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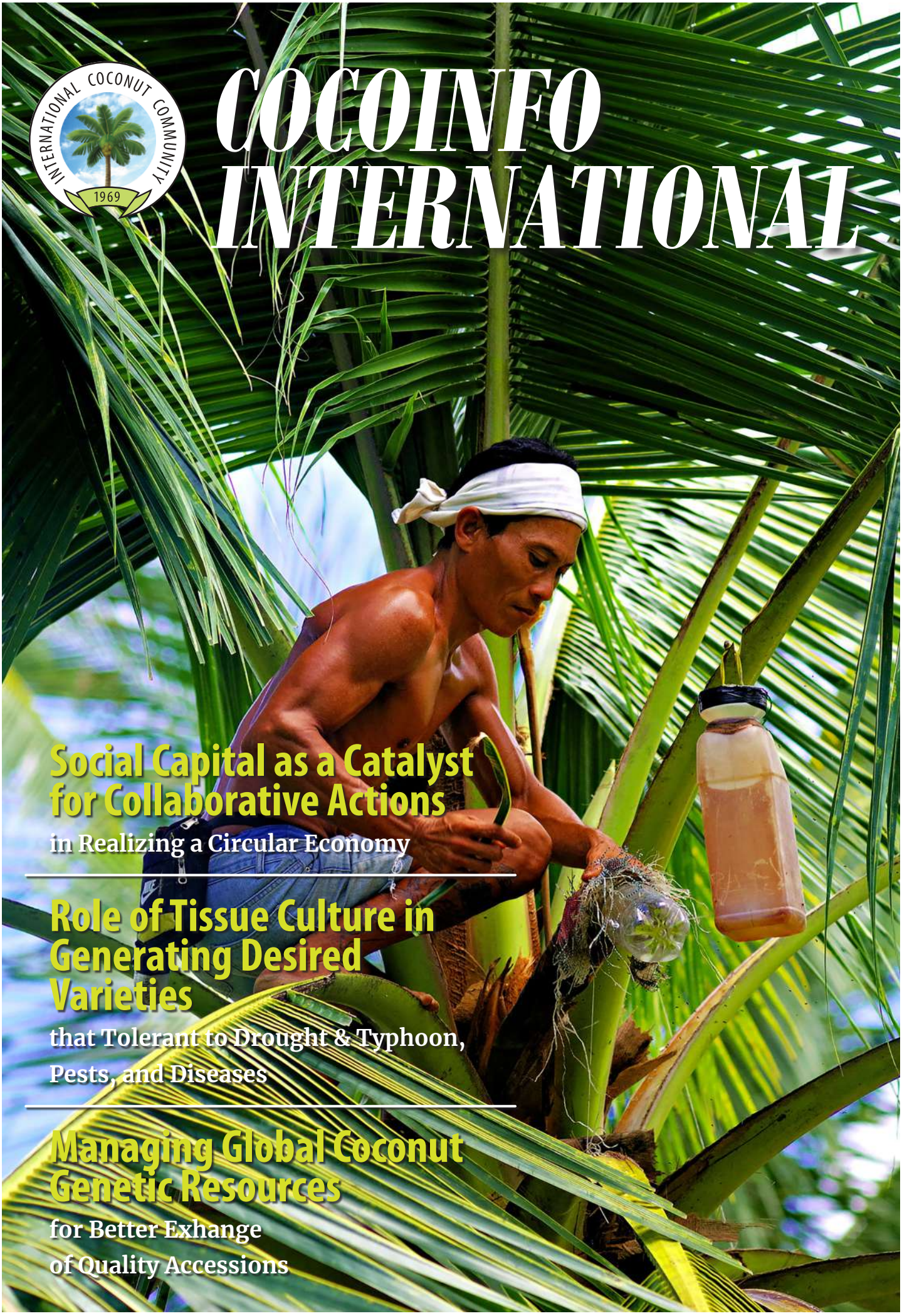

Social Capital as a Catalyst for Collaborative Actions

in Realizing a Circular Economy

Role of Tissue Culture in Generating Desired Varieties

that Tolerant to Drought & Typhoon, Pests, and Diseases

Managing Global Coconut Genetic Resources

for Better Exhange of Quality Accessions

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Nurturing Health and Sustainability through Coconut Innovations

I n this edition, we delve into the realms of health and sustainability within the coconut sector, exploring compelling advancements that go beyond the ordinary. Addressing challenges in coconut production, a breakthrough has emerged from the Philippine Coconut Authority (PCA). Researchers unveil a synthetic coconut variety generated through classical breeding methods supported by SSR markers. Despite debates surrounding the technology, this synthetic variety proves pivotal, offering a solution to the substantial investment required for hybrid seed production. The protocol opens avenues for the assessment and accreditation of coconut plantations, ensuring a robust supply of high-quality planting materials for accelerated planting and replanting programs.

Increasing coconut production is crucial to meet the global demand for coconut products, including coconut sugar. The development of coconut sugar in Indonesia represents a significant exploration into the potential economic and public health benefits derived from this specific product extracted from coconut sap. In recent years, there has been a growing interest in the production of coconut sugar as a viable alternative sweetener, driven by its perceived health benefits and sustainable characteristics. The demand for coconut sugar in the US market has progressively increased, indicating a rising consumer interest in this specific coconut-derived product. These trends underscore the potential for market expansion and the need for sustained production to meet the growing consumer demand for coconut sugar. Thailand and Indonesia are major exporters of this product. From an economic perspective, the processing of coconut sugar provides a potential source of income for farmers and local communities. The demand for healthier and ethically sourced sweeteners has presented an opportunity for coconut-producing regions like Indonesia to diversify their agricultural activities and generate revenue.

The production of coconut products to meet local and global demand has been challenged by pests and diseases. The emergence of invasive whiteflies on coconut palms in India poses a significant challenge to coconut cultivation, prompting the exploration of management strategies, with a particular focus on eco-friendly approaches such as the use of biocontrol agents. Invasive whiteflies have the potential to transmit diseases and reduce overall plant health. Recognizing the ecological sensitivity and the potential harm associated with conventional chemical pesticides, the emphasis in India has shifted toward more sustainable and environmentally friendly methods to manage this pest. The eco-friendly approach to managing invasive whiteflies not only aims to reduce the environmental impact of pest control measures but also aligns with broader principles of sustainable agriculture. By promoting the use of biocontrol agents, the strategy seeks to maintain a balance in the ecosystem, minimizing the disruption caused by invasive pests while avoiding the negative consequences associated with the overuse of chemical pesticides.

As we navigate the intricacies of coconut innovation, from the sweet allure of coconut sugar to eco-friendly pest management and synthetic variety breakthroughs, we envision a future where health and sustainability intertwine seamlessly. May this edition spark curiosity, inspire action, and pave the way for a sweeter, more sustainable coconut sector.

DR. JELFINA C. ALOUW
Director General
Editor-in-Chief

Role of Tissue Culture in Generating Desired Varieties that Tolerant to Drought & Typhoon, Pests, and Diseases

V. R. M. Vidhanaarachchi[1], S. P. N. C. Jayarathna[1], M. T. N. Indrachapa[1], and H. D. M. A. C. Dissanayaka[2]

The production of adequate food for humanity is a priority issue, and there are elevated challenges to agriculture as a result of climate change (Lal, 2005). Coconut being the most vulnerable to climate change, developing and implementing resilience strategies in agriculture to mitigate the effects is urgent for sustainable crop production. Crop productivity can mostly be affected due to retardation of growth and development, deleterious effect on reproductive mechanism, and enhanced favorable conditions to thrive pest and diseases.

The impact of climate change on coconut is considerably high as it has an economic productivity life span of 60-80 years (tall types) and 40-60 years (dwarfs). General warming trends are experienced in most of the coconut growing areas including Sri Lanka (Ranasinghe, 2019). The leading factors to the vulnerability of coconut plantations to adverse climate conditions are soil or atmospheric drought, sensitivity and adaptations of the palms (Ranasinghe et al., 2015). The most critical factors affecting coconut yield were identified as moisture stress at the time of floral primordia initiation and, temperature stress at the time of nut setting (Samarasinghe et al., 2018) and the outbreak of pest and diseases under adverse condition.

