

> While establishing coconut garden site selection, seedling selection, plant spacing, pit preparation, planting depth and the care of young palms should be carried out meticulously.

the coconut palm, causing considerable economic losses to the growers. Hence site selection, seedling selection, plant spacing, pit preparation, planting depth and the care of young palms should be carried out meticulously. Any compromise / laxity in these operations is not at all admissible.

Preparation of Planting pits for coconut

1m x 1m x 1m size pits for planting coconut seedlings are dug 2 to 3 months ahead of actual planting and are allowed to weather by exposing to the hot rays of the sun which kill the harmful microbes in the soil.

When the pits are dug, top soil of 40 cm depth is kept separately on one side of the pit, to be used later to fill up the pit. The sub-soil of 60 cm depth is dug out and is used to form small bund all around the pit to prevent rain water flowing into the pit and stagnating. The bottom of the pit is loosened by crow-barring. Dry leaves and twigs are burnt in the pits once or twice to char the soil borne pathogens and termites to death thereby preventing their attack of coconut seedlings. In hard laterite areas 2 kg common salt per pit may be applied six months prior to planting to soften the laterite bed thereby facilitate better penetration of the tender roots.

In sandy soils and in areas where drought conditions prevail, it is beneficial to lay two layers of coconut husks with their concave side facing upwards, at the bottom of the pits. These husks will absorb water six times their weight during the rainy season and will release the water to the young palms during the dry periods. Pits are filled up to a height of 40 cm with a soil mix of equal proportion of top soil, river sand and vermicompost, leaving top 60 cm of the pit as empty. Addition of river sand is helpful to prevent termite attack. Pits are copiously watered twice at 3 days interval and the soil mix is allowed to set for a week.

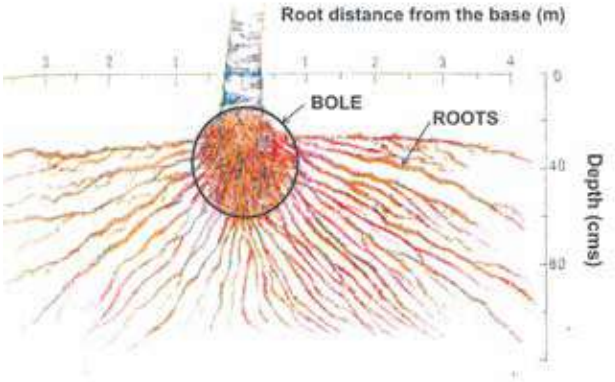
A small hole is dug in the soil mix, just sufficient to accommodate the seednut and the seedling is planted in the hole with the seednut buried in such a way that the top of the husk of the seednut is just visible outside. The soil around the seedling is well pressed and compacted to keep the seedling firmly in position. Thus coconut seedling is planted at a depth of 60 cm in the planting pit of 1mx1mx1m size. Vide picture 2. Planting pits are filled up gradually as the seedlings grow up and form the stem.

Size of the Planting pits

Size of the pits for planting coconut seedlings, normally depends upon the soil texture and the depth of ground water table. One metre cube (m3) pits are considered suitable for most localities. In light soils, where water table goes down very deep during summer, planting pits of 1m x 1m x 1m size are recommended. In hard laterite soils and in soils where ground water is very deep, it is advantageous to dig deeper pits. Generally the harder or heavier the soil, the bigger should be the pits. On hard laterite soils bigger pits of 1.2 m x 1.2 m x 1.2 m (length, breath and depth) are necessary.

