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Exploring the Global Reach: The Export Dynamics of Indian Coconut Products

Solar-Powered Innovations for Sustainable Coconut Farming

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Articles, research papers and letters on different aspects of coconut cultivation and industry are invited for publication in this Journal. All accepted material will be paid for. The Board does not accept responsibility for views expressed by contributors in this Journal. All remittances and correspondence should be addressed to the Chairman, Coconut Development Board, Kochi - 682 011.

Coconut Development Board

The Coconut Development Board is a statutory body established by the Government of India for the integrated development of coconut cultivation and industry in the country. The Board which came into existence on 12th January, 1981, functions under the administrative control of the Ministry of Agriculture and Farmers Welfare, Government of India, with its headquarters at Kochi in Kerala State and Regional Offices at Bangalore, Chennai, Guwahati and Patna. There are six State Centres situated in the states of Orissa, West Bengal, Maharashtra, Andhra Pradesh, Gujrat and in the Union Territory of Andaman & Nicobar Islands. DSP Farms are located at Neriyamangalam (Kerala), Vegiwada (Andhra Pradesh), Kondagaon (Chhattisgarh), Madehpura (Bihar), Abhayapuri (Assam), Pitapalli (Orissa), Mandya (Karnataka), Palghar (Maharashtra), Dhali (Tamil Nadu), South Hichachara (Tripura) and Fulia (West Bengal) besides a Market Development cum Information Centre at Delhi. The Board has set up a Technology Development Centre at Vazhakulam near Aluva in Kerala.

Functions

❒ Adopting measures for the development of coconut industry. ❒ Recommending measures for improving marketing of coconut and its products. ❒ Imparting technical advice to those engaged in coconut cultivation and industry. ❒ Providing financial and other assistance for expansion of area under coconut. ❒ Encouraging adoption of modern technologies for processing of coconut and its products. ❒ Adopting measures to get incentive prices for coconut and its products. ❒ Recommending measures for regulating imports and exports of coconut and its products. ❒ Fixing grades, specifications and standards for coconut and its products. ❒ Financing suitable schemes to increase the production of coconut and to improve the quality and yield of coconut.

❒ Assisting, encouraging, promoting and financing agricultural, technological, industrial or economic research on coconut and its products. ❒ Financing suitable schemes where coconut is grown on large scale so as to increase the production of coconut and to improve its quality and yield and for this purpose evolving schemes for award of prizes or grant of incentives to growers of coconut and the manufacturers of its products and for providing marketing facilities for coconut and its products. ❒ Collecting statistics on production, processing and marketing of coconut and its products and publishing them. ❒ Undertaking publicity activities and publishing books and periodicals on coconut and its products.

The development programmes implemented by the Board under the project Integrated Development of Coconut Industry in India are- production and distribution of planting material, expansion of area under coconut, integrated farming for productivity improvement, technology demonstration, market promotion and Information and Information Technology. Under the Technology Mission on Coconut, the programmes implemented by the Board are development, demonstration and adoption of technologies for management of insect pest and disease affected coconut gardens, development and adoption of technologies for processing and product diversification and market research and promotion.

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Dear friends,

Tender coconut water, often referred to as "nature's sports drink," serves as a natural source of hydration, replenishing electrolytes lost through perspiration during the hot summer months. Unlike artificially flavored beverages laden with sugars and additives, tender coconut water is low in calorie content, making it an ideal choice for maintaining hydration without compromising on health.

As we are in the extremely hot summer, tender coconut water emerges as a natural elixir capable of quenching thirst while bestowing a plethora of health benefits. Amidst the scorching heat, this refreshing beverage stands out as a hydrating drink, offering a host of benefits for well-being.

Beyond its hydrating properties, tender coconut water is a treasure trove of nutrients essential for optimal health. Packed with electrolytes such as potassium, magnesium, and calcium, it aids in maintaining fluid balance, preventing dehydration and cramps, a common occurrence during the summer heat. Additionally, its high concentration of vitamins, particularly vitamin C and B-complex, fortifies the immune system, shielding from seasonal illnesses.

In the recent years, coconut has emerged as a superstar in the realm of health and wellness widely used from health aspects to culinary delights and skin care. Many recent research findings in the fields of nutraceuticals, cosmeceuticals and pharmaceuticals truly underscore the remarkable health benefits of this tropical fruit.

The latest studies have shed light on the nutraceutical advantages of coconut products. Rich in medium-chain triglycerides (MCTs), coconuts have been found useful in weight management, improved heart health, and enhanced cognitive function. Moreover, findings have made clear its potential in managing conditions like Alzheimer's disease and epilepsy, suggesting promising avenues for future therapeutic interventions.

In cosmeceuticals also, coconut-derived ingredients have gained importance for their unparalleled skin and hair benefits. From moisturizing properties to antioxidant-rich formulations, coconut-based skincare products offer a natural solution for addressing various dermatological concerns. Furthermore, research indicates its potential in wound healing and protection against UV radiation, underscoring their multifaceted role in skincare.

Beyond nutraceutical and cosmeceutical applications, coconut products have attracted the interest of pharmaceutical researchers. Compounds found in coconuts exhibit antimicrobial, antiviral, and anti-inflammatory properties, showcasing their potential in combating infectious diseases and inflammatory conditions. Additionally, studies exploring coconut derivatives as drug delivery systems hold promise for enhancing the efficacy of pharmaceutical formulations.

As we are in an era marked by a growing emphasis on holistic health and wellness is growing day by day, the significance of coconut and its products cannot be overstated. From nourishing our bodies from within to enhancing our external appearance, coconuts offer numerous health benefits backed by rigorous scientific research.

Together, let us harness the power of coconuts to enhance our energy levels, enrich our lives, and cultivate a healthier, more sustainable future for generations to come.

Chairman,
Editorial Board

Shobha Karandlaje, Minister of State for Agriculture distributed Coconut Development Board's Export Excellence Awards

Shobha Karandlaje, Minister of State for Agriculture and Farmers Welfare, Govt. of India along with the award winners and other dignitaries during the award distribution function.

To achieve the vision of the Government of India in doubling the farmers income, we need to concentrate more on diversification of coconut products said Shobha Karandlaje, Minister of State for Agriculture, Ministry of Agriculture and Farmers Welfare, Govt. of India. The Minister was declaring and distributing the National Awards for Export Excellence of Coconut Development Board at NIANP Auditorium, Bangalore on 29th February 2024.

Coconut is a super food and coconut oil is healthier than many other edible oils. We need to introduce this to the quality conscious consumers of the future generation particularly the younger generation.

While speaking about the government support for the farmers, she informed that subsidies from Horticulture/Agriculture Departments, Agriculture Infrastructure Fund, Rashtriya Krishi Vikas Yojana etc need to be utilized properly for the benefit of farmers and stakeholders. Presently Horticulture/Agriculture Departments are doing export through concerned industrial departments. They are promoting industrial products rather than agricultural products. In order to improvise the export, she requested the State/Agriculture/Horticulture Departments to work with APEDA and DGFT for making separate cell for Agriculture/Horticulture product export. APEDA has a list of products as per the requirement from various countries across the globe. Accordingly State/Agri/Hort Departments can identify the requirements from each country and promote the required agriculture commodity from the concerned state. Advancement in technology and innovation are opening up new avenues for value addition and product diversification. Value addition is the need of the hour to double the farmer's income which will open up new avenues. She pointed out that, in the vegan food system in Europe and American countries they are preferring coconut milk than soya milk. She congratulated the excellent achievers in coconut exports and appreciated the Board for taking the efforts in recognizing the National Awardees for their Excellence in Export Performance.

Dr. Prabhat Kumar, CEO, CDB and Horticulture Commissioner, Govt of India in his introductory remarks informed that Coconut Development Board

was notified as Export Promotion Council (EPC) for all coconut products other than those made from coconut husk and fibre by the Ministry of Commerce and Industry, Government of India. The total value of coconut products exported during the year 2022-23 touched Rs. 3554.23 crores. The Board plays a pivotal role in increasing production, productivity, value addition, marketing and export of coconut and its products.

Dr. K. B. Hebbar, Director, CPCRI and Vice-Chairman, CDB congratulated the awardees and requested to use the technology assistance and financial assistance provided by CPCRI and CDB for the upliftment of the coconut sector. He said that coconut is a promising crop and we need to concentrate more for climate resilience and carbon sequestration.

Shri. Ramesh D. S. IAS, Director of Horticulture, Government of Karnataka and Dr. N. K. S. Gowda, Director, NIANP, Bangalore attended the programme as guests of honour. Dr. Hanumanthe Gowda, Chief Coconut Development Officer, CDB delivered the welcome address and Smt. Deepthi Nair S, Director, CDB proposed vote of thanks. An interactive session of award winners with State Minister was also held as part of the programme.

The National Award for Excellence in Export Performance spanning over four years from 2019-20 to 2022-23 under 12 categories comprising of three awards under each category of gold, silver, and bronze was distributed during the occasion. The awards comprised of prize money of Rs.1.00 lakh, Rs.0.75 Lakh and Rs.0.50 lakh respectively for gold, silver, and bronze winners alongwith with memento and citation.

2019-2020

M/s. United Carbon SolutionsPrivate Limited, Tiruppur, Tamil Nadu received the award under gold , M/s. Nova Carbons India Private Limited, Tirunelveli, Tamil Nadu received the award under silver and M/s. Jacobi Carbons India Private Limited, Coimbatore, Tamil Nadu received the award under bronze category of Coconut Shell Based Product Exporter. M/S. Marico Limited, Santa Cruz (E), Maharashtra received the award under gold, M/s. KLF Nirmal Industries Pvt Ltd, Irinjalakuda, Kerala received the award under silver and M/s. Fair Exports India Pvt Ltd, Bandra, Maharashtra received the award under bronze category of Coconut Kernel Based Product Exporter. M/s. Lala Agro Tropic Pvt Ltd, Ernakulam, Kerala received the award under gold categoryfor Innovative Coconut Product Exporter for the period 2019-2020.

2020-2021

M/s. Nova Carbons India PrivateLimited, Tirunelveli, Tamil Nadu received the award under gold, M/s. UnitedCarbon Solutions Private Limited, Tiruppur, Tamil Nadu received the award under silver and M/s. Jacobi Carbons India Private Limited, Coimbatore, Tamil Nadu received the award under bronze category of Coconut Shell Based Product Exporter. M/S. Marico Limited, SantaCruz (E), Maharashtra received the award under gold, M/s. KLF Nirmal Industries Pvt Ltd, Irinjalakuda , Kerala received the award under silver and M/s. Mezhukkattil Mills, Aluva, Kerala received the award under bronze category of Coconut Kernel Based Product Exporter. M/s. Vashini Exports, Coimbatore, Tamil Nadu received the award under gold category for Woman Exporter and M/s. Lala Agro Tropic Pvt Ltd, Ernakulam, Kerala received the award under gold category for Innovative Coconut Product Exporter for the period 2020-21.

2021-2022

M/s. Nova Carbons India Private Limited, Tirunelveli, Tamil Nadu received the award under gold, M/s. United Carbon Solutions Private Limited, Tirupur, Tamil Nadu received the award under silver prize and M/s. Jacobi Carbons India Private Limited, Coimbatore, Tamil Nadu received the award under bronze category of Coconut Shell Based Product Exporter. M/S. Marico Limited, SantaCruz (E), Maharashtra received the gold prize; M/s. Mezhukkattil Mills, Aluva, Kerala received the silver prize and M/s. Fair Exports India Pvt Ltd, Bandra, Maharashtra received the bronze prize under the category of Coconut Kernel Based Product Exporter. M/s. Vashini Exports, Coimbatore, Tamil Nadu received the gold prize for Woman Exporter andM/s. Lala Agro Tropic Pvt Ltd, Ernakulam, Kerala received the gold prizefor Innovative Coconut Product Exporter for the period 2021-22.

2022-2023

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Awardees - CDB Award for Export Excellence

United Carbon Solutions Pvt Ltd: Pioneering Activated Carbon Manufacturing in South India

United Carbon Solutions Pvt Ltd (UCSPL), is a leading manufacturer of activated carbon based in Kangeyam, South India. With a factory spanning ten acres in a strategic location near charcoal manufacturing units, UCSPL boasts an impressive production capacity of approximately 20,000 tons per annum, with plans for further expansion. Backed by a decade of rapid growth and strong backward integration, UCSPL secures its raw material - coconut shell charcoal - through direct access to over 50% of locally sourced materials in India, facilitated by subsidiaries United Carbon and Gee Carbon.