TISSUE CULTURE TECHNIQUES FOR DEVELOPING STRESS-TOLERANT COCONUT CULTIVARS

Efforts to develop stress-tolerant plants are of immense importance to increase crop productivity (Nair et al., 2016; Rajagopal et al., 2005). Important agronomic traits such as yield, and tolerance to biotic and abiotic stress factors are known to be controlled by multiple genes, which are also known as quantitative trait loci or QTLs. Efficient selection of plants with multiple favor-

Figure 1. Drought-affected coconut plantation in Sri Lanka

Figure 2. Coconut plantation affected by typhoons in the Philippines

able QTLs from a segregating population is challenging and conventional breeding approaches to produce tolerant seedlings show limited success.

Several breeding programs were undertaken to develop drought-tolerant coconut cultivars, in Sri Lanka, through inter and intra-varietal hybridization. These inter and intra-varietal hybridization attempts failed to develop cultivars withstanding drought and temperature stresses (Samarasinghe et al., 2018). Whereas, the selection of drought-tolerant individual genotypes within populations has been successful in Sri Lanka and these individuals are currently being in use as mother palms to produce Ambakelle Special (AS), a progeny with stable high yield, indicating a better adaptation. (Samarasinghe et al., 2021). However, there is no method to reproduce true-to-type seedlings of these drought-tolerant genotypes.

Similar is the case with Weligama Coconut Leaf Wilt Disease (WCLWD), a phytoplasma disease in Sri Lanka, only Sri Lanka Green Dwarf (SLGD) show high tolerance to this disease. But pure SLGD is not suitable for commercial planting. None of the recommended cultivars or new crosses developed out of the diseased area show complete tolerance to WCLWD under high disease pressure. These studies indicated that the disease tolerance in SLGD is not maternally controlled and may be associated with at least fewer loci. Some Tall and SLGD × Tall hybrid individuals show high tolerance even 15 years after field planting in diseased area, but these genotypes cannot be reproduced through conventional breeding. Multiplication of such tolerant individuals developed through breeding, to produce clones can be achieved through micropropagation.

The unfertilized ovary culture protocol developed by the tissue culture division of the Coconut Research Institute of Sri Lanka (Perera et al., 2009; Vidhanaarachchi et al., 2013) can be used to clone such elite individuals through somatic embryogenesis, without damaging the mother palm. The unfertilized ovary is collected from the inflorescence, which will open in 4 months (-4 inflorescence considering the last opened inflorescence as 0), which is a vegetative (somatic) tissue of the mother palm. Therefore, the unfertilized ovary is identified as a potential explant to produce true-to-type clones of elite genotypes which are bearing and of proven performance. At present high yielding individuals of Sri Lanka Tall and Sri Lanka Green Dwarf (SLGD) cross (CRI 65), selected from field plantations are being cloned using this technology. The resulting clonal plants are being evaluated in research as well as farmer fields. The first clones field established in the year 2016 are now bearing. No phenotypic variations were observed in the field-grown plants. The genetic fidelity of clonal plants with the mother palm was tested using SSR markers. In the future the selected genotypes for drought, pest and disease tolerance will be cloned using this technology.

Cloning coconut using plumule tissue obtained from a mature embryo, through somatic embryogenesis has the potential to multiply nuts of controlled pollination (Pérez-Núñez et al., 2006). Similarly, a recent technology of multiplication of shoot meristem of embryo-derived coconut seedlings also facilitates mass multiplication of seed nuts (Wilms et al., 2021). Both these tissue culture technologies can be used to mass-produce clones of desired crosses. Tissue culture techniques can also employ to eliminate endogenous pathogens during the propagation cycles. Application of antibiotics or thermal treatments are possible to eliminate such pathogens to produce disease-free progenies.

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Figure 3. Healthy Palm

Figure 4. Diseased Palm

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Managing Global Coconut Genetic Resources for Better Exhange of Quality Accessions

Erlene C. Manohar[1], Vincent Johnson[2]

Coconut is known for its socioeconomic importance, and is cultivated in more than 100 tropical countries on more than 12 million hectares. It is also culturally and ecologically valuable to millions who benefit from the coconut industry from raw to processed products, especially smallholder farming communities. The future of the industry is dependent on the continuous cultivation of coconut and associated livelihoods linked to its broad genetic diversity. Sustained investment is needed to build the capacity of various coconut stakeholders and provide resources across the value-chain, particularly for genetic resources conservation. Implementing the global strategy for coconut conservation and use will help enhance the well-being of millions of coconut smallholders worldwide. In 2020, the world produced around 61.5 million tons of coconuts (FAO 2022) mainly for copra, oil, fiber, and 'water', in major coconut-growing countries including India, Indonesia and the Philippines. Moreover, demand for coconut-based products with health benefits is rapidly growing in fast-evolving niche markets. Productivity and quality must increase to supply this growing domestic and international demand. Coconut is also a useful species for mixed and agroforestry production systems, which should be established as part of a more sustainable and resilient global agroecological intensification strategy. Hence, the conservation of productive varieties with high-quality traits and sustained varietal improvement are crucial to the promising future of the coconut industry.

Until now, germplasm conservation has mainly aimed to collect accessions from various countries to protect biodiversity through the *ex-situ* conservation, with less focus on sustainable conservation and exchange for utilization. This necessitates a transformation from the original purpose and cre-

ates the need to prioritize germplasm sharing and utilization for the prosperity of the industry. At the same time, this must be aligned with existing market prospects and competitiveness as major goal sets of the industry. Hence, the need to reflect and realign COGENT's forward direction towards sustainability of managing coconut genetic resources and facilitate the better exchange of the best-performing accessions and their global distribution for their economic utilization.

As the cornerstone of coconut industry development, effective coconut germplasm conservation must underpin the distribution of quality planting materials towards improving and expanding the existing stands of coconut palms and their productivity worldwide. However, this must be geared towards maximizing the productive capacity of coconut farmers, increasing their gained benefits, and strengthening environmental sustainability with improved climate resilience and economic stability of the coconut industry.

The strategic push towards modernizing germplasm conservation must secure coconut-linked livelihoods and effectively address the needs of the industry This strategy is expected to create ripple effects drawing significant attention, interest and participation of farmers in germplasm conservation. These can be in the areas of protection, sustainability of coconut production and livelihoods generation from the crop. Conservation strategies must be multi-level, considering not just collecting accessions but also both farm-level conservation and using coconut germplasm with identified special traits of high-value in the processing sector. Effective coconut conservation is still possible, despite significant challenges due to its physical size, and its nature as a perennial, recalcitrant crop. Given coconut's vast potential and broad diversity, conservation will pay dividends despite the extra efforts needed compared with other crops. Despite the complexity of conservation efforts, there is a need to sustain coconut genetic diversity because of its ecological, cultural and socio-economic value. Over millennia, more than 1500 widely diverse coconut varieties have been identified, and improved varieties have been developed from this single-species genus. Through the support of CGIAR center Bioversity International (now part of the Bioversity-CIAT Alliance, and being integrated into the new One CGIAR) and its partners, and commitments under the ITPGRFA and the contracting parties, *in-situ* and *ex-situ* conservation and exchange for utilization under facilitated terms and conditions were established and maintained through the International Coconut Genebanks (ICGs). ICGs operate under tripartite agreements between Bioversity (COGENT)¬ (originally registered as the International Plant Genetic Resources Institute (IPGRI), and since 2018 COGENT has been transferred to the International Coconut Community), ITPGRFA and the genebank host governments. Recently, the International Coconut Community (ICC) has replaced Bioversity in those tripartite agreements and the National Coconut Genebanks (NCGs) have also participated through membership in the ITPGRFA.

OBJECTIVES OF GERMPLASM CONSERVATION AND EXCHANGE

General: To conserve the vast coconut genetic resources to safeguard genetic diversity and restore declining productivity through the planting of superior quality germplasm and breeding for hybrid production for effective use of coconut genetic resources.

Specific:

1. To **PROVIDE** a perpetual source of germplasm through the collection and conservation of the vast coconut genetic diversity for ecological, cultural, and socioeconomic value.

2. To **IDENTIFY** potential genotypes for use in coconut breeding programs to produce high-yielding resilient varieties/hybrids to boost quality, production and productivity and characterize those with special traits for mass propagation to produce high-value products and climate-change resilient varieties suitable for agro-ecologically intensive production systems.

3. To **ENSURE** coconut diversity protection through practical strategies for conservation and safe movement of germplasm for better exchange and use for industry development of member countries.