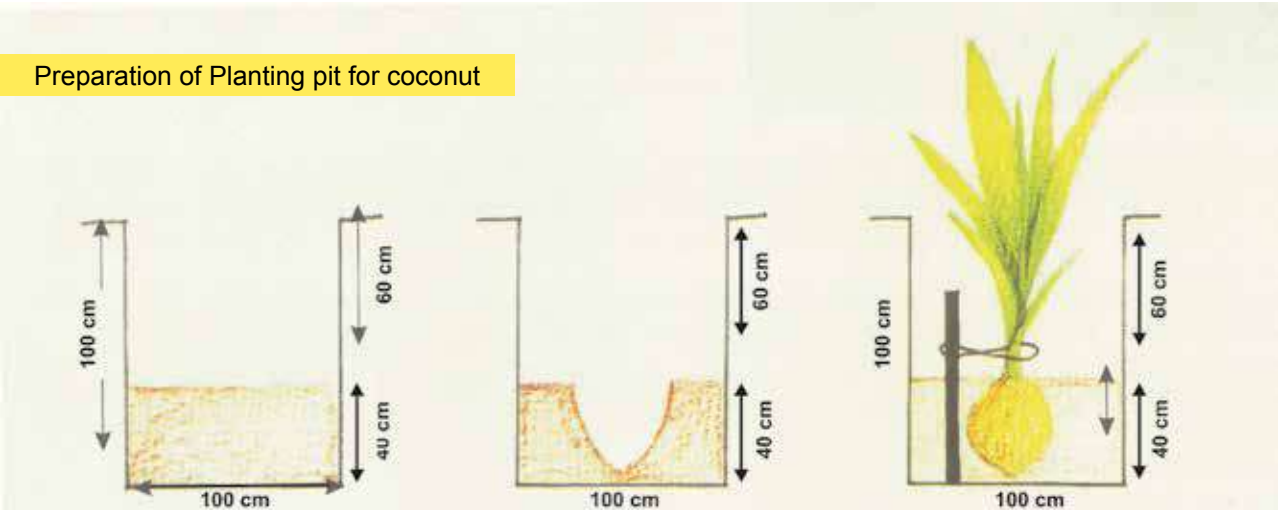
Depth of planting of coconut seedlings

The depth at which coconut seedlings are planted is very important. Planting depth defends upon the soil texture, soil depth and height of water table and other environmental factors. As a general rule, coconut seedlings should be planted at such a depth that the full-grown bole (the root forming region of



Bole and Roots of Coconut palm

Preparation of Planting pit for coconut



the coconut palm) remains wholly buried in the soil. Bole area increased with the depth of planting and the increases were 123% at 60 cm depth of planting and 129% at 90 cm depth of planting over the surface planting.

Bigger the bole, better is the rooting

Coconut, being a monocot, has no tap root but has a thick growth of string-like adventitious roots, emanating from the swollen base of the stem called the bole. The growth of the bole is completed when the coconut seedling is 3 to 4 years old. The bole acquires the shape of inverted cone and is invariably buried in the soil. In deep planted palms, the bole shall be 80 cm to 100 cm in height but in shallow planted palms it shall be 30 cm or less. Generally speaking the bigger the bole, the better is the rooting with more number of roots. A well grown coconut palm can produce 4000 to 7000 roots from the bole. It is desirable to dig 1m x 1m x 1m size pits, which can accommodate the full-grown bole and the bole can be wholly buried in the soil. One cubic metre pits are considered suitable for most localities.

An innovative coconut farmer Shri. Dominic from Kozhikode used mechanised digging pits of 3 m diameter and 1 m deep. Though higher cost was incurred, such big pits enabled. coconut seedlings to establish faster and start yielding early.

Deep planting is good for coconut

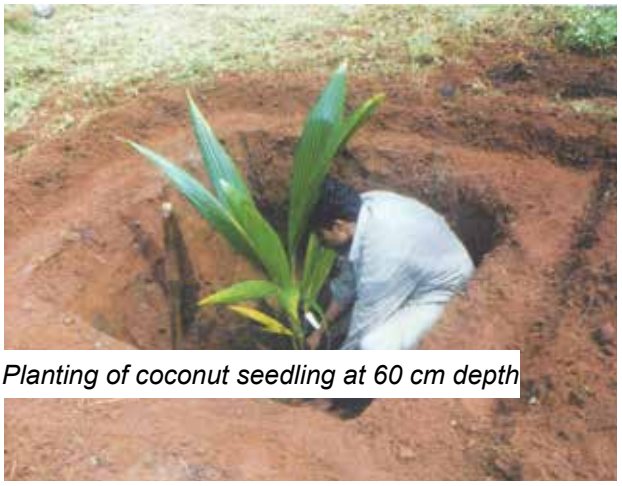
Being a perennial and tall growing palm, coconut seedlings should be planted at appropriate depth so as to ensure proper development of the bole and good development of root system, which in turn provide firm anchorage and the capacity to withstand drought. The depth of planting of coconut seedlings is as much important as its quality. The deeper the planting, the better is the growth performance of the palms, solely because of better development of root system in deep planting.