The proximity of UCSPL's manufacturing facility to charcoal processing units presents a competitive advantage, enhancing operational efficiency and supply chain dynamics. Positioned for continued success, UCSPL emphasizes innovation in product development, poised to reach greater heights in the activated carbon industry.

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Nova Carbons India Private Limited: Revolutionizing Activated Carbon Manufacturing

Nestled within the industrial area of Tirunelveli District, Tamil Nadu, Nova Carbons India Private Limited emerges as a prominent player in the production of activated carbon. Spread across 23.52 acres, Nova Carbons operates as a subsidiary of Jacobi Carbon, AB Sweden, benefiting from its global expertise and reputation.

Established in 2011 with an initial production capacity of 9000 MT/year, Nova Carbons embarked on a journey of growth and expansion. Noteworthy expansions in 2013 and 2019 propelled Nova Carbons to achieve a commendable overall production capacity of 22000 MT/Year, solidifying its position in the industry.

Committed to excellence, Nova Carbons India is having certifications including ISO 9001:2015 for Quality Management System, 14001:2015 for Environmental Management System, and 45001:2018 for Health & Safety Management System. Furthermore, the factory holds prestigious certifications for KOSHER, HALAL, NSF-41, NSF-62, and SMETA, underscoring its dedication to social responsibility.

Specializing in coconut shell steam activated carbon, Nova Carbons India delivers premium products marketed to its group sales companies. These products enjoy a wide market reach, encompassing regions such as Australia, China, USA, and various European and Asian countries.

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Transformative Excellence in Activated Carbon Manufacturing: Jacobi Carbons India Private Limited

Located at Coimbatore District, Tamil Nadu, Jacobi Carbons India Private Limited stands as a beacon of innovation and excellence in activated carbon production. Spanning over 11.75-acre with a a workforce of over 260 dedicated individuals, Jacobi Carbons India is at the forefront of manufacturing high-quality activated carbon for global markets.

As a vital subsidiary of Osaka Gas Chemicals Co., Ltd. (OGC), Japan, Jacobi Carbons India upholds the legacy of its parent company, renowned as a pioneering force in the industry. Collaborating seamlessly with the Jacobi Group sales companies, the facility manufactures activated carbon under contract, contributing significantly to the group's worldwide operations.

The company stands tall as one of the world's top three activated carbon producers, with an impressive annual output exceeding 100,000 metric tons. Its global footprint encompasses 20 manufacturing facilities and five carbon reactivation plants, solidifying its position as a leader in activated carbon technology and innovation.

Since its inception in 2009, Jacobi Carbons India has continually expanded its operations to meet growing demands and exceed industry standards. Through strategic expansions in 2011 and 2018, the facility has doubled its production capacity to an impressive 16,000 metric tons per year.

Committed to upholding the highest standards of quality, environmental stewardship, and workplace safety, Jacobi Carbons India has earned prestigious certifications including ISO 9001:2015 for Quality Management System, 14001:2015 for Environmental Management System, and 45001:2018 for Health & Safety Management System. Moreover, the facility holds certifications for KOSHER, HALAL, NSF-41, NSF-62, and SMETA for Social Accountability, underscoring its dedication to ethical practices and compliance.

For further information, please contact

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Marico Limited: Empowering Lives through Innovation and Sustainability

Marico Limited stands as a beacon of excellence in India's consumer products landscape, particularly in the beauty and wellness sector. Headquartered in Mumbai, the company has established a formidable presence across more than 25 countries in Asia and Africa. Operating six state-of-the-art factories in India, located at strategic hubs including Puducherry, Perundurai, Jalgaon, Guwahati, and Sanand, Marico continues to redefine industry standards through its commitment to quality and innovation.

From household names like Parachute, Hair & Care, Parachute Advanced, and Nihar Naturals to emerging favorites such as Mediker, Pure Sense, Coco Soul, Revive, Set Wet, Livon, Beardo, Just Herbs, True Elements, and Plix, the company's products embody excellence and efficacy. In 2022-23, Marico achieved a turnover of approximately USD 1.2 billion, reflecting its robust performance and unwavering consumer trust.

Driven by a vision of holistic sustainability and social responsibility, Marico embarked on a transformative journey towards backward integration and community empowerment. The establishment of the Parachute Kalpavriksha Foundation underscores Marico's commitment to making a tangible difference in the lives of Indian farmers. Through this initiative, Marico aims to enhance the livelihoods of coconut farmers across the country, particularly in Tamil Nadu, Karnataka, Kerala, and Andhra Pradesh.

With over 80,000 farmers enrolled, covering nearly 3.1 lakh acres of plantation, Marico's initiatives encompass a spectrum of support mechanisms aimed at bolstering agricultural productivity and promoting sustainable farming practices. A dedicated team of scientists and agronomists, numbering over 100, actively engage with farmers, providing them with invaluable insights and technical assistance to optimize their yields.

In addition to productivity enhancement programs, Marico extends services to farmers, including access to agricultural experts via phone consultations, establishment of Agri Business Centers (ABC), implementation of water conservation projects through the construction of farm ponds, and provision of classroom training sessions facilitated by the Kalpavriksha Knowledge Centre.

For further information, please contact

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K.L.F. Nirmal Industries Private Limited : A legacy of Purity and innovation

With over 75 years of expertise in the edible oil industry, KLF Nirmal is one of India's foremost brands in coconut oil. Renowned for its commitment to purity and quality, KLF Nirmal operates cutting-edge extraction and packaging facilities located in Irinjalakuda, Thrissur District, Kerala, and Perundurai, Erode District, Tamil Nadu. The company's stringent quality parameters, from copra procurement to processing and packaging, ensure that every drop of coconut oil embodies purity and wholesomeness, making KLF Nirmal a trusted name in households across the nation.

Founded by the visionary entrepreneur, late Shri. K.L. Francis, KLF has a rich legacy of innovation and excellence. Under his leadership, the company diversified its product offerings to include a wide range of processed coconut products, such as coconut milk, virgin coconut oil, coconut milk powder, baby oils, and coconut soap, among others. With nearly 20 different coconut-based products, KLF Nirmal continues to redefine the boundaries of coconut-based consumer goods, catering to diverse tastes and preferences.

Committed to upholding the highest standards of food safety and environmental stewardship, KLF Nirmal has earned prestigious certifications including ISO 22000, HACCP, and BRC, underscoring its dedication to quality and sustainability.

For further information, please contact,

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Email: exports@klfnirmal.com

Mezhukkattil Mills: Championing Sustainability in Coconut Processing

For nearly five decades, Mezhukkattil Mills has been a renowned name in Kerala's coconut industry, for its commitment to quality, innovation, and sustainability. Specializing in the manufacture, packing, and export of a diverse range of coconut products, Mezhukkattil Mills goes beyond conventional offerings to introduce innovative products like coconut paste, superfine powder, flour, butter, and diced chips, alongside coconut oil, virgin coconut oil, and desiccated coconut powder.

Recognized as a government-certified Star Export House, Mezhukkattil Mills is leading the charge towards environmental conservation through its zero-waste initiative. By implementing robust solid waste management systems and recycling effluent water, the company sets a precedent for sustainable manufacturing practices in the industry.

With a commitment to quality and innovation, Mezhukkattil Mills has garnered numerous awards and certifications, including the prestigious "MADE in KERALA" award by FICCI, BIS certification for coconut oil, and international standards such as FSSC 22000, ISO 9001, and HACCP.

For further information, please contact,

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Fair Exports India Pvt. Ltd.: Nurturing Global Trade and Community Development

Fair Exports India Pvt. Ltd., a part of the esteemed Lulu Group International, is a dynamic player in the global food processing industry. With a diverse portfolio spanning over fruits, vegetables, garments, household items, ready-to-eat snacks, FMCG products, and fish, Fair Exports epitomizes innovation and excellence in international trade.

Under the visionary leadership of Shri. Yusuf Ali M.A, the company has emerged as a major exporter of fresh coconut to the Middle East, catering to the vast Indian diaspora in the region. Leveraging imported machinery, modern production methods, and a dedicated team of experts, Fair Exports ensures the highest quality standards in its products.

Recognized for its outstanding contributions to export trade, Fair Exports has been honored with the prestigious Three Star Export House status by the Government of India, along with a Certificate of Authorized Economic Operator (AEO) for its facilitation of business operations.

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Lala Agro Tropic Private Limited: Crafting Eco-friendly Solutions from Coconut Shells

Based in Ernakulam, Kerala, M/s. Lala Agro Tropic Private Limited is a pioneering company specializing in the manufacturing of utility items derived from coconut shells. With a mission to transform waste into wealth, Lala Agro Tropic produces eco-friendly products like coconut shell ice cream cups and bird feeders, catering to both domestic and international markets.

Originating as a proprietorship firm in 1994, focusing initially on supplying coconut shell-based ice cream cups, Lala Agro Tropic has evolved over three decades to expand its product line. Today, the company crafts an array of handcrafted items from coconut shells, demonstrating its commitment to sustainability and innovation.

Raw materials are primarily sourced from Tamil Nadu and Kerala, processed at state-of-the-art facilities in Koovappady and Kalady, Ernakulam district. Looking ahead, Lala Agro Tropic aims to diversify its offerings further, with plans to introduce products like bird's nests, cutlery, and other utility items derived from coconut shells, targeting markets in Australia and EU countries.

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Vashini Exports: Nurturing Nature's Bounty with Passion and Precision

Vashini Exports, established over 70 years ago in Southern India, is a leading global player in tropical fruit exports, with a specialized focus on mature coconuts. Operating a sprawling 3900-acre organic farm boasting 300,000 coconut trees, Vashini Exports yields an impressive 80 million coconuts annually.

As a testament to its commitment to excellence, Vashini Exports has garnered numerous accolades from government and industry bodies. With over 2000 empowered farmers under its wing, the company prioritizes sustainable organic farming methods, ensuring the production of superior-quality coconuts.

With a fully-equipped in-house quality testing unit and a 50,000 sq. ft. warehouse facility, Vashini Exports guarantees year-round supply of premium coconuts and coconut-based products. These products, meticulously processed and packaged, are shipped from Pollachi, South India, to 25 countries worldwide, catering to diverse culinary needs.

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Carbure Activated Carbon Private Limited: Empowering Excellence in Activated Carbon Production

Carbure Activated Carbon Pvt Ltd, helmed by Ms. Kiruthika.T and Mr. Suresh.R, is a premier processing unit specializing in the manufacture of activated carbon. Established in 2020 with a vision to produce international standard quality activated carbon, the company operates a production plant in Palladam, Tamil Nadu.

Certified with ISO 9001/14001/GMP, GMP, KOSHER, and HALAL certifications, Carbure Activated Carbon Pvt Ltd exemplifies excellence and inclusivity in entrepreneurship. With a production capacity designed for 6000 MT per year of coconut-based activated carbon, the company caters to diverse customer requirements with standard and value-added carbons.

Encouraging women entrepreneurship, Carbure Activated Carbon Pvt Ltd serves as a beacon of inspiration and innovation in the activated carbon industry, driving towards unparalleled quality and customer satisfaction.

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Nata Nutrico Coconut Food Products: Pioneering Healthy and Natural Beverages

Embarking on its journey in 2019 after over a decade of meticulous scientific research, Nata Nutrico Coconut Food Products emerged as India's premier Nata de Coco production company. Assisted by the Coconut Development Board and supported by Start Up India, Nata Nutrico is dedicated to revolutionizing the beverage industry with its innovative and nutritious offerings.

Initially focusing on Nata de Coco, a product derived from coconut water that enjoys immense popularity in Southeast Asian countries, Nata Nutrico introduced this delicacy to India as an edible food with unparalleled nutritional benefits. Drawing on rich experience and expertise, the company continuously experiments with different production techniques and undertakes rigorous quality improvements to ensure that every batch of Nata Nutrico meets the highest standards of quality and taste.

Driven by commitment to creating premium-quality health and beverage products, Nata Nutrico is at the forefront of the natural beverages revolution. With a vision to provide not just thirst-quenching refreshment but also fulfilling sustenance, the company aims to lead the way in developing wholesome and nutritious drinks that cater to the evolving needs of health-conscious consumers.