KEY ISSUES OF GERMPLASM CONSERVATION AND EXCHANGE

1. Germplasm exchange remains limited due to biosafety issues of pest and disease threats

2. Limited funds for sustainable conservation and management of genebanks and improvements in germplasm exchange

3. Policy blockages and lack of standard operating procedures for more effective and efficient management of coconut collections (ICGS & NCGS)

4. Standardization and optimization of coconut tissue culture and cryopreservation protocols as science-based tools for germplasm conservation, mass propagation and exchange are warranted.

5. Policy issues need addressing to encourage sustainable commitment and accountability of host countries to support genebank management; and

6. Risks to *ex-situ* conservation due to instability of land ownership of the ICGs and NCGs and other threats including pests and diseases and climate change.

PROPOSED KEY STRATEGIES IN MANAGING GLOBAL GENETIC RESOURCES FOR EFFECTIVE GERMPLASM EXCHANGE AND DISTRIBUTION TO MEMBER COUNTRIES

1. **Strict compliance of host countries** of the genebanks (ICGs and NCGs) and donor countries to their agreement under Article 15 of the ITPGRFA for germplasm conservation, exchange, and utilization by fostering synergies and commitment. **Expansion of the ICGs network under Article 15 of the ITPGRFA**. There is a need for a consultation platform with policymakers for harmonization and integration of legislative policies at national and international levels to guarantee institutional agreements. The scope of the consultation platform may expand to sustained management of the genebanks and germplasm movement with reference to biosecurity regulations of importing and donor countries.

2. **Tissue culture and cryopreservation protocol standardization and optimization** as tools in germplasm exchange via clean planting materials and for mass propagation of quality germplasm with special traits. These science-based tools are vital in the conservation and germplasm exchange. However, these upstream research-based technologies (as presented in ICC-COGENT's 2022 coconut tissue culture (CTC) symposium) still require unified direction and prioritization. Technology sharing to capacitate various laboratories of member countries has already been initiated with the recent CTC workshop held in India (May 2022). Despite, the reported advances in CTC and cryopreservation, cohesive efforts to optimize and standardize the protocols remain the top priority. At present, financial resources to support the ultimate goal must be generated. Strategically, COGENT's ITAG4 will engage the private sector through the development of business plans with indicative investment and economic opportunities from these technologies. This will revolutionize the techno-business framework with the engagement of researchers to generate technologies and investors for the provision of investment.

3. **Rejuvenation of the ICGs/NCGs and promoting the use of the conserved germplasm**. Identified germplasm with potential traits for utilization as quality planting materials is vital for breeding programs. These can be used as parent materials in hybridization programs for increasing productivity and boosting quality that will fill the current coconut product demand-supply gap. As reported to COGENT, globally, there are more than a thousand accessions in the 5 ICGs and 19 NCGs, but they are threatened due to a lack of good management practices. Within these collections, superior accessions have been identified and reported with promising traits. Considering the potential and opportunities offered by these genebank collections, improving genebank management and germplasm rejuvenation are the main concern of COGENT-ITAG1. With the provision of staunch support of the host countries of ICGs and NCGs. ACIAR's prompt funding for the 3-year project of supporting the international initiative revitalized COGENT to start the revival of the ailing genebanks. However, with the culmination of the project in December 2022, COGENT's advancing sustainability planning and resource mobilization are top priority next steps. Given ICC's support of the COGENT's Global Strategy through crafting a new Roadmap, recovery is geared towards sustainable genebank management and improved germplasm exchange which are deemed technically feasible and economically viable. This includes agreeing on a biosecurity protocol to allow free and safe movement of germplasm.

4. **Adoption of farmer-participatory** *in-situ* **conservation** to enhance and augment the existing collections through incentivized coconut planting of indigenous germplasm. This scheme will boost the interest of farming communities in conservation and augment germplasm collections. However, this should be in the context of improving productivity and mass propagation of germplasm of high economic value that can be mass propagated for national replanting/planting programs and farmer-led on-farm hybridization schemes.

5. **Technology Pitching** of science-based innovations to mitigate the challenges of managing

sustainable germplasm conservation and exchange. The strategy is intended to support sustainability via potential investments from potential users. With the breakthroughs in CTC, investment opportunities are not far-reaching. Selling the innovations as a solution to the problem and provision of opportunities are the key elements that will attract investment partners. Building a strong sustainability plan with competent experts with known track records of significant achievements can build the trust of potential donors and the private sector that will engage in full development for the use of CTC and cryopreservation protocols in the germplasm conservation and exchange systems.

6. **Enhancing the skills of the research team of ICGs/ NCGs**. The sharing of the CTC protocols for use in the mass propagation and breeding program is a logical approach to improve the conservation management and exchange of genetic resources. Using the conserved germplasm in the genebanks with known quality traits to produce hybrids through the tissue culture will address the needs of the industry to improve global production. Hence, the provision of skills training for researchers in the ICGs/NCGs is necessary. Moreover, improving genebank and data management activities have to be considered for standard data collection and updating the data management system using a user-friendly program. Given these innovations, these can boost the interest of the donor institutions and private sector for business investment. Initial technology transfer and knowledge sharing of CTC was initiated through the ACIAR-funded project in the conduct of the first CTC workshop held in CPCRI, India last May of this year. Forty Junior researchers from member countries of COGENT were trained by the globally renown experts on CTC.

7. **Genetic fidelity testing for the genetic integrity of the plants derived through micropropagation** becomes crucial if genetic transformation studies have to be carried out. Somaclonal variation in tissue culture is a common phenomenon which makes it mandatory to check for genetic stability of the micropropagated germplasms for exchange and distribution. This will guarantee the genetic constitution since coconut is a perennial crop, nurturing the coconut up to the productive stage is a long duration and true-to-type plants must be assured. Risks of somaclonal variation have to be considered in the evaluation of the CTC protocols to be adopted in the formulation of the germplasm exchange process and micropropagation.

8. **Income-generating** initiatives to augment the existing support of host institutions for managing ICGs and NCGs. Added income from intercropping with high-value companion crops, production of high-value products and hybrid production are feasible initiatives that can be undertaken to generate income for augmentation to the management expenses of the ICGs and NCGs. Business plans were be developed to be provided to the ICGs and NCGs for adoption as a component of their sustainability plans.

9. **Ecological considerations on the impact of climate change** with reference to the selection of genotypes with resilience against abiotic stress and tolerance to pests and diseases. Inevitable climate-change impacts will increasingly significantly affect coconut landscapes globally including genebanks. Selection of genotypes that can survive abiotic stresses are good materials for breeding and planting in areas prone to calamities. Such tolerance to pest incursion and disease infection are major parameters in the selection process.

10. **Strategic planning in crafting the COGENT Roadmap** with unified directions and targets set through consultative discussions and interactive brainstorming among ITAG members. Based on the context of the conceptual framework of the global strategic plan of COGENT (Figure 1), there are three key areas of concern that should be aligned to our strategic goal for germplasm conservation and use. The proposed conservation strategies must be aligned with industry needs. Given the vast biodiversity of coconut globally, selection criteria of potential genetic materials for mass propagation and breeding must address the industry challenges of low production and productivity, and search for germplasm with special traits required for market-driven products (i.e. lauric acid content, Glycemic Index etc).

In summary, the components of the framework will focus on priority key areas such as genetic diversity conservation, biosafety/crop protection, mass propagation and capacity building. The ICGs/NCGs must be supported for their effective and sustained management through policy upgrading and agreement compliance. The support of the host countries is crucial for effective genebank management and germplasm exchange for distribution. Harmonized standard operating procedures and biosafety protocol must be established and implemented through the adoption of science-based tools to keep genebank accessions safe and safeguard participating countries from the threat of pest incursion and disease outbreaks. The advancement in CTC technology forms part of the safe movement

and sharing of planting materials among member countries. Similarly, mass propagation, selection and sharing of high-value germplasm is now feasible, given the success of the coconut somatic embryogenesis in the research laboratories of Mexico, the Philippines, Sri Lanka and India. Advances in Belgium on the tissue culture using ICC-COGENT has initiated the sharing of technologies with high-caliber tissue culture experts worldwide to junior researchers of major laboratories engaged in CTC and cryopreservation researches. Thus, the desire for a more effective germplasm exchange and distribution system can be achieved. Nonetheless, this has to be in parallel with the continuing support of partner institutions like ACIAR, DFAT, ITPGRFA, the Crop Trust, One CGIAR and other agencies (national/international) which are of paramount importance in achieving the expected outcomes in the global conservation, exchange and use of the coconut germplasm geared towards industry prosperity.