Experiments were conducted in Nileswar-I Coconut Research Station at Pilicode in Kerala as early as in 1923 and in the Regional Coconut Research Station at Veppankulam in Tamilnadu in 1961 to study the comparative efficiency of different depths of planting of coconut seedlings.

In the experiment conducted at Nileswar I Coconut Research Station, there were four planting depths viz., 0 cm, (surface planting), 30 cm, 60 cm and 90 cm. Each treatment has 3 rows of 12 palms. In all the treatments 90 cubic centimetre pits were dug and filled to the required depths before planting the coconut seedlings. The test coconut variety was West Coast Tall was soil type and the Laterite.

Surface planting resulted in reduced bole area and shallow root system, which ramified only in the surface layer of soil. Such roots easily dried up during the summer months. The growth performance of surface planted coconut seedlings were poor and the mortality rate was high. Seedlings planted at the depth of 60 cm, developed bigger bole and better root system with more number of roots, which helped the seedlings to withstand drought better and the seedling mortality was low. The results of this experiment are given in Table 1.

Table 1 : Role of depth of planting on survival of coconut seedlings			
	Depth of planting from surface level	No. of seedlings planted in June 1923	No. of seedlings died upto April 1925
1.	Surface planting	31	12
2.	30 cm deep planting	32	9
3.	60 cm deep planting	31	1
4.	90 cm deep planting	32	4



Planting of coconut seedling at 60 cm depth

Table 2
Effect of planting depths on the growth parameters of the palms

	Depth of planting	Bole area m2	No. of roots on the bole	Pre flowering age (Months)	Nut yield per Palm	Percentage of palms affected by cyclone	
						Uprooted	Tilted
1.	Surface	0.400	3055	76	50	10	5
2.	30 cm	0.560	3840	70	55	10	5
3.	60 cm	0.892	6142	66	62	NIL	NIL
4.	90 cm	0.916	7427	66	62	NIL	NIL

Similar experiment was conducted in 1961 at the Regional Coconut Research Station at Veppankulam in Tamilnadu to find out the appropriate depth at which coconut seedlings should be planted. In this experiment the effects of four different depths of planting, viz., 0 cm, (surface planting), 30 cm, 60 cm and 90 cm were compared. The depth of planting was reckoned as the distance from ground level to the collar of the seedling. Results of this experiment are given in Table 2.

The results of Veppankulam experiment has very well proved the importance and necessity of deep planting of coconut seedlings and the unsuitability of surface planting. In this experiment, palms planted at the depth of 60 cm, yielded 23.90 percent increased nut yield over the surface planted palms and these palms came to flowering earlier by 10 months.

Deep planting of coconut seedlings at a depth of 60 cm in one cubic metre pits is highly beneficial as it ensures big bole, wholly buried in the soil and good root system with more number of roots. Such a good root system ensures higher uptake of water and nutrients from the soil thereby enabling the palms to produce good growth and high yield. Such a good root system puts forth firm anchorage thereby enabling the palms to withstand the onslaught of cyclonic storms. Both in surface planting and 30 cm deep planting the percentage of palms uprooted and tilted by the cyclone were ten and five respectively, whereas none of the deeper planted palms was affected by cyclone.

Uprooting and tilting of palms by cyclone are caused by the poor root anchorage which in turn is caused by reduced number of roots, emanated from the reduced area of the bole, which are invariably occur in shallow planted palms. Poor root anchorage had been attributed as the sole cause for the uprooting and devastation of thousands of surface planted coconut palms in the East Coast of Tamilnadu by cyclonic storms in 1952 and 1955.