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Solar-Powered Innovations for Sustainable Coconut Farming

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Introduction

In coconut farming, using solar power is a big step forward. It brings in new ways of doing things that are both innovative and good for the environment. By harnessing the inexhaustible energy of the sun to renewable solutions, these technologies are used in redefining the conventional approaches to coconut farming. The orientation of leaves in coconut crown facilitates the infiltration of sunlight and offers chances for solar energy utilisation, especially in coconut gardens aged above 20 years. From precision irrigation systems energized by sunlight to advanced post-harvest processing methods reliant on photovoltaic brilliance, each facet showcases a nuanced application of solar power in optimizing efficiency, minimizing environmental impact, and fostering resilience. This article details the multifaceted landscape of solar-powered technologies in coconut cultivation, delving into their mechanisms, applications, and the transformative potential they hold for shaping the future of sustainable agriculture.

1. Solar-Powered Irrigation:

Using solar power for irrigation is a game-changer in coconut farms. It's crucial for preserving water resources and making things more sustainable.In this innovative approach, solar energy is harnessed to power irrigation systems for ensuring a consistent and efficient water supply to the coconut palms. Photovoltaic panels of the system capture the sun's energy to drive water pumps that distribute water precisely to the roots of the coconut palms. Beyond the immediate benefits of reduced operational costs and enhanced efficiency, solar-powered irrigation aligns seamlessly with the principles of sustainable agriculture and clean energy. By diminishing the reliance on conventional energy sources, this technology offers economic advantages to coconut farmers. Solar irrigation contributes significantly to environmental conservation as well.

A solar-powered irrigation system utilizes energy from the sun to pump water for irrigation purposes. It typically involves solar panels collecting sunlight and converting it into electricity, which powers a pump

to draw and distribute water to fields or gardens. This technology offers a sustainable and eco-friendly way to irrigate crops, reducing reliance on traditional energy sources and promoting efficient water usage in agriculture. These solar-powered systems are a harmonious blend of technological innovation and ecological stewardship, fostering the vitality and resilience of coconut gardens.

2. Solar Dryers for Copra

Solar dryers for copra signify a groundbreaking advancement in the traditional method of sun-drying, revolutionizing the post-harvest processing of coconut. These innovative dryers harness the abundant energy of the sun through photovoltaic panels, providing a controlled and efficient environment for copra drying. Unlike conventional sun-drying, solar dryers offer precise control over temperature and humidity, ensuring optimal conditions for the drying process. This meticulous control not only improves the quality of the final copra product but also accelerates the drying time, mitigating the risk of spoilage and contamination.

Solar dryers for copra are devices that use solar

energy to dry coconut kernels to make copra. These dryers harness the sun's energy to create a controlled environment for drying coconut meat efficiently. Typically, they consist of a drying chamber where coconut pieces are placed and exposed to direct sunlight. The system's design enables airflow and ventilation while retaining heat to gradually dehydrate the coconut, reducing its moisture content to the desired level for copra production. Solar dryers offer an eco-friendly and cost-effective method for drying copra compared to traditional drying methods, contributing to improved quality and increased efficiency in coconut processing. Additionally, solar dryers contribute to sustainability by reducing the reliance on fossil fuels commonly used in traditional drying methods, aligning with global efforts toward eco-friendly agricultural practices. The adoption of solar dryers in copra production represents a commitment to efficiency, quality, and environmental responsibility, heralding a new era in the post-harvest processing of coconuts.

3. Solar-Powered Coconut Processing Machines

Solar-powered coconut processing machines exemplify the fusion of technology and sustainability in the coconut industry. These cutting-edge machines leverage solar energy to drive various essential processes involved in coconut product extraction. From coconut oil extraction to grinding and other post-harvest activities, solar-powered processing machines utilize photovoltaic technology to harness the sun's energy. This innovative approach not only reduces reliance on conventional energy sources but also significantly lowers operational costs, making coconut processing more economically viable for farmers. Beyond financial benefits, the adoption of solar-powered machines aligns with environmental conservation efforts, contributing to a greener and more sustainable coconut industry.

These machines are designed to aid in tasks such as coconut husking, deshelling, grating, milk extraction, and oil extraction. They incorporate solar panels to capture sunlight, converting it into electricity to power motors, blades, or other mechanical components involved in the processing.These machines are often equipped with efficient mechanisms to handle different stages of coconut processing, making the overall process more sustainable by reducing reliance on non-renewable energy sources. Solar-powered coconut processing machines offer benefits such as lower operational costs, reduced carbon footprint, and increased accessibility in regions with limited access to electricity. They contribute to enhancing the efficiency and sustainability of coconut processing while promoting environmental friendliness. By capitalizing on the renewable energy potential of the sun, these machines showcase a commitment to efficient and eco-friendly practices, ensuring a brighter and more sustainable future for coconut processing.

4. Solar-Powered Sensor Networks

Solar-powered sensor networks represent a sophisticated and eco-friendly approach to modernizing coconut cultivation. In this technology

solar energy is harnessed to power an array of sensors strategically deployed throughout coconut plantations. These sensors are designed to monitor a spectrum of crucial parameters, including soil moisture levels, temperature variations, and humidity conditions in real-time. By continuously collecting and analyzing data, solar-powered sensor networks empower farmers with actionable insights for precision agriculture. The beauty of this innovation lies not only in its ability to optimize resource management but also in its role in enhancing overall crop health and yield.

These sensors could be deployed for environmental monitoring, agriculture, weather forecasting, infrastructure management, or other applications requiring continuous data collection.Solar-powered sensor networks utilize solar energy to power a network of sensors used for various monitoring purposes.These networks typically consist of sensors equipped with solar panels that convert sunlight into electrical energy. This energy is stored in batteries or capacitors, allowing the sensors to function even during periods without direct sunlight. The sensors collect data such as temperature, humidity, air quality, or specific environmental parameters depending on their purpose. This data is transmitted wirelessly to a central hub or server for analysis and decision-making.

Solar-powered sensor networks offer the advantage of sustainability and autonomy, as they can operate off-grid in remote areas without relying on traditional power sources. They reduce maintenance needs and operational costs while providing real-time data crucial for various industries and research purposes. The reliance on solar energy ensures these networks are self-sustaining and operate efficiently in remote areas, contributing to the accessibility of advanced agricultural technologies. As the agriculture sector adapts to the demands of the future, solar-powered sensor networks emerge as a beacon of sustainability, providing farmers with the tools to make informed decisions and maximize the potential of coconut cultivation.

5. Solar-Powered Lighting for Coconut Farms

Solar-powered lighting systems have become a beacon of innovation in coconut farms, transforming the way farmers illuminate their fields during the night. In this cutting-edge solution, solar panels harness sunlight during the day, storing the energy in batteries, which is then utilized to power efficient LED lighting systems after sunset. Beyond the obvious safety benefits, as illuminated coconut farms reduce the risk of accidents and enhance security, these solar-powered lighting systems also carry significant economic and environmental advantages. By relying on renewable energy, coconut farmers can reduce their dependence on traditional grid electricity, resulting in substantial cost savings and a lower carbon footprint.

These systems incorporate solar panels that capture sunlight and convert it into electricity, which is stored in batteries for use when sunlight is unavailable. LED lights, known for their energy efficiency, are strategically positioned across the

farm, providing illumination while minimizing power consumption. Automated controls often manage these lights, turning them on at dusk and off at dawn, or activating them based on motion detection. This technology offers sustainable, cost-effective lighting solutions for coconut farms, reducing reliance on traditional grid-connected electricity while ensuring essential illumination for nighttime activities. Furthermore, the sustainable nature of these lighting systems aligns with the broader shift toward environmentally conscious agricultural practices. In essence, solar-powered lighting for coconut farms not only brightens the night but also symbolizes a commitment to efficiency, safety, and ecological responsibility in the cultivation of this vital tropical crop.

6. Off-Grid Solar Solutions

Off-grid solar solutions have emerged as a transformative force within coconut cultivation, particularly in remote and isolated plantations where access to traditional power sources is limited. In these off-grid settings, solar energy takes center stage, providing a sustainable and reliable alternative to conventional electricity. Photovoltaic panels capture and store solar energy in batteries, ensuring a continuous power supply for essential operations in coconut cultivation, including water pumping, lighting, and machinery. These off-grid solar solutions not only address the challenges of energy accessibility in remote areas but also contribute to increased self-sufficiency for coconut farmers. By reducing dependency on external power grids and fossil fuels, these solutions offer economic empowerment, cost savings, and environmental sustainability. The integration of off-grid solar solutions with coconut cultivation exemplifies a harmonious synergy between technological innovation and the unique challenges faced by farmers in secluded agricultural landscapes.

Challenges and Considerations

While solar technologies in coconut cultivation offer promising solutions, several challenges and considerations must be navigated for successful implementation. One primary concern is the initial investment costs associated with acquiring solar-powered equipment and systems. While the long-term benefits are evident, the upfront expenses may pose a barrier, especially for small-scale farmers. Maintenance and technical expertise are additional considerations, as ensuring the consistent and efficient performance of solar technologies requires periodic checks and repairs. Moreover, the geographical variability in sunlight intensity and weather patterns can impact the effectiveness of solar solutions, particularly in regions with unpredictable climate conditions. Integration into existing agricultural practices and adapting traditional methods to incorporate solar technologies may also present challenges, necessitating farmer education and training initiatives. Lastly, policy and regulatory frameworks must be conducive to the adoption of solar solutions, including supportive incentives and subsidies. Addressing these challenges and considerations is crucial for the widespread and successful integration of solar technologies into coconut cultivation practices.

Conclusion

In conclusion, the exploration of solar technologies in coconut cultivation unveils a promising trajectory towards sustainable and efficient agricultural practices. From solar-powered irrigation systems ensuring precise water management to innovative post-harvest processing machines reducing operational costs, each facet examined in this review article underscores the transformative potential of harnessing solar energy in the coconut industry. The nuanced applications of these technologies bring to light a synergy between innovation and environmental stewardship, addressing challenges while offering solutions that promote economic viability for farmers. Nevertheless, as we conclude this review, it is imperative to acknowledge the existing challenges – from initial investment costs to considerations of geographic variability and the need for supportive policy frameworks. The path forward lies in collaborative efforts among farmers, policymakers, and the broader agricultural community, fostering awareness, education, and technological advancements. As solar technologies continue to evolve, their integration into coconut cultivation holds the promise of a greener, more resilient, and economically vibrant future for the coconut industry.

Exploring the Global Reach: The Export Dynamics of Indian Coconut Products

Renu P Viswam
Statistical Officer, CDB, Kochi

The export of Indian coconut and coconut products, including coir, has reached an impressive milestone, generating a revenue of Rs. 7500 crores during the fiscal year 2022-23. With approximately 6500 exporters registered with the Coconut Development Board, our export sector has demonstrated remarkable growth and adaptability. These exporters have not only penetrated into newer markets but also diversified product offerings in existing ones, expanding their reach to new geographical locations. These incremental advancements by India's small and medium-scale coconut product exporters have significantly boosted our export economy.

Despite the prevailing geopolitical tensions worldwide and logistical challenges in the Red Sea, compounded by inflationary pressures in major developed nations, there may be a marginal dampening effect on the growth trajectory of the export market. However, as a modest contributor, it is anticipated that India's coconut exports will continue to uphold their share in the export economy during the upcoming fiscal year 2023-24.

India has set a formidable export target of USD 1 trillion by 2030, underscoring its commitment to bolstering international trade. India's Foreign Trade Policy 2023 include a provision for ongoing updates, demonstrating the government's proactive stance towards promoting exports and boosting revenue. This flexibility provides exporters with the assurance that policies can be adjusted promptly to address evolving circumstances, instilling confidence in the export community.

Recent trade agreements, notably with countries such as the UAE, Australia, and most recently the Swiss Confederation, Norway, Iceland, and Liechtenstein, hold significant promise for Indian exporters. These agreements are poised to unlock new markets, presenting abundant opportunities to introduce novel and enticing flavors from India to

diverse regions. As opportunities multiply and the number of registered exporters in the coconut sector continues to rise, there is a pressing need to diversify product offerings beyond fresh coconut to include a range of value-added products. With new avenues opening up and a supportive policy framework in place, Indian exporters are well-positioned to expand their product lines and seize emerging opportunities in the global market.

As per the latest export statistics of export of coconut and coconut products (upto Dec 2023 (2023-24), the export is valued at Rs 2509 crores. Major coconut products exported from India are Activated carbon, Fresh Coconut, Shell Charcoal, Coconut Oil and Desiccated Coconut.