PRIORITY CONSERVATION AND GERMPLASM EXCHANGE SET-UP PLANS

1. **Setting** and executing the Global Strategic Plan and adopting a workable mechanism to ensure **sustainable germplasm conservation and use** in accordance with Article 15 of the ITPGRFA.

2. **Ensuring an efficient and biosecurity-compliant germplasm exchange** through consultations and formulation of regulatory standard guidelines in coherence with other national and international policies.

3. **Tasking** the ITAGs to accelerate technology development and harmonization of **research outputs** in a unified direction by crafting the Roadmap for the conservation of coconut germplasm and use. This will include developing priority research proposals within a resource management framework and business plans that will boost the private sectors and funding donors investment.

4. **Updating the germplasm data management system** to catalog collections in the ICGs and NCGs as repositories of the global coconut genetic resources.

5. **Promoting opportunities** from conservation and use of germplasm as the foundation of global coconut genetic diversity and perpetual source of **quality planting materials** for mass propagation and hybridization program to address industry needs aligned to the mandate of the International Coconut Community (ICC).

ACTIVITY ASSESSMENT AND REVIEW

Currently, coconut germplasm is only conserved as accessions in one or more of the 24 *ex-situ* field genebanks, comprising local varieties, introductions from other collections, or accessions collected directly abroad. Brazil, Côte d'Ivoire, India, Indonesia, and Papua New Guinea host five international coconut genebanks (ICGs), and 19 national collections (NCGs) are registered. A total of more than 1700 accessions held within the ICGs and NCGs are mostly documented in a Coconut Genetic Resources Database (CGRD), which being migrated and upgraded. All 24 institutions

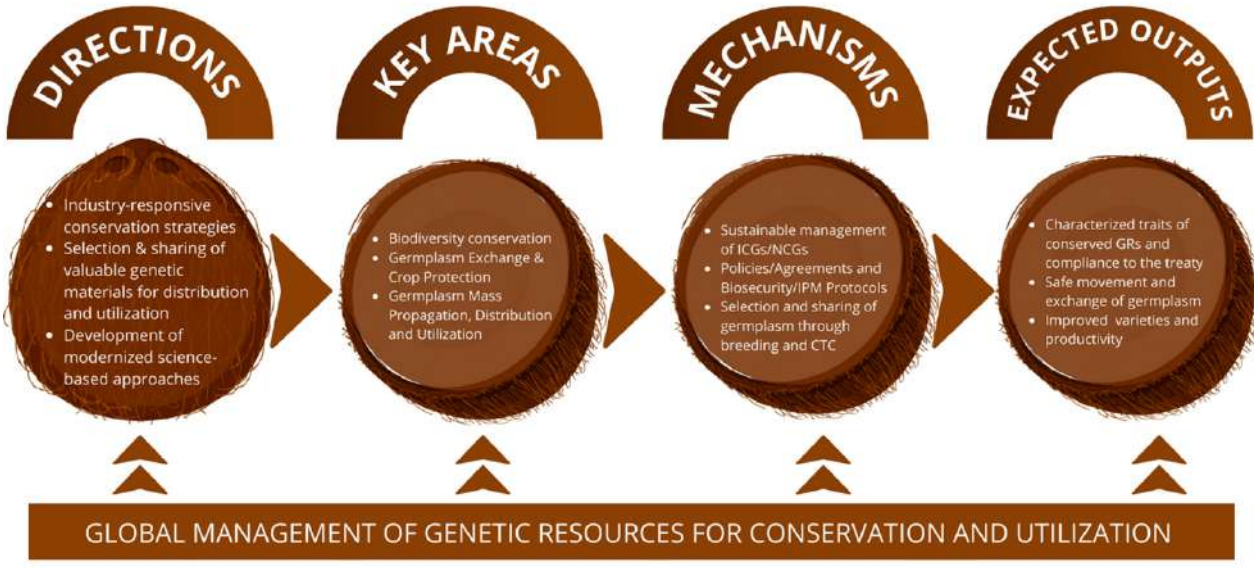

Figure 3. Healthy Palm

managing the *ex-situ* and *in-situ* collections have a government mandate to carry out national coconut research and conservation activities such as: acting as a national repository; maintaining field collections; characterizing and evaluating for important traits; disseminating germplasm information, and providing and exchanging germplasm.

A recent review of the status of *ex-situ* collection management demonstrated wide variations in collection management. Sixty percent (60%) of the collections routinely conduct characterization while all genebanks generate some evaluation and/or characterization data and most collections carry out screening for pest and disease resistance. Few collections manage their germplasm information systematically. Most collections need to better combat genetic erosion, where significant losses are often associated with land-use/tenure issues. Ineffectual controlled hand-pollination causes unwanted mixes between accessions, resulting in useless material being conserved and errors being propagated through germplasm transfers around the world. Most collections are yet to rationalize duplicated accessions, and may require international support for this. Without safety duplication, unique accessions are vulnerable to permanent loss. Some genotypes are unique to one genebank while others are found in more than 15 countries. There is a need to develop and implement a more harmonized genebank management approach using standard operating procedures (based on the updated version of the STANTECH Manual).

A Strategic Planning Process and Management System will be followed in crafting the Road map linked to the key areas of STRATEGIC PLANNING, CAPABILITY DEVELOPMENT PLANNING AND RESOURCE MANAGEMENT wherein gaps and needs can be identified from planning to programming down to budgeting. With this planning process, the strategic direction will be determined for every intervention or programs to be implemented. Likewise, the timeline of programming will be evaluated and prioritized with reference to a budget. These deliverables can be mapped out starting with the development of the ICGs Implementation Plan and ITAGs appropriate interventions/programs based on resources and capability. All of these activities must be synchronized with each ITAG's proposed strategic plan and direction. In this framework, all these activities will be coordinated by the COGENT coordinator with the support of the ICGs and ITAGs through consultation meetings and conferences under the guidance of ICC. Other institutions that have historically supported these activities are also needed by COGENT in its quest for effectively conserving and using coconut genetic resources–including ACIAR CIRAD, FAO, ICC and One CGIAR. There are initiatives already undertaken and planned for the purpose such as the CTC program development. In summary, COGENT needs support to undertake the following activities for sustainable management of germplasm conservation and enhanced germplasm exchange.

KEY AREAS AND PRIORITY ACTIVITIES

Policy Advocacy:

a. Establishment of an Alliance among member countries for better germplasm exchange and full support for sustainable management of ICGs and NCGs.

b. Formulation of standard, harmonized and holistic Standard Operating Procedures (SOP) and biosecurity measures with due consideration of both national and international regulatory policies.

c. Expansion of agreements and ICG host-country compliance with the ITGRFA through consultations with policymakers and host institutions.

d. Institutionalization of policy guidelines for regular ICG and NCG appraisals for monitoring and evaluating accessions' performance and assurance of germplasm protection.

Research and Development:

a. Formulation of marker-assisted selection protocols to identify outstanding heritable traits with reference to yield potential, and suitability of desired marketable target products for mass propagation and hybrid production

b. Creating business opportunities for Coconut Tissue Culture and Cryopreservation R & D Program to boost the interest of donors and the engagement of the private sector.

c. Integration of income-generating initiatives in the genebanks and adoption of farmer-participatory *in-situ* conservation of high-value genetic resources.

d. Provision of science-based tools in the crafting of the international biosecurity protocol.

Coordination and Promotion:

a. Implementation of the Global Strategy Plan (GSP) through the crafting of germplasm conservation

road map of COGENT in adherence with the science-based thematic areas through enhancement of the activities of the ITAGs and provision of support.

b. Organizing scientific conferences, symposia, and workshops with experts in partnership with research institutions including the private sector.

c. Production of publications and website updating for information dissemination.