Planting at 90 cm depth has not conferred any substantial advantage over 60 cm planting depth with regard to root production, flowering age and nut yield. As such planting depth of 60 cm is found optimum for coconut under normal situations and hence the same is recommended for adoption by the coconut farmers. ■

Sweet Husk Type Coconut from the Bay Islands

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Coconut is a versatile crop that has been an integral component of ancient and modern lifestyles of human being. It is regarded as one of the unique species possessing nutritional, religious and socio-economic significance. The economy of a number of small tropical islands of the world is largely dependent on coconut and allied industries. It is not necessary to reiterate the multifaceted applications of this crop. A number of morphologically distinct types are found in coconut, which could diversify the product range apart from the existing popularly exploited forms such as tender coconut water, copra, oil, virgin coconut oil and other value added products. Such unique types include those with soft endosperm, fragrant endosperm and sweet husks.A sweet husk

> The sweet husk type coconut found in the Bay Island is characterized by soft edible husk which can be eaten in the raw form

type coconut was observed in the Bay Islands, which is characterized by its soft edible husk. Yes, the husk could be eaten in raw form like any tropical fruit!

Outer covering in coconut is commonly known as husk, which is bitter and tough during younger stages. Upon maturity the fruits turn dry with considerable amount of fibres, which are used for making coir based by-products. However, in some parts of the world, exceptional palms have been reported to have softer, less fibrous husk that could be chewed like sugarcane. These phenotypes are popularly known as sweet husk or edible husk types. Available reports suggested that such types have been identified from various places including Pacific islands, Thailand, Sri Lanka, Micronesia etc. In many of these places, the husk is consumed both in raw and processed forms.

During regular visits to the farmers' fields, one edible husk coconut type was noticed in the fields of Mr. Shyamal Chandra Halder. Mr. Halder is a 63 years old farmer engaged in farming profession for past 25 years from the North and Middle Andaman district of Andaman and Nicobar Islands. His family settled in the islands since 1965 and his father introduced a few nuts of this type from their ancestral village in Bangladeshduring 1974. At present, two yielding palms are maintained in his home garden in the islands.

At his farm, he offered the author sliced husk that could be eaten as such with good palatability. Husk from fully dried nuts remained comparatively softer than those obtained from ordinary palms. Further, it was also observed that the mesocarplost its sweet taste and soft texture were developed during later stages of fruit development. No distinct change in taste and quality was observed during different seasons.

Mr. Halder is proud of this unique possession and local people are showing their interest in cultivating this type. Sensing the future requirements, he has already collected seednuts from those palms and few more seedlings have been recently planted for area expansion.Such types are rare and hence need to be conserved for their possible utilization in future.

Acknowledgement

Authors are thankful to Dr. S. Dam Roy, Director and Dr. R.K. Gautam, Head (I/c), Division of Horticulture and Forestry, ICAR-CIARI, Port Blair for their constant support and encouragement. Thanks are also due to the ICAR- All India Coordinated Research Project on Palms for providing financial assistance. *Author for correspondence: ajit.hort595@gmail.com ■

Coconut Based Convenience Food Training

Coconut Development Board, State Centre, Odisha organised Coconut Based Convenience Food training programmes in association with Orissa University of Agriculture & Technology at Bhubaneswar from 2nd to 5th August,2017. The training was conducted at the College of Community Science,Dept. of Home Science, OUAT, Bhubanswar. The trainees were selected by OUAT, Bhubaneswar, SHG members and from different Coconut Producer Societies of Puri districts.

Prof. Dr. Md. Khalid Khan, Director, CC & ED (career counselling and entrepreneurship dev.) & Ex-Dean, CAET inaugurated the programme. Dr.Rajat Kumar Pal, Deputy Director welcomed the participants. Dr.Manasi Mahanty, Director, CCS, OUAT, Bhubaneswar addressed the trainees and Dr.Chitrotapla Debadarshini, Asst. Prof.CCS, OUAT, Bhubaneswar delivered vote of thanks.