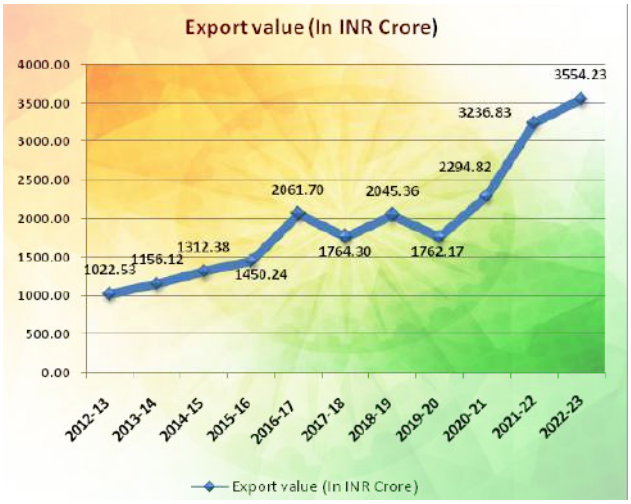
Export revenue from Coconut

Year	Total Exports (in Rs. Crore)*	Coconut Exports including coir (in Rs. Crore)#	% Contribution of Coconut Sector to total exports
2018-19	23,07,726	4,773	0.21
2019-20	22,19,854	4,520	0.20
2020-21	21,59,043	6,074	0.28
2021-22	31,47,021	7,577	0.24
2022-23	36,20,631 (provisional)	7,546	0.21

Source: Reserve Bank of India*
 # Coconut Development Board & Coir Board

Fig. 1

In recent years, the export of coconut products, excluding coir, has experienced a notable surge, accompanied by impressive growth rates in this segment (Fig. 1). Despite this positive trend, Indian coconut exporters have not been able to capture a significant share of the global export market, primarily due to the competitive advantage in pricing and certain duty benefits enjoyed by other South Asian countries such as the Philippines, Srilanka Indonesia, in developed nations like the USA and Europe. However, the implementation of new trade policies and trade agreements presents Indian exporters with opportunities to explore untapped markets and introduce a wider array of value-added products.



The primary contributor to coconut export revenue is activated carbon derived from coconut shell charcoal, accounting for approximately 60% of the total export revenue from coconut. This versatile material is utilized across various sectors, including medicine, water purification, mining, skincare, and as a catalyst in the chemical industry. With a growing emphasis on achieving Sustainable Development Goals, promoting activated carbon from coconut shell charcoal serves as an environmentally friendly alternative to wood charcoal, mitigating deforestation concerns.

Recent demand for export products produced through cleaner and greener processes has catalyzed technological advancements in this sector. As a result, Indian activated carbon derived from coconut shell has emerged as a premier and highly sought-after product in the export market.

Over the past five years, India's major export destinations for activated carbon have included USA, Sri Lanka, Germany, China, Japan, and Russia. Export quantities to these regions have remained consistent. Furthermore, India's export footprint has expanded significantly, with exports now reaching 125 countries compared to 115 countries in 2019-20, indicative of India's successful penetration into newer markets for coconut products.

Among India's notable coconut products exports are fresh coconut, coconut oil, dried coconut, desiccated coconut, and copra. India's major export destinations include the USA, UAE, Germany, the Netherlands, the UK, and other GCC countries such as Oman and Saudi Arabia. Notably, with the Comprehensive Economic Partnership Agreement (CEPA) with the UAE, export to this region has nearly doubled. For instance, from 2018-19 to 2022-23, exports to the UAE surged from Rs. 186 crores to Rs. 390 crores. The UAE stands as India's second-largest trading partner after the USA, signaling promising prospects for exporters awaiting the conclusion of Free Trade Agreement (FTA) discussions with the UK, Oman, and others.

However, India's export competitiveness faces challenges from higher domestic prices in comparison to international price, infrastructural deficits, including inadequate road and sea networks, logistical inefficiencies, technology gaps, and quality control issues. In recent years, concerted efforts have been made to address these obstacles. Significant improvements in the logistics network and the introduction of numerous value-added products have empowered Indian exporters to enhance their competitiveness in the global market. Moreover, a heightened emphasis on quality certification has enabled them to penetrate and capture new markets effectively.

Nevertheless, challenges persist, like the attacks in the Red Sea and the Russia-Ukraine conflict, alongside other geopolitical tensions. These disruptions have led to soaring logistics costs, posing additional hurdles for the export sector. Despite these setbacks, Indian exporters have displayed remarkable resilience, consistently contributing to the growth of the Indian economy. Their ongoing dedication and adaptability underscore their pivotal role in sustaining and advancing India's export sector.

The streamlining of various processes, facilitated by online platforms, has significantly enhanced the ease of doing business for exporters. Processes such as Importer Exporter Code (IEC) application, Registration-cum-Membership Certificate (RCMC) issuance, status holder certificates, amendments, Ice Gate, Duty Drawback, among others, can now be completed online, minimizing hassles and time delays. This digital transformation has automated numerous procedures, reducing costs and transit times, thereby expediting the delivery of products to end consumers or buyers in destination countries. Overall, the adoption of digitalization has proved immensely beneficial for exporters, streamlining operations and enhancing efficiency.

The below figure gives a snap shot wherein countries and products to which export has increased/ decreased in the last five years and products where our exports have increased.

Products	Countries
Activated Carbon Copra Coconut Oil Coconut	USA UAE Sri Lanka Germany Netherlands
Coconut Shell Dried Coconut	Afghanistan Pakistan Russia Japan Oman

Schemes of the Board that exporters can avail under Coconut Development Board are given below :

Coconut Development Board is the designated Export Promotion Council for all coconut products than those made from Husk.

More than 6500 coconut exporters are registered with Coconut Development Board for various coconut products. Export revenue from the coconut sector has been experiencing a significant upward trend in recent years. Inclusive of both coconut and coir products, the sector's contribution to export revenue for the year 2022-23 stands at approximately Rs. 7500 crores.

RCMC Registration

- Gives access to export promotion schemes
- Participation in International Trade fairs, Exhibitions etc
- Claim Benefits /Incentives/Concessions/ Schemes under FTP

India's membership in the International Coconut Community underscores its commitment to global cooperation in the coconut industry. The Coconut Development Board plays a pivotal role in organizing seminars, meetings, exhibitions, and exposure visits as part of its export promotion activities. These initiatives provide a platform for knowledge exchange, networking, and fostering international partnerships.

Furthermore, India frequently hosts international delegations, seminars, and networking events aimed at promoting exports and enhancing collaboration within the coconut industry. Such engagements not only showcase India's capabilities in coconut production and processing but also facilitate valuable interactions between Indian exporters and their international counterparts.

The Coconut Development Board plays a pivotal role in supporting and enhancing the capabilities of exporters in the coconut industry through various initiatives.

Registration cum Membership Certificates (RCMC): The Board issues RCMC, valid for five years, under three categories - Manufacturer Exporter, Merchant cum Manufacturer Exporter, and Merchant Exporter.

The same can be applied through the DGFT website. The current fee for the same is Rs. 5900/-.

Assistance for Participation in International Events: The Board facilitates exporters' participation in major exhibitions, trade fairs, and buyer-seller meets. Registered Manufacturer exporters and Merchant cum Manufacturer Exporters with the CDB can avail assistance under this scheme.

Dissemination of Trade Information: The Board provides vital assistance and data on trade-related queries, FOB prices, destinations, guidance on exporting or entering new markets, as well as information and advice on quality parameters, certifications, packaging, labeling, and updates on trade policies and agreements.

Export Excellence Award: Recognizing the contributions of exporters to the country's economy and the coconut sector, the Board presents the Export Excellence Award. These awards, spanning 12 different categories, acknowledge outstanding achievements with prize money, memento, and citation.

Quality Testing Laboratory: The Board is having a state-of-the-art NABL accredited lab at the CDB Institute of Technology, Aluva, encouraging industries and exporters to conduct quality testing. Additionally, the Board provides training and seminars on quality testing.

Market Intelligence: Regular updates on market prices, export prices, international trends, and production details are provided through the Board's website. Market reviews are also published regularly in the Indian Coconut Journal, offering insights into international prices.

Studies, Surveys, and Market Research: Undertaking studies to assess challenges, prospects, changes, value additions, and the impact of various schemes in areas such as technology, development, market, and policies.

Trainings in Packaging, Branding, Labeling, and Quality Standards: The Board conducts regular trainings, seminars, and workshops on the latest technological advancements in the coconut industry, as well as on packaging and quality parameters.

Coconut Development Board's multifaceted efforts play a crucial role in strengtheningc India's coconut export sector. From facilitating registration and providing financial assistance to exporters, to disseminating trade information and fostering market intelligence, the Board's initiatives are comprehensive and far-reaching. Moreover, with state-of-the-art quality testing laboratory, regular training programs, and market research activities, the Board ensures that exporters are equipped with the necessary tools and knowledge to thrive in the global market.

Nutritional Power of Coconut Neera - Beyond a Health Drink to Food as Medicine

C. Mohankumar, Salini Bhasker, Parvathy S Menon, Hanna Karneena Poulose, Seetha Lakshmi M, Anagha S Nair and Shibin Varghese

Scopeful Bioresearch (SBR), Kribs- Bionest, Kinfra, Hi Tech Park, Kalamassery, Kochi

The commercial potential of coconut palm is unique and different from other tropical crops due to its diversified health products for the existence of human life. Hence, the people of tropical world use the eulogistic epithet, “tree of life” for coconut palms. Coconut palm is an oleaginous crop cultivated in more than 85 countries for the production of edible oil and for the harvesting of coconut neera and sweet toddy from the spadix. As an energy health drink, the nutritional value of Coconut Neera (CN) is unquestionable. Based on the perishable nature of neera, proper scientific care is indispensable in order to prevent the auto fermentation at harvesting and processing level. Otherwise, it deteriorates the quality, which in turn reduces the shelf life of this valuable natural drink. Some of the competent research labs in Kerala have put their efforts for the prevention of innate fermentation of neera during harvesting and processing by physical and chemical measures.However, none of them was fully successful at industrial scale. The unscientific approach during the implementation of anti-fermentation methods and the lack of proper training for technicians may be the possible reason for this lacuna. Moreover, it affects the nutritional quality and natural aroma of this health drink. Altogether, the harvesting, processing and bottling of coconut neera was not satisfactory in Kerala. Moreover, the synthetic drinks gradually suppressed the marketing strategy of coconut neera, even though they are not at all competent with coconut based on its nutritional merits.

In order to overcome these constraints of neera harvesting and processing, the research team of Scopeful Bioresearch (SBR), the biotech company in Bionest, Kinfra Kochi has formulated a different approach in the processing of harvested neera. They standardised a processing protocol of harvesting neera for developing neera concentrate by maintaining all the nutritional quality. A semi-

Figure 1. Condensed Coconut Neera

liquid product of thick consistency and transparent with delicious taste and aroma of natural Neera was developed successfully by SBR with the shelf life of 24 months at room temperature (Fig.1). The protocol has been filed for Indian patent with trade name Nutricon C (NC) (Fig 2.a) and the company has started its production in retail by using the FSSAI license.

Figure 2.a. Nutricon C

The attractive part during the production of Nutricon C is the yield of neera water as the sub product that can be utilised as drinking water by further processing. In every trial of 50L of neera, an amount of 40L of neera water was collected along with the main product Nutricon C (10kg).

Merits of Nutricon C

Nutricon C is readily soluble in water so that the natural neera drink can be prepared by mixing 3-4 teaspoon NC (15-20g) in 100ml water (Fig 2.b). In other words, one bottle of Nutricon C (200g)

Figure 2.b. Neera drink prepared from condensed neera

processed from 1 L of harvested neera can be used for the preparation of 5 bottles of neera drink of 200ml capacity. It is understood from the storage study that the shelf life of Nutricon C was 24 months without diminishing the nutritional quality from the date of manufacture. On par with previous reports on the nutritional composition of processed neera, Nutricon C has 16% moisture with calorie value of 326 Kcal/100 g with rich content of proteins, sugars, essential minerals, vitamins and aminoacids. In the case of minerals, all essential minerals needed for human metabolism like sodium, potassium, calcium, magnesium, iron, zinc, copper and selenium were present in NC. The presence of 18 amino acids inevitable for protein synthesis in body system was observed in NC. Besides the use of NC as a drink, based on the texture, aroma, nutritional value and the delicious taste, NC can be used as a bread spread as well as for preparation of protein rich jams with the trade name 'Protee Jam' without preservatives unlike the conventional jam preparation. Using NC, SBR has developed the protocol of preparing 8 types of jams using the fruits gooseberry, fig, peanut, banana, pineapple, cashew nut, chocolates and that are not popular today in jam industry (Fig 3.a & b). More over the nutritional value of NC was exploited by SBR in developing a herbal formula in

Figure 3.a. Jams prepared from Nutricon C (Protee Jams)- Peanut, Pineapple, Dates & Cashew nuts

Figure 3.b. Protee Jams – Chocolate, Banana, Gooseberry

consultation with Dhanwanthari, the pioneers in Ayurveda for increasing intelligence, immunity and memory in children and the product is labelled as the trade name 'DeliKids' (Fig4.). Thus, the potential of preparing diversified nutraceuticals and dietary supplements from Nutricon C (condensed neera) is enormous which may develop a different commercial platform in Neera industry.