MILESTONES AND OUTCOMES

Streamlining efforts and priority activities are coherently planned among the ITAGs of COGENT and the support system of ICC and funding institutions is vital. Major areas of concern have been identified through consultations with the experts and ITAG members. ICG appraisals and status evaluations of the major program were comprehensively established. As such, as presented in Table 1, COGENTs strategic plan is articulated with defined expected outputs and target timelines and defined milestones. Research and development support must be focused on developing mechanisms and technologies for effective germplasm exchange, mass propagation and cryopreservation. Sharing and transfer of technologies must be a priority to ensure the continuity of advancement of scientific outputs. New and junior researchers must be capacitated through skills trainings, and synergy among research institutions must be nurtured to accelerate modernized approaches. Program development per ITAG thematic area aligned to industry needs and backed up by science are in the pipeline of the global strategic plan of COGENT. However, these expected outputs can only be achieved with the needed resources. Given the challenges, strategies and resources, milestones in given timelines are achievable through synergy and commitment of the key players supported by international and national policies.

Identified milestones are aligned with the global perspective of conservation and germplasm exchange that will benefit industry stakeholders of member countries. Within the stated strategies, foremost is the upgrading of the ICGs and NCGs for enhanced management and collection of accessions. An updated germplasm management system must establish a user-friendly data management program for easy and access to information and sharing. A major component of this activity is the capacity building of the curators and the database managers for standard operating protocols for genebank management and harmonized data sets that will be adopted in all genebanks. These are fundamental requirements in breeding activities for the utilization of germplasm with known quality traits to produce hybrids.

Hence, the need to boost an efficient germplasm exchange and distribution to improve access to genetic diversity globally, and maximize the use of broader genetic resources for a sustainable industry. However, challenges facing and gaps within the current programs must be addressed such as R & D support for CTC and cryopreservation technologies to develop tools that will safeguard the exchange of germplasm from one country to another. COGENT has already initiated technology sharing among experts through symposia and trainings/workshops. An R&D program for CTC has already been developed. However, resources must be mobilized, and junior researchers capacitated to promote the continuity of technology development through a succession plan. Pooling of resources and conserving experts for R & D program stability are paramount in developing and implementing a sustainable and long-term global strategic plan for coconut conservation and germplasm exchange to ensure biosafety and continuity of selected accessions' collection and distribution.

COGENT's unwavering initiatives as the international network for conservation under the leadership of ICC will continue promoting coconut germplasm conservation and exchange through coordination, convergence and synergy among countries and donor countries. Webinars, conferences and consultative meetings are the Strategic communication platforms that will heighten awareness among key players and enthusiasts in the coconut industry. With such enormous commitment, COGENT will need the full support of host countries of ICGs/NCGs and the resources from donor institutions to realize the main goal of sustainable prosperity of the coconut industry now and in the future.

ACKNOWLEDGEMENTS

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Special thanks to Ms. Irene Kernot of ACIAR and Dr. Tristan Armstrong of DFAT for their convictions and guidance in our activities and continuous encouragement and hopefully for the possible fund sup-

	2022	2023	2024	2025	2026	Beyond
R&D Support	Efficient germplasm exchange and sustainability of ICG conservation of genetic resources Development of biosafety and germplasm exchange protocols Tissue Culture (Clonal Propagation/ Somatic Embryogenesis) and embrio cryopreservation					
Capacity Building and Promotion	Conduct of trainings, attendance to conferences/ symposia and technical meetings Publication of technical papers, newsletter, proceedings and documentation of technical meetings					
Program Proposal Development	Linking Conservation, Distribution and Utilization of Genetic Resources responsive to the industry needs		Mass Propagation Scheme and Distribution of Genetic Resources of economic importance Farmer-participatory conservation of indigenous populations			
Resource Mobilization & Management	Develop income-generating scheme for sustainability of ICGs and NCGs Submission of project/ program proposals to donor institutions and local funding support to NCGs					
Key Milestones	• Improved management of 5 ICGs and 19 NCGs • Conserved the target accessions per year • Updated the database management • Developed improved varieties responsive to industry needs • Trained ICG curators and staff on database management • Utilized x number of genetic resources for breeding • Engaged participation of junior researchers for succession plan		• Activated the ITAGs and addressed challenges of the R&D projects • Reviewed Biosafety Protocols for germplasm movement • Supported priority R&D projects of ITAGs • Tissue Culture Workshop and Conference • Webinars on CRB, CLY and IPM Symposium • Proposals Submitted and Approved by donors • Published technical papers and newsletter • Secured governmental (ICG hosts) policies and support			

port for the project exit strategies to sustain the outputs and significant outcome of the project. To Daniele Manzella of FAO-PGRFA for his trust and constant advice to COGENT for better management of coconut germplasm conservation and exchange a compliance to the treaty.

To the International Coconut Community for the full confidence in COGENT through the acceptance of the network to continue its functions aligned to the mandate of ICC. To Dr. Alouw and ICC Steering Committee, for sustaining COGENT's activities.

To the members and team leaders of the four ITAGs who have relentlessly pursued the support activities to address the challenges of germplasm conservation and exchange through their research efforts and knowledge sharing to unify the directions of the Global Strategy Plan. Other initiatives were undertaken prior to the transfer of COGENT to ICC through the support of CIRAD and Bioversity-CIAT Alliance and ITPGRFA, COGENT is indebted to these organizations.

[1] *COGENT Coordinator (2021 - 2024)*
[2] *Support Coordinator, COGENT*

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Photo by: Anjana Atapattu (Sri Lanka), World Coconut Day Competition

Multisector Collaboration, Climate Change Adaptation & Mitigation Research and Innovation Policy and Program of Coconut Industry in Indonesia

Boediastoeti Ontowirjo[1]

Indonesia has long experiences as the world's leading coconut producers. Indonesia's coconut production now around 18 million tons, and its contribution to the world coconut production reaches around 29%.

Coconut is usually traded in the form of copra. In the last five years, Indonesia's copra production averaged 2.859 million tons per year. Production is relatively stable, minimum 2.840 million tons in 2019 and maximum 2.858 million tons in 2020 (Figure 1). The figure shows the areas of coconut plantation are slightly reducing and the production is relatively stable.

In addition, according to the Ministry of Agriculture of Indonesia's data, it is estimated that production in 2022 will increase to 2.860 million tons on an area of 3.330 million hectares. By having those numbers, productivity in the coconut industry is expected to be 1,140 Kg/Ha.

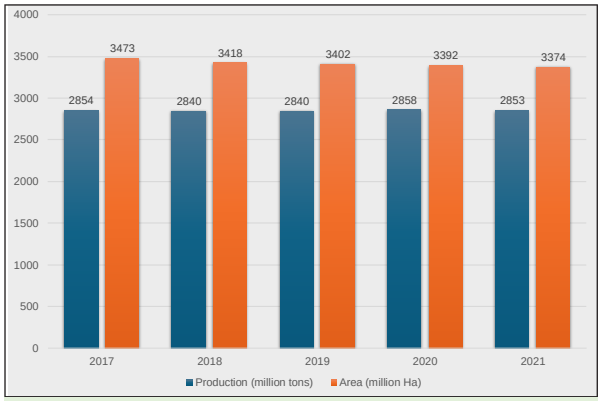

Figure 1. Coconut Plantation Area and Copra Production 2017 – 2021. Source: Directorate General of Estate Corp, Ministry of Agriculture of Indonesia, 2022

Now a days, due to the impact of climate change on land's productivity, coconut industries face significant challenges. A Country with majority of smallholders as coconut producers needs to mitigate the risk of climate change and pays attention to sustainability issues. Indonesia with 99% of coconut producers are smallholders has indicated change in farming system.

In plantation sectors, especially coconut plantations, have unintended impact, such as increases in greenhouse gases (GHG) due to industrial waste and traditional coconut processing. This issue has become a global issue. According to Ministry of Environment and Forestry's data (2019), the agricultural sector accounts for 8 percent of national greenhouse gas (GHG) emissions. According to Zhang et al. (Zhang et al., 2019), it was found a bidirectional causality between agricultural carbon emission and agricultural economic growth in both short term and long term.

According to the Intergovernmental Panel on Climate Change /IPCC (2022), total net anthropogenic GHG emissions continued to increase over the 2010–2019 period, as have cumulative net CO_2 emissions since 1850. Average annual GHG emissions during 2010–2019 were higher than in the previous decade, but growth rates between 2010 and 2019 are lower than between 2000 and 2009 (IPCC, 2022; Shukla et al., 2022).

In the field of research, BRIN has developed research and innovation policy and program to mitigate the risk of climate change to coconut industries. The policy and program are aiming to discover suitable technology that could adapt to climate change and sustainability issues.