Training on preparing virgin coconut oil, coconut pickles, coconut jam, coconut chips, coconut candy and coconut squash was extended to the trainees. Dr.Diptimayee Jena, Associate Professor spoke on the importance of packaging and marketing of processed coconut food products and briefed about the machineries used in processing of various coconut products, its cost & availability. Dr.Chitrotapla Debadarshini, Asst. Prof. CCS, OUAT, Bhubaneswar spoke about the importance of food safety processing of processed foods and delivered lecture on food safety & hygienic aspects of processed foods & FSSI. Mrs.Ritanjali Parida & Mrs. Puspanjali Bhol, Master Trainers, imparted training on packaging, labelling & displaying of products. After the training a post training evaluation was conducted by CDB.

Market review – July 2017

Domestic price

Coconut Oil

During July 2017 the price of coconut oil opened at Rs. 13100 per quintal at Kochi and Alappuzha market and Rs.14300 per quintal at Kozhikode market expressed an overall upward trend at all three markets during the month.

The price of coconut oil closed at Rs.14600 per quintal at Kochi market, Rs.14500 per quintal at Alappuzha market and Rs.15400 per quintal at Kozhikode market with a net gain of Rs.1500, Rs.1400 and Rs. 1100 per quintal respectively.

The price of coconut oil at Kangayam market in Tamilnadu, which opened at Rs.11200 per quintal, expressed an upward trend and closed at Rs.12467 per quintal with a net gain of Rs.1267 per quintal.

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

	Kochi	Alappuzha	Kozhikode	Kangayam
01.07.2017	13100	13100	14300	11200
09.07.2017	13300	13300	14400	11267
16.07.2017	13900	13800	14800	11933
23.07.2017	14600	14600	15400	12400
31.07.2017	14600	14500	15400	12467

Milling copra

The price of milling copra at major markets moved in tune with the prices of coconut oil. During the month, the price of milling copra opened at Rs.8500 per quintal at Kochi, Rs.8700 per quintal at Alappuzha market and Rs.9050 per quintal at Kozhikode market. The price of milling copra expressed an overall upward trend at all three markets during the month.

The prices closed at Rs.9900 at Kochi, Rs.9500 per quintal at Alappuzha market and Rs.9950 at Kozhikode markets with a net gain of Rs.1400, Rs.800 and Rs.900 per quintal respectively.

At Kangayam market in Tamilnadu, the prices expressed a upward trend. The prices opened at Rs.8100 and closed at Rs. 8700 per quintal with a net gain of Rs.600 per quintal.

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

	Kochi	Alappuzha (Rasi Copra)	Kozhikode	Kan-gayam
01.07.2017	8500	8700	9050	8100
09.07.2017	8700	8800	9250	8100
16.07.2017	9300	9050	9700	8300
23.07.2017	9900	9600	10000	8600
31.07.2017	9900	9500	9950	8700

Edible copra

The price of Rajapur copra at Kozhikode market which opened at Rs.8800 per quintal expressed slight upward trend during the month. The prices closed at Rs.9600 per quintal with a net gain of Rs.800 per quintal.

Table3 :Weekly price of edible copra at Kozhikode market (Rs/Quintal)	
01.07.2017	8800
09.07.2017	9000
16.07.2017	9700
23.07.2017	9700
31.07.2017	9600

Ball copra

The price of ball copra at Tiptur market which opened at Rs.7929 per quintal expressed a mixed trend during the month and closed at Rs.8600.

Table 4 : Weekly price of Ball copra at major markets in Karnataka (Rs/Quintal)	
	Tiptur
01.07.2017	7929
09.07.2017	7900
16.07.2017	8569
23.07.2017	9108
31.07.2017	8600

Dry coconut

At Kozhikode market, the price of dry coconut opened at Rs.6600 per quintal. The price expressed a mixed trend during the month and closed at Rs.7100 with a net gain of Rs.500 per quintal.