Figure 4. Delikids- A nutraceutical from Nutricon C

Quality analysis of Nutricon C

Regarding the profile of vitamins in NC, it contains Vitamin A (Retinol), Vitamin B1 (Thiamine), Vitamin B2 (Riboflavin), Vitamin B3 (Niacin), Vitamin B5 (Pantothenic Acid), Vitamin B6 (Pyridoxine) Vitamin B7 (Biotin) Vitamin B9 (Folic acid), Vitamin B12 (cyanocobalamin) and Vitamin C (Ascorbic acid). Further microanalysis of NC at SBR has shown the presence of two essential nutrients - Vitamin D3 (cholecalciferol- the 'sun shine' vitamin) and the amino acid Taurine.

Vitamin D in Nutricon C

This is the first-time report indicating the presence of vitamin D3 in Nutricon C. It is estimated that NC contains 400 IU (10µg) Vitamin D3 per 100g NC. Vitamin D3 content in NC makes it an essential one for human metabolism for children and adults. Except fortified drinks, milk (cow, buffalo, goat) the

presence of Vitamin D3 in other natural drinks is highly negligible. It has been reported that human system requires 10-15µg (400-600 IU) Vitamin D3 per day. Vitamin D3 deficiency is a global threat of 50% of the human population hence it has become an important public health issue. Emerging research supports the physiological role of Vitamin D3 in strengthening bones, muscles and activates immune system. Vitamin D3 also increases the absorption of calcium by the body.

Taurine in Nutricon C

Taurine is a β-amino acid, with diverse cytoprotective activities. In human metabolism it is an essential nutrient. Today taurine has been approved for the treatment of heart diseases and other impaired functions of the body. It is estimated that NC has 10-13mg taurine per gram NC. However, Taurine is abundantly found in poultry, meat, seafoods, and dairy products, its presence in plant food and drink is unknown. People who eat meat and seafood have plentiful taurine intake whereas vegetarians consume much less, because plants do not contain taurine in appreciable amounts. As an essential element of the body, taurine is added as a supplement in popular energy drinks for fortifying them by the manufacturing companies. Therefore, the presence of taurine in NC is unique for all the vegetarians as a therapeutic element essential for body metabolism. Taurine plays an essential role in digestion and it helps in liver function properly. It has been reported that taurine has widespread anti-inflammatory action as well as other beneficial effects in the treatment of major diseases like epilepsy, cystic fibrosis and diabetes.

Precisely, Nutricon C is a natural product processed from harvested neera, the wonderful gift from the tree of heaven. Proper scientific research in utilising the therapeutic benefits of neera for the production of its derived products as nutraceuticals and dietary supplements will promote the food industry and Ayurveda to a different scale. Thus, nutraceutical industry especially the development of herbal formulations in Ayurveda sector will certainly promote the economy of coconut farmers of all coconut-growing states in India and other coconut growing countries of tropical word.

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I, Mini Mathew, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Sd/

Date : 01-03-2024

(Mini Mathew)

Inspiring stories from CDB Institute of Technology

Dr. Prabhat Kumar, Dr. B Hanumanthe Gowda and Resmi D. S
CDB, Kochi- 11

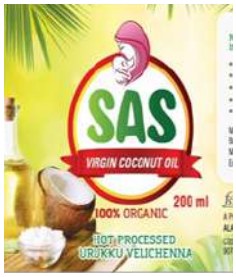
KEERTHY FOOD PRODUCTS

Mrs. Bindu Jayanthilal was born and brought up in Rajasthan and had a career as a teacher in Bihar with her husband. After returning from Rajasthan, due to her passion for agriculture, she bought 4.5 acres of land at Kairady, Palakkad, Kerala. Initially, she started a poultry farm, which was later expanded with Polyhouse, mushroom cultivation, Fish farm etc. After getting trained from CIT, she has initiated production of coconut based products also, mainly Coconut chutney powder with brand name 'Keerthy Food products'. She is now in the path of expansion of her unit by including more machineries and modification of infrastructure for coconut processing it is expected that more coconut value added products under the brand will be produced in the nearby future.

Contact details:
Mrs. Bindu Jayanthilal
Keerthy Bhawan,
Kallamparambilkallam, Kairady,
Nemmara, Palakkad-678510
Contact No. 9961521562

SAS

Mr. Sundaran, Palamuttath a gulf returnee hailing from Mukkom, Kozhikode, Kerala wanted to start an agri based enterprise in his own place. He passionately attended various trainings offered by CIT and decided to start his own VCO unit during



2018 in a small scale level with the brand name 'SAS'. Shri Sundaran claims that his product has got huge demand and appreciation and he is getting orders through various whatsapp groups and social media. He believes that commitment to purity and quality are the reasons for his success. His determination to maintain the quality of the products has helped him to gain trust among his customers.

Contact details:
Mr. Sundaran
Sopanam, Mampatta,
Mukkam (PO),
Kozhikode-673602

VAHINZZ FOOD PRODUCTS

Mrs. Saranya VS, North Paravur, Kerala was working as a Research Assistant. Being inspired by a video about the Training programs of CDB Institute of Technology, she approached CIT and attended four days training during June 2022. From there she got the idea of starting a coconut based business venture. Now, under the brand 'Vahinzz Food products', she is manufacturing Coconut water Lemonade, Curry paste, Activated charcoal tooth powder, turmeric oil etc. She participates in domestic exhibitions and is selling her products in the domestic market.

Contact details:
Mrs. Saranya VS
W/o Renjith PB, Puthezhath(H),
Pattanam, Vadakekkara P.O,
N.Paravur-683522
Contact No. 9544485699

MIRIYAM

Mrs. Swapna Shelton, Kottekkad, Thrissur was having a stitching unit and was earning a nominal income from her unit. In search of an enterprise which could improve her income, she came to know about the trainings at CIT and attended a four days training on Coconut Food Products from CIT during October, 2022.

Based on the skills and confidence gained from the 4 days training programme, she soon started producing coconut based products utilizing the vessels and scraper available at her home. She mainly focused on Virgin Coconut Oil made from the milk of fully matured coconut. In order to utilize the leftover kernel, she started preparing Coconut based chutney powder and Coconut water was converted to squash. She is also producing pickles, dried powder, curry mixes etc. Her products are having high demand in the market and later on she installed few machineries like scraper, coconut milk extractor, VCO cooker and roasting machine by availing loan from a bank.

The products are marketed in the brand name 'MIRIYAM'. She sells her products through direct marketing to customers. Thus Mrs. Swapna has set a good model as a household entrepreneur.

Contact details:
Mrs. Swapna Shelton
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Contact No. 9497457929,
7558080064

PRADHANI SONS

Mrs. Shamila Abdul Khader, a 60 years old women entrepreneur is a true inspiration for all the women entrepreneurs and reminds us that age is not a barrier for anyone to be successful in life. Shamila has attended the CIT training programme during December 2021. Being motivated by the 4 days' programme, she was able to start a small venture producing Virgin Coconut Oil, Coconut Pickle, Tender Coconut Jam, Coconut Chutney Powder, Coconut Lemonade etc.

The products were marketed under the brand name 'PRADHANI SONS', Customers directly purchases the products from her owing to its quality. She also sells it through her own shop and nearby shops also.

Contact details:
Mrs. Shamila Abdul Khader
Pradhaniveedu, Vaniyampara,
Thrissur
Phone No. 9497826883

NANDANAM AGRO FOOD INDUSTRIES

Mr. Narendran C from Oorakam, Thrissur, Kerala, after his retirement from the marketing division of Nestle Food Products, started a food based business venture. Being attracted by the goodness and benefits of Coconut, he started searching for the training and opportunities in this field where he came to know about the training programs offered

by CDB Institute of Technology. He attended a one day program during January, 2021.

Based on the technical skills and confidence gained from the training, he started his own venture with coconut chips and virgin coconut oil. The coconut chips was produced in different flavours of which the chocolate coated chips was in high demand. The left over coconut water was converted to coconut lemonade, which is also in high demand. His Coconut chips is marketed under the brand name 'Kerabyte' and Coconut water lemonade 'Kerafresh'. The products are prepared four times in a week utilizing 50-60 nuts per batch.

Products are sold domestically through Supermarkets & bakeries. Digital marketing is also done through Amazon & Flipkart.

Contact details:
Mr. Narendran
Nandanam Agro Food Industries, Oorakam, Thrissur
Contact No. 9249785197

ZAIN-CO-FOODPRODUCTS

Mrs. SAFNA CI, from Edathala, Thrissur, Kerala is a homemaker turn entrepreneur. Her passion and love for natural products drew her into coconut value addition.

She attended one day training on 'Coconut Food Products' from CIT during June 2022 and with the skills and knowledge acquired from the training, she started producing Virgin Coconut Oil and Roasted Coconut Masalas, Coconut chutney powder and Coconut lemonade by utilizing the byproducts.

The products are marketed under the brand name 'Zain-Co-Food Products'. Products are sold domestically through direct sales and nearby shops.

Contact details:
Mrs. Safna C I
Kochuveedu(H), Malappally, U.K Road, Edathala-683101
Contact No. 9746372566

MALABAR COCONUT FARMER PRODUCER COMPANY

This is the success story of a Farmer Producer Company which turned out to be a major producer of Coconut oil in Calicut. Malabar farmer Producer Company is a consortium of around 1600 shareholders. The FPO was established on 6th April 2021. The company started with the production of copra and coconut oil with capacity of around 10,000 nuts per day. Later on for utilizing the byproducts of coconut oil production, they sought

technical guidance from CIT and attended the training program on coconut value addition. Soon they started producing coconut lemonade and later soft drinks from matured and tender coconut water. They are selling their products domestically through three sales oulets at Kozhikode and through outlets in almost all railway stations in India through OSOP (One Station One Product) Scheme.

NATURE FOODS

Mr. Paul KJ residing at Kumbalangi, Ernakulam, Kerala already had a unit producing traditional snacks of Kerala like achappam, banana chips, coconut chutney powder marketing locally and in the Middle East. His search for unique ways to utilize the wasted Coconut water, the byproduct of chutney powder production directed him to CIT from where he learned the technology for vinegar production from matured coconut water. He is having local as well as export sales for his products. He is supplying his products to NAFED Stall at the CDB Head Quater. premises. *Contact details:*

Mr. Paul KJ
Kannankeril(H), Kumbalangy P.O-682007
Contact No.9400740303

Productivity Concerns and Management Challenges in coconut farming

Lellapalli Rithesh and N. V. Radhakrishnan

Ph.D. Scholar and Professor & Head, Department of Plant Pathology, College of Agriculture, Kerala Agricultural University, Vellayani, Thiruvananthapuram, Kerala, India

Introduction

India, known for its diverse agricultural landscape, has been a significant player in the global coconut market. The coconut, often referred to as the "tree of life," has been a vital part of Indian culture and economy for centuries. It's essential to understand the historical significance of coconuts in India. The coconut palm (*Cocos nucifera*) is not just a tree; it's a symbol of prosperity, sustenance, and cultural heritage. From providing edible copra and oil to offering raw materials for various industries, coconut has been an integral part of the Indian life.

However, in recent times, the coconut industry in India has been facing productivity concerns, declining yields, market dynamics environmental pressures and various other factors impacting coconut cultivation in India. The need of the hour is to address these challenges comprehensively and develop strategies that ensure the long-term viability of coconut farming while preserving its cultural heritage and economic significance. Through collaborative efforts involving government support, research and innovation, and stakeholder engagement, the Indian coconut industry can overcome these challenges and thrive in the dynamic global market landscape. This article analyses the roots of these issues and explore potential strategies for sustainable coconut cultivation.