The research was carried out in accordance with the Presidential Decree on National Research Master Plan (RIRN) 2017- 2045. In the 2017-2019 period, the research priority is applied research on natural resources, followed by the priority for advanced research on natural resources in 2020-2024.

Long term research plan within RIRN is incorporated into the five-yearly National Research Priorities (PRN). One of the research priorities is food security. In 2020- 2024, research in this field is aiming to increase value added and competitiveness of export-oriented plantation and forestry products through production technology innovation, post-harvest, processing, and distribution. Coconut plantation and products are included.

During climate change's threats mentioned above, the International Coconut Community – a UNESCAP intergovernmental organization – pays collective concerns on the productivity and sustainability of coconut industry, particularly on how to increase productivity through improved farming systems, product diversification, and capacity building on market research. Thus, this paper will discuss the economic value of coconut in the Indonesian economy and its linkages with other sectors, followed by an explanation of the research that has been carried out and the programs that will be implemented related to climate change mitigation.

COCONUT AND MULTI SECTORAL LINKAGE IN INDONESIA

The Coconut Contribution in GDP

The share of the coconut sector's GDP (including copra) to the entire plantation sector's GDP is 15.17%. The GDP is calculated using the expenditure approach in demand account of Indonesian I-O Table 2016. The plantation sectors are sugar cane, tobacco, fiber plant, biopharmaceutical plants, rubber, coconut, oil palm, coffee, tea, cocoa, cloves, cashew, and other plantation products.

In term of global trade, Indonesia is considered as a net exporter. The coconut portion of plantation crop exports is 34.22% (Figure 2). The main export products are among others coconut oil, copra, coconut cake, desiccated coconut, shell (oth wood) charcoal, and other processed coconut. In further process, copra is widely used in both food and non-food

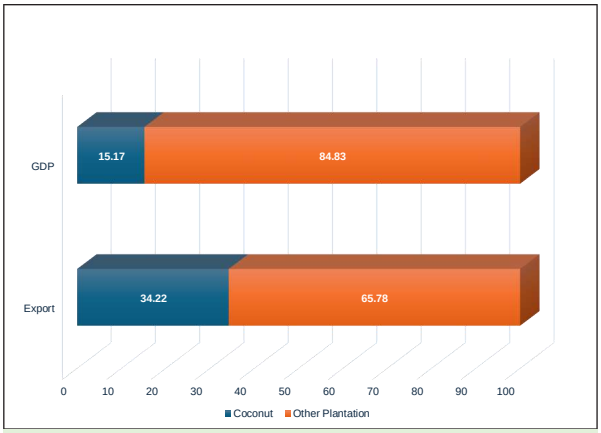

Figure 2. GDP and Export Distribution of Estate Crops, 2016 (%). Source: Indonesian Input-Output Table 2016, 2021

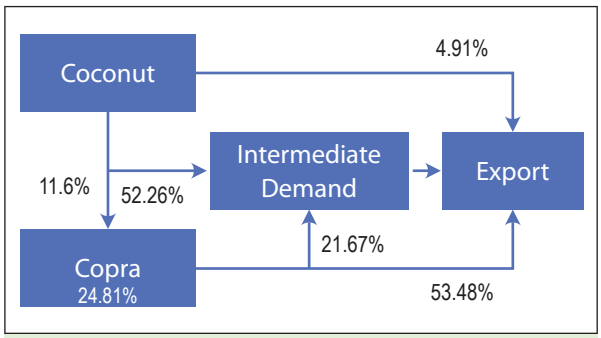

Figure 3. Coconut and Copra Export Based on I-O Table 2016. Source: Indonesian Input-Output Table 2016, 2021

industries. The large portion of coconut exports is due to the large amount of copra exports.

By separating copra from the total amount of coconut export, parts of coconut exports are 4.91% of coconut output (product). According to the Input-Output Table, most of the coconut products are distributed to intermediate demand, namely 11.6% for copra and 52.26% for other intermediate demand (Figure 3). The big parts of other intermediate demand mostly are the food industries sector and the food and drink supply sector.

Besides coconut and copra exports, there are many coconut-based commodity exports. Those are crude coconut oil, fraction of coconut oil, semi-finished coconut oil, desiccated and grated coconut, young coconut, other processed coconut, coconut cake, coconut charcoal, raw coconut fiber, and other coconut fiber. The total export value reached around US$ 1,171,840,000.

Sectoral Competition and New Invention

In recent decades there has been a shift in the use of cooking oil from coconut oil to palm oil. This shift also has an impact on shifting land use. In the last ten years, land use for oil palm has increased. On the other hand, land use for coconut plantations has decreased (Figure 4). This figure also shows how smallholder plantations change.

Product inventions are continuing to develop. In term of patent, there are 61 patents relating to coconut production in Indonesia (September 2022). Those inventions in food, material culture, bioenergy, bio-composite, feedstuff, material for cosmetics, paper, and fertilizer. Among 61 inventions, 42 of them (71%) are bioproducts (Table 1).

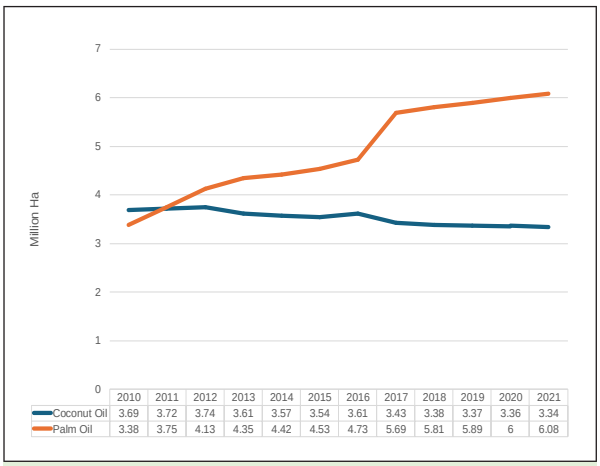

Figure 4. Planted Area of Smallholders Estates: Coconut and Palm Oil 2010-2021. Source: Statistics Indonesia, various years

RESEARCH AND INNOVATION POLICY OF INDONESIA

Research and Innovation become the key to support sustainable development. Development of human capital as well as proficiency in science and technology has been a main pillar of four development pillars to achieve Indonesia vision of 2045. Contribution of research in science and technology to innovation are in the form of capability of science and technology, and collaboration among scholars/universities, government, and private entities/businesses. As a result, it will improve productivity and competitiveness of the country. In order to achieve that, BRIN provides policy direction and strategy to improve resource capabilities in science and technology. Those are (i) science and technology focusing in key research of RIRN to support

Table 1. Invention in Field of Coconut (Sept 2022)

No.	Field of Invention	Number
1.	Cosmetic	2
2.	Medicine	2
3.	Animal feed	3
4.	Foodstuffs	13
5.	Bioenergy	5
6.	Biofilter	1
7.	Biocomposite	4
8.	Biocide	1
9.	Paper	1
10.	Cultur	4
11.	Media	4
12.	Fertilizer	2
13.	Non-bioproducs	19

Source: Directorate General of Intellectual Property, Ministry of Law and Human Rights, 2022