Table5 : Weekly price of Dry Coconut at Kozhikode market (Rs/1000 coconuts)	
01.07.2017	6600
09.07.2017	7100
16.07.2017	7600
23.07.2017	7500
31.07.2017	7100

Coconut

At Nedumangad market the price of partially dehusked opened at Rs. 14000 and ruled at same price throughout the month. At Bangalore APMC, price of partially dehusked coconut opened at Rs.20000 per

thousand nuts and closed at Rs.14000 per thousand nuts with a net loss of Rs.6000. At Manglore APMC market the price of partially dehusked coconut of grade-I quality opened at Rs.20000 per thousand nuts and closed at Rs.21000 per thousand nuts.

Table 6: Weekly price of coconut at major markets (Rs /1000 coconuts)			
	Nedumangad	Banglore	Mangalore (Grade-1)
01.07.2017	14000	20000	20000
09.07.2017	14000	17000	21000
16.07.2017	14000	15000	21000
23.07.2017	14000	14000	21000
31.07.2017	14000	14000	21000

Tender coconut

The price of tender coconut at Maddur APMC market in Karnataka opened at Rs.10000 per thousand nuts and remained at the same level throughout the month.

Table7 : Weekly price of tender coconut at Maddur market (Rs/1000 coconuts)	
01.07.2017	10000
09.07.2017	10000
16.07.2017	10000
23.07.2017	10000
31.07.2017	10000

International price

Coconut oil

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

Table 8: Weekly price of coconut oil in major coconut oil producing countries during May 2017

	International Price(US$/MT)	Domestic Price(US$/MT)		
	Philippines/ Indonesia (CIF Europe)	Philippines	Indonesia	India*
1/7/2017	1686	1650	1672	2047
8/7/2017	1620	1601	1600	2078
15/07/2017	1562	1511	1530	2172
22/07/2017	1523	1453	1493	2281
29/07/2017	1600	1560	1570	2266

* Kochi Market

Copra

The domestic price of copra at Philippines and Indonesia expressed a declining trend during the month whereas the price of copra in Srilanka and India expressed a slight upward trend.

Table 9: Weekly price of copra in major copra producing countries during May 2017

	Domestic Price(US$/MT)			
	Philippines	Indonesia	Srilanka	India*
1/7/2017	1047	1000	1375	1328
8/7/2017	1040	969	1406	1359
15/07/2017	983	969	1406	1453
22/07/2017	933	928	1407	1547
29/07/2017	923	928	1538	1531

* Kochi Market

Desiccated coconut

The FOB price of desiccated coconut in India during the month of July was competitive compared to the international prices of major DC exporting countries.

Table 10: Weekly price of desiccated coconut during May 2017

	Domestic Price (US$/MT)			
	Philippines	Indonesia	Srilanka	India*
1/7/2017	2673	2450	2943	2484
8/7/2017	2502	2410	3040	2279
15/07/2017	2668	2450	2875	2237
22/07/2017	2668	2450	2887	2237
29/07/2017	2668	2475	2889	2215

*FOB

Coconut

The price of dehusked coconut in Srilanka and India expressed a slight upward trend during the month. The price of coconut quoted at different domestic markets is given below.

Table 11: Weekly price of dehusked coconut with water during May 2017

Date	Domestic Price (US$/MT)			
	Philippines	Indonesia	Srilanka	India*
1/7/2017	220	261	222	398
8/7/2017	215	263	248	406
15/07/2017	197	263	248	406
22/07/2017	196	263	286	422
29/07/2017	203	255	296	414

*Pollachi market

Coconut shell charcoal

The FOB price of coconut shell charcoal in major countries markets are given below

Table 12: Weekly price of coconut shell charcoal during May 2017

Date	Domestic Price(US$/MT)			
	Philippines	Indonesia	Srilanka	India
1/7/2017	406	478	450	437
8/7/2017	406	477	507	457
15/07/2017	406	465	510	456
22/07/2017	406	465	510	467
29/07/2017	406	465	450	466

*Kangayam

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 chlorpyriphos 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 chlorpyriphos 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 measurers. 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. ■