Productivity Concerns

One of the primary concerns plaguing the coconut industry in India is the declining yields. Several factors contribute to this decline, starting with the prevalence of old and unproductive coconut palms. Many coconut farms in India are home to aged trees that have surpassed their peak productivity, leading to a decline in overall output. Furthermore, the lack of adoption of high-yielding coconut varieties has hindered the industry's potential. While traditional varieties have cultural significance, newer hybrid varieties have been developed to enhance productivity. The slow transition towards these high-yielding varieties poses a significant challenge to the industry's growth.Poor soil fertility and inadequate nutrient management practices can limit coconut growth and productivity. Soil degradation due to erosion, salinity, or chemical imbalances further aggrevates these issues, impacting the overall health and vigor of coconut palms. Moreover, water scarcity and inefficient irrigation practices in certain regions can compromise coconut yield potential, especially during critical growth stages. Addressing these soil and water management challenges is crucial for improving productivity and sustainability in coconut cultivation.

Furthermore, inadequate pest and disease management practices can significantly impact coconut productivity. Pests such as the rhinocerous beetle, spiralling white fly, red palm weevil and diseases like bud rot, root (wilt), and other

phytoplasma diseases can cause substantial damage to coconut palms, reducing both yield and quality of coconut products. Effective pest and disease management strategies, including timely monitoring, early detection, and integrated pest management approaches, are essential for mitigating these risks and ensuring optimal productivity in coconut cultivation. Additionally, investing in research and development to develop disease-resistant coconut varieties and innovative pest control methods can further enhance productivity and resilience in the face of evolving pest and disease pressures. By addressing these multifaceted productivity concerns, the Indian coconut industry can unlock its full potential and sustainably meet the growing demand for coconut products both domestically and internationally.

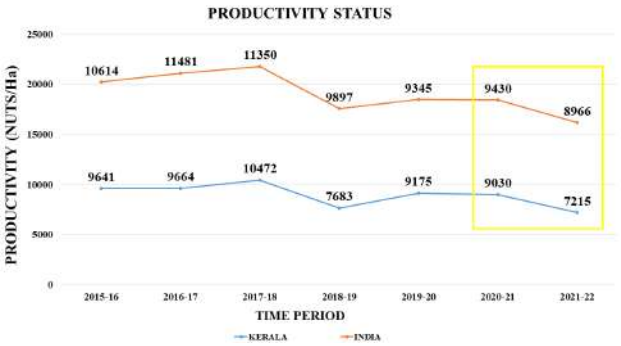


Fig. 1 productivity status of coconut in India and Kerala

Pest and Disease Management

Pest and disease management in coconut cultivation requires a multi-faceted approach that integrates various strategies to effectively mitigate the impact of infestations. Alongside traditional pest control methods, such as chemical pesticides, there is a growing recognition of the importance of integrated pest management (IPM) practices. IPM emphasizes the use of biological control agents, cultural practices, and host plant resistance to manage pest and disease populations while minimizing the reliance on synthetic pesticides. By incorporating natural enemies of pests, such as predators, parasitoids, and pathogens, into pest management strategies, farmers can achieve sustainable pest control outcomes while minimizing environmental risks and preserving ecosystem balance.

However, the successful implementation of IPM practices requires comprehensive education and support for coconut farmers, particularly in areas prone to pest and disease outbreaks. Farmer training programs can play a crucial role in disseminating knowledge about pest and disease identification, monitoring techniques, and the application of IPM strategies. Additionally, extension services can provide on-site technical assistance and advisory support to farmers, helping them adopt and adapt IPM practices to their specific agroecological contexts. Moreover, organizing farmers into clusters or cooperatives facilitates the collective implementation of IPM practices over larger areas, enabling synergies in pest management efforts and enhancing the overall effectiveness of pest and disease management strategies in coconut industry. Through collaborative efforts and capacity-building initiatives, the coconut sector in India can

Fig.2 Major pests and diseases of coconut

better address the challenges posed by pest and disease infestations, safeguarding productivity and sustainability in coconut cultivation.

Climate Change and its Impact on Coconut Cultivation

Climate change poses a multifaceted threat to coconut cultivation beyond just temperature and precipitation changes. One significant impact is the rise in sea levels, which can lead to saltwater intrusion in coastal coconut plantations, rendering the soil unsuitable for cultivation. This not only diminishes the productivity of existing coconut plantations but also restricts the expansion of coconut cultivation into new coastal areas. Furthermore, the increased frequency and intensity of extreme weather events such as cyclones and hurricanes can cause widespread damage to coconut palms. These natural disasters can uproot trees, damage fruiting structures, and spread new diseases and pests, severely impacting coconut yields. The recovery time for coconut palms after such events is lengthy, leading to prolonged periods of reduced productivity and income loss for coconut farmers. Another concerning aspect of climate change is its influence on pest and disease dynamics in coconut plantations. Warmer temperatures create more favorable conditions for the proliferation of new pests. These threats not only directly damage coconut trees but also indirectly affect yield by reducing tree vigor and fruit quality.

Moreover, changes in precipitation patterns contribute to water stress in coconut-growing regions. Drought conditions can lead to reduced water availability for irrigation, affecting the overall health and productivity of coconut palms. Conversely, excessive rainfall, particularly during the flowering and fruiting stages, can result in flower abortion, reduced pollination rates, and increased susceptibility to fungal diseases, ultimately impacting coconut yields. Addressing the impact of climate change on coconut cultivation requires a comprehensive approach that encompasses both mitigation and adaptation strategies. Besides developing climate-resilient coconut varieties through breeding programs, promoting agroforestry practices that integrate coconut cultivation with other resilient crops can enhance the resilience of coconut farming systems. Additionally, adopting water-efficient irrigation techniques, such as drip irrigation and rainwater harvesting, can help mitigate the effects of water stress on coconut plantations. Furthermore, raising awareness among coconut farmers about climate-smart agricultural practices and providing them with access to relevant resources and technologies can empower them to cope with climate change challenges effectively.

Land Use Changes and Urbanization

Rapid urbanization in India is leading to the conversion of agricultural lands into urban areas, shrinking the available land base for coconut cultivation. This reduction in agricultural land not only exacerbates existing productivity concerns but also introduces new environmental stressers such as pollution, soil degradation, and water scarcity. To address these challenges, a comprehensive approach is needed that combines efforts to preserve and expand coconut cultivation areas with innovative farming practices like vertical farming, multiple cropping, and intercropping. These practices can help maximize the productivity of limited land resources while mitigating the impact of land use changes on coconut productivity and environmental sustainability.

In addition to optimizing land use, it's crucial to consider the socio-economic implications for coconut farmers. As urbanization progresses, there may be opportunities to integrate coconut farming into peri-urban landscapes like homestead farming, leveraging urban-rural linkages to sustain coconut cultivation while meeting urban demand for fresh produce. Collaborative efforts between government agencies, research institutions, farmers, and other stakeholders are essential to develop and implement effective strategies for navigating the challenges of rapid urbanization while ensuring the sustainability and resilience of the coconut industry. By adopting a multifaceted approach that addresses land use planning, innovative farming practices, and socio-economic considerations, India can mitigate the adverse effects of urbanization on coconut productivity and livelihoods while promoting environmental sustainability in the agricultural sector.

Market Dynamics and Economic Challenges

The economic challenges faced by coconut farmers in India extend beyond market dynamics to include issues of financial resilience and income stability. Fluctuating market prices not only affect farmer's income but also contribute to income insecurity and financial instability within coconut farming communities. Limited access to markets further exacerbates these challenges, as it restricts farmer's ability to reach broader consumer bases and secure better prices for their products. Moreover, the lack of adequate value addition opportunities in the coconut industry limits farmer's ability to capture additional value from their produce, reducing their overall profitability.

Addressing these economic challenges requires a multifaceted approach that empowers coconut farmers and enhances the economic viability of coconut farming. Cooperative initiatives can play a significant role in empowering farmers by enabling collective bargaining, resource sharing, and access to shared infrastructure and services. Improving market linkages is essential to broaden farmers' access to markets, connect them with buyers, and facilitate fair trade practices. Furthermore, promoting value addition through coconut-based products not only creates additional revenue streams for farmers but also adds value to coconut produce, increasing its competitiveness in the market. Additionally, creating awareness about the nutritional and health benefits of coconut products can stimulate demand, stabilize prices, and contribute to the long-term sustainability of the coconut industry. Through these concerted efforts, the economic resilience of coconut farming communities can be strengthened, ensuring a more stable and prosperous future for coconut farmers in India.

Government Policies and Support

Government policies and support are pivotal in fostering a conducive environment for the sustainable development of the coconut industry in India. In addition to financial support for adopting high-yielding and disease-resistant coconut varieties, the government can incentivize farmers to implement climate-smart agricultural practices that enhance resilience to changing environmental conditions. This may include promoting water-efficient irrigation techniques, encouraging the use of organic fertilizers, and facilitating the adoption of agroforestry systems that integrate coconut cultivation with other crops to enhance biodiversity and ecosystem services. By prioritizing research and development in these areas, policymakers can equip coconut farmers with the tools and knowledge necessary to adapt to evolving agricultural landscapes and mitigate the impacts of climate change on coconut productivity.

Moreover, promoting farmer education and training programs is essential for building the capacity of coconut farmers to adopt modern farming techniques, improve crop management practices, and enhance post-harvest handling and processing methods. Access to credit is another critical aspect of government support, as it enables coconut farmers to invest in inputs, equipment, and infrastructure needed to enhance productivity and profitability. Strengthening agricultural extension services is equally important in ensuring that coconut farmers have access to timely information, technical assistance, and market intelligence to make informed decisions and maximize their agricultural potential. By addressing these various dimensions of support, government policies can empower coconut farmers to overcome challenges, capitalize on opportunities, and contribute to the sustainable growth of the coconut industry in India.

Conclusion

The challenges facing the coconut industry in India are complex and multifaceted, requiring a holistic and collaborative approach for sustainable solutions. By addressing productivity concerns, implementing effective pest and disease management strategies, adapting to climate change and promoting economic resilience, the coconut industry can thrive in the face of adversity. Sustainable coconut cultivation is not just a necessity for the livelihoods of millions of coconut farmers but also crucial for preserving India's rich agricultural heritage. As stakeholders across the coconut value chain come together, there is hope that the coconut palm, the symbol of life and prosperity, will continue to thrive and contribute to the Nation's agricultural and economic growth.

Coconut Macaroons

Coconut macaroons are a type of drop cookie, consisting of a mound of shredded coconut held together with egg whites, sweetened condensed milk, coconut milk etc. Coconut macaroons are perfect balance of tempting textures and delicious taste with soft and chewy inside and crisp and golden outside. Normally macaroons have less number of ingredients and they are also simple and natural. Coconut macaroons are gluten free and it contains Medium Chain Triglycerides known as MCTs. MCTs are easily absorbed in digestion process and they also help other food nutrients in the process of absorption.

Ingredients	Quantity
Shredded coconut	60 g
Desiccated coconut powder	30 g
Coconut milk	25 ml
Condensed milk	45 g
Egg white	1 egg
Powdered sugar	20 g
Vanilla extract	1 ml
Sodium bicarbonate(optional)	0.5 g

Method of preparation

• Major ingredient of Coconut macaroon is Shredded Coconut. Shredded coconut is "grated" bits of coconut, usually in long thin strips/strands. Sweetened shredded coconut/coconut flakes are normally preferred. Shredded coconut could be used directly or used after preheating the coconut in an oven for about 20-30 min. The preheating is done to reduce the excess moisture levels, over heating of coconut is not desirable.

• Shredded coconut and desiccated coconut are blended together and mixed thoroughly. Condensed milk and coconut milk is added to the mix.

• Powdered sugar is taken in a glass vessel, egg white is added and mixture is blended well with an electric beater for about 3-4 minutes. A foamy texture is formed. This foamy mix is then folded into the coconut mixture and all ingredients are mixed well.

• Vanilla extract is added to the above mixture. It would reduce the off taste and odour of raw egg and provide a pleasant aroma and flavour. If needed, Sodium bicarbonate, a leavening agent could be added to the mix. It will make the product fluffy and helps in air incorporation.

• All the ingredients are mixed well and the batter is scooped and placed over butter paper and baked at 180˚C for about 30-45 min.