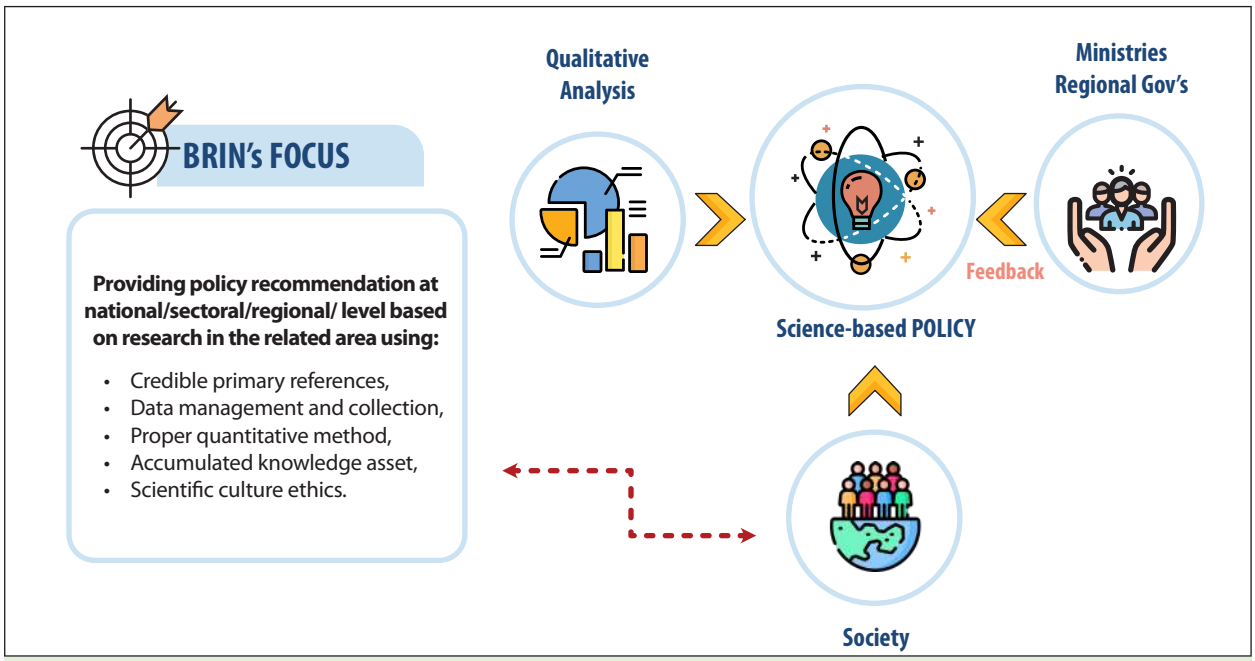

Figure 5. Research and Innovation Policy Concept. Source: BRIN, 2022

sustainable and equitable development; (ii) research and innovation ecosystem; (iii) research power house development; (iv) research funding enhancement both in its amount and quality.

Policies mentioned above are important to avoid failure during the proses of research, invention, innovation, and commercialization. Therefore, research needs interaction with industries or startups as users. BRIN focuses on providing science-based policy platform that could accumulate qualitative analysis, society and government (Figure 5).

RESEARCH AND INNOVATION POLICY FOR CLIMATE CHANGE ADAPTATION AND MITIGATION ON COCONUT PLANT

Reducing Chemical Fertilizer

The use of chemical fertilizers can contribute to GHG emissions that indirectly play a role in climate change. So that, efforts are needed to reduce the use of chemical fertilizers by using organic fertilizers.

Waste from the coconut industries has potential to produce organic fertilizer. The waste is in the form of coconut fiber and coconut water. Coconut coir waste can be used as solid or liquid organic fertilizer and old coconut water waste is used as liquid organic fertilizer. The fertilizer which was derived from coconut coir and old coconut water contain high potassium elements that gives the plant growing better.

Intensification of Coconut Plant

Developing New Superior Coconut Variety
Ideally, coconut varieties are expected to have short trunk, early age, high fruit production, and high yield of palm juice and sugar. However, it is mostly tall type of coconut in Indonesia. The tall type of coconut is about 98% of the total coconut plantation areas (around 3.4 million Ha in 2022).

The coconut research program faces global climate change. Therefore, it needs to assemble coconut varieties that are environmentally friendly, fast in production and high product yields, high value added for coconut farmers, and able to preserve environmental change. Research policies should encourage collaboration between relevant agencies, both nationally and internationally.

To increase national coconut production, from 2004 to 2022 the Palma Crops Research Institute, Balitbangtan (Balit Palma, 2022) has succeeded in releasing 52 superior coconut varieties, and one Genjah Kopyor Cungap Merah variety released by researchers from the Muhammadiyah University of Purwokerto (Sisunandar, 2022). This superior coconut variety consists of 37 types of tall, 10 types of dwarfs, and 6 hybrid coconuts.

Tall Type Coconut
Various varieties of superior coconut have been developed. The Research Institute for Palma Crops has developed 11 new varietas. Those are Mapanget Tall, Tenga Tall, Bali Tall, Palu Tall, Sawarna Tall, Kima

Atas Tall, Banyuwangi Tall, Jepara Tall, Lubuk Pakam Tall, Rennel Tall and Takome Tall.

As a result of cooperation among provincial and district government, there are many local superior varieties that have been developed. Those are Sikka and Adonara Tall (East Nusa Tenggara), Mastutin Tall (West Nusa Tenggara), Kramat, Moluwahu, and Panua Tall (Gorontalo), Buol St-1 (Central Sulawesi), Odeska and Apela Tall (North Sulawesi), Bido and Nui Sua Tall (North Maluku), Lampana Tall (Aceh), Sri Gemilang Tall (Riau), Gambut and Zabak Tall (Jambi), Puan Kalianda Tall (Lampung), Bojong Bulat Tall (Yogyakarta).

Potential yield of these superior coconut varieties is on the range of 2.6 tons - 4.0 tons of copra/ha/year. It is higher than the production of common coconuts variety which is around 0.83 tons of copra/ha/year.

Dwarf Type Coconut
The Indonesian Palmae Crops Research Institute, Ministry of Agriculture of Indonesia, until 2022 has released 9 Dwarfs coconut type. Those are Nias Yellow Dwarf, Bali Yellow Dwarf, Raja Brown Dwarf, Salak Green Dwarf, Kebumen Entok Dwarf, Pandan Wangi Dwarf, Kopyor Green Dwarf, Kopyor Yellow Dwarf and Kopyor Brown Dwarf and Kopyor Red Cungap (Sisunandar, 2022). Some of the Dwarfs varieties can produce fruit around 100-140 nuts/palm/year. The Dwarf coconut varieties are generally used as tender coconut or taping the sap for coconut sugar production.

Hybrid Type Coconut
Crossing of Dwarf and Tall has been experience since 1975 in Indonesia. There are three types of local hybrid coconut. Those are KHINA 1 (Nias Yellow Dwarf crossing with Tenga Tall), KHINA 2 (Nias Yellow Dwarf crossing with Bali Tall) and KHINA 3 (Nias Yellow Dwarf crossing with Palu Tall). Those three types have been released by the Ministry of Agriculture in 1984.

The KHINA hybrid started to first flower at the age of 3-4 years. The copra production is 4-5 tons/Ha/year. Content of copra which is around 300 gr/nut or require 3-4 nuts to produce 1 kg of copra. The oil content of copra is 64%-65% (Novarianto, et al, 1984; Novarianto, et al, 1992).

Balit Palma also released two low input hybrid coconut varieties, namely KHINA-4 (RBD x MTT) and KHINA-5 (BYD x MTT). In early 2019, a new hybrid coconut was released under the name of HENGNIU. The new hybrid could grow fruit earlier (at the age of 3 years). Then, the production of copra is approaching 4 tons/Ha (Novarianto, et al. 2022).

Improving irrigation system
Another effort in future coconut research is to improve the irrigation system. Several irrigation systems have been widely applied in oil palm plantations, so that this kind of irrigation system can also be applied in coconut plantations. Several types of irrigation systems such as sprinkler, drip, and surface irrigation systems (surface irrigation). In selecting an irrigation system, it is necessary to pay attention to several aspects, such as water sources, land topography, cost, and efficiency.

RESEARCH AND INNOVATION POLICY FOR CLIMATE CHANGE ADAPTATION AND MITIGATION ON COCONUT INDUSTRY

Coconut is a social commodity that is spread throughout the archipelago. This plant has various advantages, because all parts can be used both as food and non-food ingredients. Starting from the roots, stems, midribs, leaves/sticks, mayang (bunchs), coir, shells, and coconut water and moreover coconut meat can all be processed into various products, to increase added value. Therefore, the coconut tree is nicknamed The Tree of Life.

The flesh of the coconut is the main part to produce copra, crude coconut oil, desiccated coconut, and coconut milk. Coconut flesh has a very good nutrition, especially medium chain fatty acids (MCFA) and lauric acid (C12). It also contains protein and dietary fiber that is good for health. Therefore, coconut flesh, apart from being used as raw material for cooking oil and Virgin Coconut Oil (VCO), also has the potential to be processed into various food products.

Nira tapped from a bunch of mayang is also a source of raw sugar which has a low glycemic index. Furthermore, the by-product of coconut water is the raw material for processing nata de coco or bio cellulose. So that, it can be further processed into edible films/coatings and biodegradable films that can replace plastic packaging that is not environmentally friendly.

Furthermore, other parts such as stems, midribs, leaves/sticks, coir, shells have been used as raw

materials for processing non- food products, including activated charcoal, liquid smoke, planting media, handicrafts, furniture, and high economic value building materials. Coconut oil/VCO has also been used as a raw material for cosmetics and health products.