• After baking, macaroons are cooled completely and are packed in airtight packages.

Nutritional Value of Coconut Macaroons cookies	
Parameter	**Value (per 100 g)**
Moisture	16.00 g
Carbohydrate	43.10g
Protein	6.02 g
Fat	30.30 g
Total ash	1.30 g
Crude Fibre	1.71 g

(Coconut Macaroons is developed by CDB Institute of Technology)

Sushri. Shobha Karandlaje inaugurated the new office building of CDB, DSP farm, Abhayapuri

Sushri. Shobha Karandlaje, Minister of State for Agriculture and Farmers Welfare, Government of India, virtually inaugurated the new office building of the Coconut Development Board (CDB) at DSP Farm, Abhayapuri, Assam on 13th March 2024. The Minister commended the Coconut Development Board for its dedicated efforts in improving coconut cultivation in the North Eastern states of India. She encouraged the people of North India to utilize coconut oil for both edible and non-edible purposes, emphasizing its numerous benefits.

Highlighting the significance of DSP farms, the Minister highlighted its role as centers for knowledge dissemination, showcasing advanced scientific practices in coconut cultivation. Through the adoption of innovative technologies and strategic planning, these farms empower farmers with the necessary tools for sustainable socio-economic progress.

Dr. Hanumanathe Gowda, Chief Coconut Development Officer, CDB extended welcome to the attendees, while Dr. Rajat Kumar Pal, Director of CDB, proposed vote of thanks.

Established in 1986-87, the DSP Farm in Abhayapuri, Assam, spans over 40 hectares with 3,927 palms, of which 3,388 are bearing. The newly constructed office building is equipped with modern amenities in line with the principles of 'Digital India'. The facility includes a training room designed to conduct training of farmers from Assam and the Northeast region.

CDB organized State Level Seminar on Aspects and Prospects Of Coconut in Arunachal Pradesh

Coconut Development Board, Regional Office, Guwahati in association with Department of Horticulture, Lower Dibang Valley district organized state level seminar on aspects and prospects of coconut production and value addtion at Adi Giidi Notko Hall, Roing, Lower Dibang Valley district, Arunachal Pradesh on 6th March, 2024. Smt. Soumya Saurabh IAS, Deputy Commissioner, Lower Dibang Valley district was the chief guest of the programme.

Tony Borang, Zilla Parishad Chairperson Lower Dibang valley district, Dr. Rajat Kumar Pal, Director, Coconut Development Board, Regional office, Guwahati, Dr. Sarat Saikia, Principal Scientist, AAU-HRS, Kahikuchi, Guwahati, Shri Gebom Angu, Joint Director Horticulture, Government of Arunachal Pradesh, Shri Kuru Ama, District Horticulture Officer, Roing, Lower Dibang Valley District, Dr. Utpal Baruab, Senior Scientist and Head, KVK Namsai and Dr. Deepanjali Deori, Senior Scientist and Head, KVK Roing attended the programme. Two progressive coconut farmers and Deputy Commissioner of Lower Dibang Valley along with other dignitaries were felicitated during the meeting. An exhibition of coconut value added food products and handicraft items were arranged at the venue. Around 300 participants including famers, scientist, departmental officers and delegates from different departments took part in the programme.

Dr. Rajat Kumar Pal, Director, Coconut Development Board, Regional Office, Guwahati delivered the welcome address. Smt. Soumya Saurabh IAS, Deputy Commissioner, appreciated Coconut Development Board for organizing a State Level Seminar in Lower Dibang Valley district which will encourage the farmers to take up coconut cultivation in the area.

Tony Borang, Zila Parishad Chairperson and Dr. Sarat Saikia, Principal Scientist, AAU-HRS, Kahikuchi spoke during the occasion. In the technical session which followed, Shri Kuru Ama District Horticulture Officer, Lower Dibang Valley, Dr. Sarat Saikia Principal Scientist, Horticultural Research Station, AAU, Kahikuchi, Dr. Utpal Baruah, Senior Scientist and Head, KVK, Namsai, Shri Mridul Talukdar, Horticulture Assistant, Coconut Development Board, Regional Office and Shri Kaushik Das, Field Consultant (Marketing), Coconut Development Board, Regional office, Guwahati spoke on various topics.

State Level Seminar on Aspects and Prospects of Coconut Production and Value Addition in Guwahati

Coconut Development Board, Regional Office, Guwahati organized State Level Seminar on Aspects and Prospects of Coconut Production and Value Addition at Bani Kanta Kakati Auditorium Hall, Srimanta Sankardev Kalakshetra, Panjabari, Guwahati on 29th February, 2024. Shri Atul Bora, Minster of Agriculture, Govt. of Assam was the Chief Guest of the Programme. Shri Ganashyam Das, Executive Member of Bodoland Autonomous Council, Kokrakjhar, Shri Tiranga Bharatiya Bora, Director of Horticulture and Food Processing, Khanapara, Guwahati, Shri Nabin Chandra Roy, General Manager NABARD, Dispur, Guwahati, Dr. Rajesh Kumar, Principal Scientist, ICAR-ATARI, Zone-VI, Kahikuchi, Guwahati, Dr. Pradeep Mahanta, Chief Scientist, Horticulture Research Station, AAU, Kahikuchi, Dr. Alpana Das, Head, CPCRI, Kahikuchi, Guwahati, Dr. Samiran Pathak, Principal Scientist, Horticulture Research Station, Kahikuchi, Guwahati and Dr. Charu Lata Mahanta, Professor, Department of Food Engineering and Technology, Tezpur University, Tezpur attended the programme.

Progressive coconut growers, group leaders, Agriculture Officers and KVK Scientists who have contributed for the development of coconut sector in the state were felicitated with memento during the ocassion. An exhibition of coconut food products was arranged as part of the programme.. 250 participants including farmers, FPC members, entrepreneurs, scientists, departmental officers and delegates from different departments attended the programme.

Dr. Rajat Kumar Pal, Director, Coconut Development Board, Regional Office, Guwahati delivered the welcome address Shri Atul Bora,

Hon'ble Minister of Agriculture, Govt. of Assam in his address said that coconut can be cultivated in Assam similar to South India and that coconut can be a lucrative business in Assam. Shri Nabin Chandra Roy, General Manager, NABARD, Dr. Rajesh Kumar, Principal Scientist, ICAR-ATARI, and Dr. Alpana Das, Head of CPCRI, Kahikuchi spoke during the occasion. Shri Rajesh Kumar, Principal Scientist, ICAR-ATARI, Zone-VI, Kahikuchi, Guwahati chaired the technical session which followed, Dr. Pradip Mahanta, Chief Scientist, Horticultural Research Station, AAU, Kahikuchi, Guwahati spoke on Innovations in Coconut Cultivation Technology, Dr. Samiran Pathak, Principal Scientist, Horticultrual Research Station, Kahikuchi, Guwahati spoke on Integrated Disease and Pest Management of Coconut, Dr. Charu Lata Mahanta, Professor, Department of Food Engineering and Technology, Tezpur University, Tezpur spoke on Scope for value addition in Coconut (Local/National and International Market) and Dr. Rajat Kumar Pal, Director, Coconut Development Board, Regional Office, Guwahati spoke on the present Scenario of Coconut Cultivation in North-East India. Shri Raju Rai, Coconut Development Board, Regional Office, Guwahati proposed vote of thanks.

Exhibitions

Krishi Mela : CDB, Regional Office, Bihar participated in Krishi Mela held from 9th to 11th March 2024 at Chaibasa, Jharkhand. Shri Arjun Munda, Hon'ble Minister of Agriculture and Farmer's Welfare inaugurated the fair.

Agri Tech : CDB, SC, Andhra Pradesh participated in Agri Tech 2024 from 16th to 18th February 2024 at Rajendra Nagar, Hyderabad.

Horti Food Festival : CDB, SC, West Bengal participated in Horti Food Festival 2024 from 17th to 19th February at Netaji Indoor Stadium, West Bengal.

AAHAR : Coconut Development Board, MDIC, New Delhi participated in 38th AAHAR an International Food & Hospitality Exhibition at Pragati Maidan New Delhi from 7th to 11th March 2024.

Krishi Udyan Mela : CDB, SC, West Bengal participated in Krishi Udyan Mela from 15th to 16th February 2024 at BCKVV campus, West Bengal.

Krishi Sammelan

A one day Farmers Meet (Krishi Sammelan) was organized at ICAR-CPCRI Research Centre, Kidu, Karnataka on 11th March 2024. Sushri. Shobha Karandlaje, Hon'ble Minister of State for Agriculture and Farmers Welfare was the Chief Guest of the programme. Around 2000 progressive farmers from various districts attended the mela along with officials from state government, development agencies, FPOs, KVKs and other agencies. Hon'ble Minister in her address highlighted various measures taken by central government to protect the interest of coconut and arecanut farmers of the region to manage the sudden outbreak of certain pest and diseases, the prevailing price fluctuation and for preventing illegal import of commodities from neighboring countries.

Dr. S. K. Singh, Deputy Director General (Hort. Sci.), ICAR, New Delhi presided over the function and urged the farmers to adopt improved technologies in agriculture to reduce the cost of production and tide over the climate crisis. Dr. Prabhat Kumar, CEO, CDB and Horticulture Commissioner Govt. of India called upon farmers to make use of the Coconut

Development Board (CDB) schemes to rejuvenate old gardens with improved high yielding varieties to check declining crop productivity. Vegan population in Europe/America is particularly looking for coconut products and advised the farmers to think of eco-friendly produces, use minimum water and to adopt multi cropping system. Sushri Bhagirathi Murulya, MLA, Sullia, called upon farmers to actively participate in programmes like Krishi Sammelan to learn about new technologies/developmental schemes and reap the benefits. The Mela was attended by Dr. Homey Cheriyan Director DASD, Dr Hanumanthe Gowda CCDO CDB, Shri Kishore Kodgi President CAMPCO and Shri Satish Kalige, Bilinele Ward Member.

Cultivation practices for coconut - April

As the dry hot summer continues in this month, the pest population will be on the rise especially the weather sensitive pests such as black headed caterpillar, rugose spiralling whitefly and nesting whiteflies. Moisture deficit, diminishing relative humidity and rise in temperature favours the outbreak of these aforesaid pests. Coconut palm needs continuous moisture and nutrition for sustaining production and withstanding pressure from pest outbreak. Once the month accelerates population build up of pest coupled with moisture deficit situation would lead to palm ill health thereby reducing yield. Sustenance of palm itself would become very difficult under reduced humidity and rise in temperature. Nut setting gets reduced and palm health would divert for mere survival mechanism than for enhancing yield. Henceforth, the strategies outlined under soil and water management would turn more crucial in the general upkeep of palm health. Palm health management is therefore very crucial for the bio-suppression of black headed caterpillar and rugose spiralling whitefly.

Black headed caterpillar, *Opisina arenosella*

The coconut black headed caterpillar, *Opisina arenosella*, is a major pest prevalent in almost all coconut growing tracts across the country especially along the water bodies during winter. The infested portions get dried and form conspicuous grey patches on the upper surface of the lower fronds. Severe pest damage results in complete drying of middle to inner whorl of fronds leaving a burnt appearance. Presence of black headed caterpillars, webbing of leaflets and occurrence of dried faecal matter on the leaflets are the characteristic features of pest incidence. In the absence of natural enemies in the new area of emergence, the outbreak becomes faster and expands at high speed. Damage results in tremendous reduction in photosynthetic area, decline in rate of production of spikes, increased premature nut fall and retarded growth. Extensive feeding of caterpillars causes a crop loss of 45.4% in terms of nut yield in addition to rendering the fronds unsuitable for thatching and other purposes. Farmers need not panic and this approach is one of the classical examples of successful augmentative biological control suppressed by natural enemies.

Pest infested field

Black headed caterpillar

Goniozus nephantidis

▶ *Management*

- Regular monitoring of palm fronds for pest occurrence in endemic zones.
- Removal and destruction of 2-3 older and dried leaves harbouring various stages of the pest. The leaflets could be burnt to reduce the caterpillar/ pupal population.
- Domestic quarantine should be strengthened by not transporting coconut fronds from pest-infested zone to pest free zone.
- Augmentative release of the larval parasitoids viz., *Goniozus nephantidis* (20 parasitoids per palm) and Bracon brevicornis(30 parasitoids per palm) if the pest stages is at third-instar larvae and above. The pre-pupal parasitoid (*Elasmus nephantidis*) and pupal parasitoid (*Brachymeria nosatoi*) are equally effective in pest suppression and are released at the rates of 49% and 32%, respectively for every 100 pre-pupae and pupae estimated.
- Before releasing, the parasitoids are adequately fed with honey and exposed to host odours (gallery volatiles) for enhancing host searching ability.
- Ensure adequate irrigation and recommended application of nutrients for improvement of palm health.

Rugose Spiralling Whitefly *(Aleurodicus rugioperculatus)*

This period could also witness the establishment of the invasive rugose spiralling whitefly (*Aleurodicus rugioperculatus*) in new areas as well as re-emergence in already reported areas. Presence of whitefly colonies on the lower surface of palm leaflets and appearance of black coloured sooty mould deposits on the upper surface of palm leaflets are characteristic visual symptoms of pest attack. In severe cases, advancement in senescence and drying of old leaflets was observed. Leaflets, petioles and nuts were also attacked by the whitefly pest and a wide array of host plants including banana, bird of paradise, Heliconia sp. were also reported.

▶ *Management*

- In juvenile palms, spraying of water with jet speed could dislodge the whitefly and reduce the feeding as well as breeding potential of the pest.
- Ensure good nutrition and adequate watering to improve the health of juvenile and adult palms
- No insecticide should be used as this causes resurgence of the pest and complete kill of the natural aphelinid parasitoid, *Encarsia guadeloupae.* A pesticide holiday approach is advocated for the build up of the parasitoid.

Rugose spiralling whitefly Parasitized pupae

Encarsia guadeloupae

Sooty mould scavenger beetle

- Installation of yellow sticky traps and conservatory biological control using *E. guadeloupae* could reduce the pest incidence by 70% and enhance parasitism by 80%.
- Habitat preservation of the sooty mould scavenger beetle, *Leiochrinus nilgirianus* could eat away all the sooty moulds deposited on palm leaflets and cleanse them reviving the photosynthetic efficiency of palms.
- A close scrutiny should be made for the presence of other whiteflies including the nesting whiteflies on coconut system.

Nesting whiteflies (Paraleyrodes bondari and Paraleyrodes minei)

In addition to the rugose spiralling whitefly, two more nesting whiteflies (*Paraleyrodes bondari and Paraleyrodes minei*) are found associated with palm leaflets. Nesting whiteflies are smaller in size (1.1 mm) than rugose spiralling whitefly (2.5 mm). The nymphs are flatter with fibreglass like strands emerging form dorsum whereas the nymphs of rugose spiralling whitefly are convex in shape. Adult nesting whiteflies construct bird's nest like brooding chamber and sustains in the chamber. *P. bondari* had X-shaped oblique black marking on wings with two minute projections on rod shaped male genitalia

P. bondari

P minei

Cybocephalus sp.

whereas *P.minei* is devoid of black markings on wings and possesses cock-head like genitalia.

▶ *Management*

- In juvenile palms, spraying of water with jet speed could dislodge the whitefly and reduce the feeding as well as breeding potential of the pest.
- Ensure good nutrition and adequate watering to improve the health of juvenile and adult palms
- Effective nitidulid predators belonging to *Cybocephalus sp.* were observed on the palm system and pesticide holiday is advised for conservation biological control.

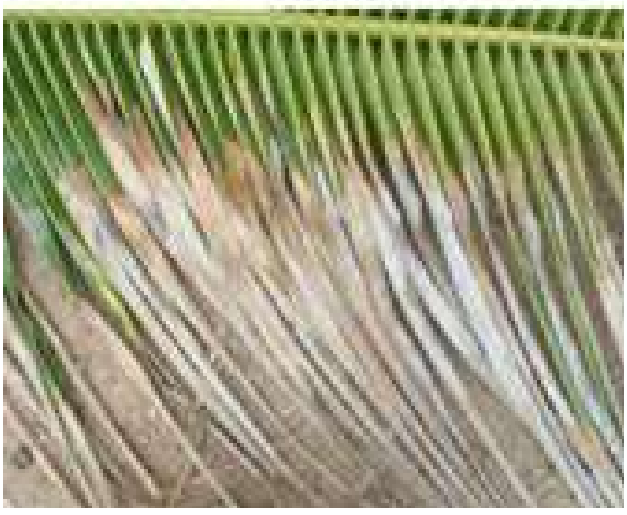
Disease

Leaf blight of coconut *(Lasiodiplodia theobromae)*

Leaf blight is an emerging disease in Coimbatore, Erode, Dindigul, Tirunelveli and Kanyakumari districts of Tamil Nadu. The pathogen causes damage in leaf and nuts. Affected leaflets start drying from the tip downwards and exhibit a charred or burnt appearance. The leaves in lower 3 to 4 whorls are affected. Leaf blight causes apical necrosis of lower leaves with an inverted "V" shape, and symptoms similar to those induced by drought (water deficit) and other stresses. The leaflets have extensive necrotic lesions with defined edges and without transition areas between the necrotic and healthy tissues. The pathogen can internally colonize the rachis, inducing internal necrosis that moves upward towards the stem (systemic invasion). The necrotic tissues develop exposed cracks that release gums under the leaf rachis and at petiole insertion. On coconuts, small black sunken region appear near the perianth of immature nuts. When nearly mature / mature nuts were infected, the infection spread internally into mesocarp without any external symptoms. The affected nuts are desiccated, shrunk, deformed and drop prematurely causing 10% to 25 % loss in nut yield.

▶ *Management*

- Improving the palm health by application of 5 kg neem cake enriched with Trichoderma harzianum and soil test based nutrition.
- Adequate irrigation and adoption of soil and water conservation measures is advised.
- Root feeding of hexaconazole @ 2% (100 ml solution per palm) thrice a year.



The dynamics of insect pests and diseases in coconut system vis-à-vis weather change pattern is so critical in population build up. Timely prophylactic measures to safeguard palms and enhancing palm health through need-based nutrition is very essential to withstand the pressure exerted by pests and diseases in outbreak situation. ■

(Prepared by: Thamban, C. and Subramanian, P., ICAR-CPCRI Kasaragod and Joseph Rajkumar ICAR-CPCRI Regional Station, Kayamkulam)

Market Review – February 2024

Domestic Price

Coconut Oil

During the month of February 2024, the price of coconut oil opened at Rs. 14400 per quintal at Kochi market, Rs.14600 per quintal at Alappuzha market and Rs.16600 per quintal at Kozhikode market.

The price of coconut oil closed at Rs.14200 per quintal at Kochi, Rs.14400 per quintal at Alappuzha market and Rs.16200 per quintal at Kozhikode market with a net loss of Rs. 200 per quintal at Kochi and Alappuzha market and Rs. 400 per quintal at Kozhikode market respectively. During the month, the price of coconut oil in Kerala, showed a downward trend.

During the month, the price of coconut oil at Kangayam market opened at Rs. 11333 per quintal and closed at Rs. 10933 per quintal with a net loss of Rs. 400 per quintal.

Weekly price of coconut oil at major markets Rs/Quintal)				
	Kochi	Alappuzha	Kozhikode	Kangayam
01.02.2024	14400	14600	16600	11333
03.02.2024	14400	14600	16600	11333
10.02.2024	14400	14600	16500	11000
17.02.2024	14300	14500	16300	10933
24.02.2024	14300	14500	16200	11000
29.02.2024	14200	14400	16200	10933

Milling copra

During the month, the price of milling copra opened at Rs. 9600 per quintal at Kochi, Rs. 9550 per quintal at Alappuzha and Rs. 10600 per quintal at Kozhikode market.

The prices of milling copra closed at Rs. 9400 per quintal at Kochi market, Rs. 9450 per quintal at Alappuzha market and Rs. 9700 per quintal at Kozhikode market with a net loss of Rs.200 per quintal at Kochi, Rs. 100 per quintal at Alappuzha market and Rs. 900 per quintal at Kozhikode market respectively.

The price of milling copra at Kangayam market opened at Rs.8500 and closed at Rs.8400 with a net loss of Rs.100 per quintal.

During the month, the price of milling copra showed a downward trend.

Weekly price of Milling Copra at major markets (Rs/Quintal)				
	Kochi	Alappuzha	Kozhikode	Kangayam
01.02.2024	9600	9550	10600	8500
03.02.2024	9600	9650	10600	8500
10.02.2024	9600	9650	10300	8500
17.02.2024	9500	9550	9900	8500
24.02.2024	9500	9550	9800	8400
29.02.2024	9400	9450	9700	8400

Edible copra

During the month the price of Rajpur copra at Kozhikode market opened at Rs. 10400 per quintal expressed a downward trend during the month and closed at Rs. 9800 per quintal with a net loss of Rs. 600 per quintal.

Weekly price of edible copra at Kozhikode market (Rs/Quintal)	
01.02.2024	10400
03.02.2024	10300
10.02.2024	10300
17.02.2024	9800
24.02.2024	9900
29.02.2024	9800

Ball copra

The price of ball copra at Tiptur market opened at Rs. 9500 per quintal and closed at Rs.8600 per quintal with a net loss of Rs.900 per quintal.

Weekly price of Ball copra at major markets in Karnataka (Rs/Quintal) (Sorce: Krishimarata vahini)	
01.02.2024	9500
03.02.2024	9600
10.02.2024	9000
17.02.2024	8000
24.02.2024	8800
29.02.2024	8600

Dry coconut

At Kozhikode market, the price of dry coconut opened at Rs. 11000 per quintal and closed at the same price during the month.

Weekly price of Dry Coconut at Kozhikode market (Rs/Quintal)	
01.02.2024	11000
03.02.2024	11000
10.02.2024	11000
17.02.2024	11000
24.02.2024	11000
29.02.2024	11000

Coconut

At Nedumangad market in Kerala, the price of coconut opened at Rs. 13000 per thousand nuts and closed at the same price during the month.

At Pollachi market in Tamil Nadu, the price of coconut opened Rs. 29500 per ton and closed at Rs. 28500 per ton with a net loss of Rs. 1000 during the month.

At Bangalore market in Karnataka, the price of coconut opened at Rs. 20000 per thousand nuts and the price was almost steady during the month.

At Mangalore market in Karnataka, the price of coconut opened Rs. 36000 per ton and closed at Rs. 32000 per ton with a net loss of Rs.4000 during the month.

Weekly price of coconut at major markets				
	Nedu-mangad (Rs./1000 coconuts)[#]	Pollachi (Rs./ MT) [##]	Bangalore Grade-1 coco-nut, (Rs./ 1000 coconuts) [##]	Mangalore Black coconut (1 tonne) [##]
01.02.2024	13000	29500	20000	36000
03.02.2024	13000	29000	20000	36000
10.02.2024	13000	28250	20000	34000
17.02.2024	13000	28000	20000	32000
24.02.2024	13000	28500	20000	32000
29.02.2024	13000	28500	20000	32000

International price

Coconut

International price and domestic price of coconut oil at different international/ domestic markets are given below.

Weekly price of dehusked coconut with water				
Date	Domestic Price (US$/MT)			
	Philippines	Indonesia	Sri Lanka	India*
03.02.2024	127	198	220	350
10.02.2024	127	198	223	341
17.02.2024	140	205	207	338
24.02.2024	140	205	227	344
				*Pollachi market

Coconut Oil

International price and domestic price of coconut oil at different international/ domestic markets are given below.

Weekly price of coconut oil in major coconut oil producing countries					
	International Price(US$/MT)	Domestic Price(US$/MT)			
	Philippines/ Indonesia (CIF Europe)	Philip-pines	Indo-nesia	Sri Lanka	India*
03.02.2024	1158	1140	NR	1830	1367
10.02.2024	1173	1141	NR	1853	1327
17.02.2024	1184	1141	NR	1808	1319
24.02.2024	1185	1152	NR	1784	1327
					*Kangayam

Copra

The price of copra quoted at different domestic markets in Philippines, Sri Lanka, Indonesia, and India are given below.

Weekly International price of copra in major copra producing countries				
Date	Domestic Price (US$/MT)			
	Philippines	Indonesia	Sri Lanka	India* * Kangayam
03.02.2024	637	656	1077	1025
10.02.2024	637	657	1038	1025
17.02.2024	634	657	1040	1025
24.02.2024	630	667	1061	1013
				* Kangayam

[#](Source: Epaper,Kerala Kaumudi), [##](Source: Star market bulletin)

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