With the advancement of the food processing industry, it is estimated that from year to year the demand for edible film/edible coating packaging will increase. In addition, there is a growing trend of consumers who prefer to consume packaged food products because they are aware of more healthy and practical consumption. Therefore, in the field of research, BRIN prepares the following research policy and programs. Those are product diversification and utilizing unprocessed by-products optimally to produce more environmentally friendly products.

Developing Healthy and Environmentally Friendly Food Product diversification

Research in Virgin Coconut Oil (VCO)
Since 2018, The Indonesian Palm Crops Research Institute, Ministry of Agriculture has adopted Direct Micro Expelling-Fluid Bed Dried (DME-FBD) technology. DME-FBD is a method of processing coconut oil/VCO with a drying system in the form of a flat bed. The advantages of this method are healthy and environmentally friendly. Energy from biomass waste, such as shells, coir and wood waste are considered as clean energy.

Current research in VCO has used coconut Mapanget Tall (DMT). It has produced VCO with higher quality compared to the traditional one. That VCO has water content of only 0.07%, free fatty acids just 0.0017%, and a distinctive aroma of fresh coconut (Pradhana, et al. 2019). On the other hand, traditional VCO processed by refining, bleaching, and deodorizing has water content 4,71% and 0,5% free fatty acids. Furthermore, the traditional one requires a long drying time (27 hours). Thus, the research could improve the quality of VCO, mainly natural antioxidants, low water content and low free fatty acids.

Research in VCO-Emulsion
VCO-Emulsion plays a role in reducing total cholesterol levels, LDL cholesterol levels, blood triglyceride levels and increasing blood HDL cholesterol levels. VCO-Emulsion with pineapple juice containing 25% VCO, has a fat content of 26.50% (contains 46.14% lauric acid), 0.07% protein, crude fiber and 0.22% (Rindengan, 2015).

As much as 15% VCO in food product processing, such as Ice Cream-VCO could provide better characteristics. For example, 16.19% fat content, 18.05% lauric acid, 3.41% protein, <10 CFU total microbes and has 305.59 Calories (Rindengan, 2008).

Research in Baby Biscuits
The use of VCO in processing baby biscuits has increased the ability to digest and provide higher calories and Protein Efficiency Ratio (PER). The fat content of the six baby biscuit formulas added with VCO ranged from 25.12 - 28.54%, higher than the Indonesian National Production Standard (SNI) but had the amount of medium chain fatty acids (C8, C10 and C12) (Rindengan, 2014).

Research in Coconut Chip
The use of CaCl2 in processing coconut chips can hold the quality of coconut chip longer. Coco chips are processed by soaking in a CaCl2 solution (0-2%) and packaged in plastic-coated aluminum foil.

The result can hold up to 6 months of storage, the organoleptic characteristics of coco chips are still like 0 months of storage (Rindengan, et al. 2019).

Research in Edible Film
One of the ingredients that trigger environmental pollution is plastic packaging because it cannot decompose quickly. Natural resources that have the potential as raw materials for edible films have been widely used. One of the food products made from coconut water which can be used as raw material for edible films is nata de coco (bacterial cellulose, bio cellulose) because chemically it is classified as cellulose. Bio cellulose is a unique material because the cellulose produced is free of lignin, has high mechanical properties and does not damage the environment (biodegradable) so that it can replace synthetic polymers that are currently widely used.

The formulation of Coconut gel, CMC (carboxymethyl cellulose) and glycerol in a certain ratio, produced an edible film with a thickness of 0.0551 mm, tensile strength 19.0747 Mpa, elongation 18.2618%, water vapor transmission rate 16.878 (g/m2/24 hours) and better brightness values (clear). After being applied as an edible coating on slices of young coconut meat that was packaged in a vacuum, in storage using the Freezer it could reduce the total microbial growth for up to 3 months (Rindengan, et al., 2018).

Developing a Non-Food Product diversification

Research in Preservatives (Liquid Smoke)
Liquid smoke is a result of condensation in the form of liquid from combustion vapors by pyrolysis technique. The vaporized compounds will simultaneously be withdrawn from the hot reactor zone which will then condense in the cooling system.

Liquid smoke is made from incomplete combustion of materials that contain a lot of lignin, cellulose, hemicellulose, and other carbon compounds. Liquid smoke has various functional properties due to the presence of phenol and carbonyl compounds that can give aroma, taste, and color, as a natural preservative because they contain phenol and acid compounds that act as antibacterial and antioxidant. The chemical composition of coconut shell liquid smoke is phenol 5.13%, carbonyl 13.28%, acidity 11.39%.

The advantages of using liquid smoke compared to traditional smoking are its ability to adjust the desired product flavor and remove harmful components before being used in food. Liquid smoke can be widely used in food and fish and meat preservation, which cannot be overcome by traditional methods. In addition, it could be used to reduce pollution (Riadi, 2020).

Research in Coconut Husk Composite Product
Coconut fruit contains about 30% coconut husk. From coconut husk, various household needs can be produced.

Research Center of Biomass and Bioprocess, BRIN conducts research to assist industries. Some researchers are as follows research in producing furniture, composite cups, composite roofs, composite car door trim, and dashboard (Figure 6).

Research in Coconut Shell Activated Carbon Product
Each coconut contains about 20% shell. From coconut shell, activated carbon can be produced which is useful in making cosmetic materials, water filters and air filters. This research is continuously developed by the Research Center of Biomass and Bioprocess, BRIN to meet industries' need (Figure 7).

Research in Low EC Coconut Peat Process

Low EC Coconut peat is created in the process of separating coconut fiber from coconut shells. Coconut peat is often used in agriculture and many industries (Figure 8).

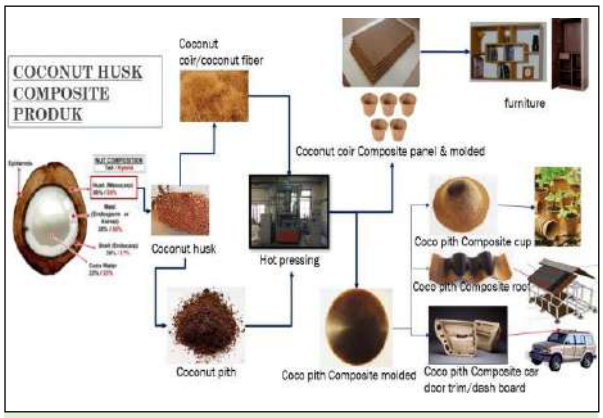

Figure 6. Coconut Husk Composite Product. Source: Research Center of Biomass and Bioprocess - BRIN, 2022

Figure 7. Coconut Shell Activated Carbon Products. Source: Research Center of Biomass and Bioprocess - BRIN, 2022

Research in Coconut Wood Process
Research will cover methods and technologies to process wood or coconut trunks into various building materials. Key research focuses are as follows: (i) research to produce wooden blocks or boards; and (ii) research in a more advanced process to produce wood pallets (Figure 9).

PROGRAM OF COCONUT INDUSTRY IN INDONESIA

To support good coconut cultivation and industry, BRIN conducts programs to develop applied and advanced research. One of which is in the field of developing value added and competitiveness of crops. In this field, research programs will support the aim of national development, especially for food security.

Increasing coconut production at the cultivation and industrial stages should be aware of environmental quality. For this reason, research and innovation policies bring direction to the programs that

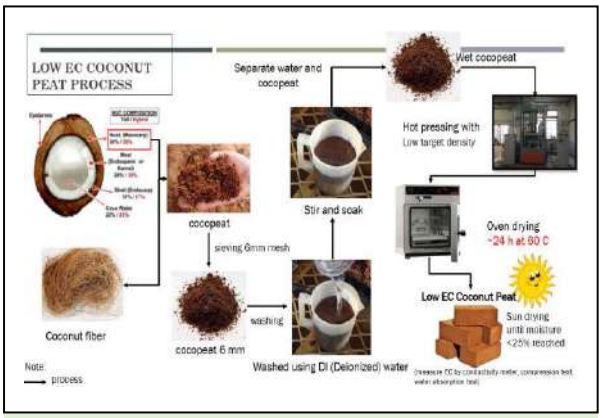

Figure 8. Low EC Coconut Peat Process. Source: Research Center of Biomass and Bioprocess - BRIN, 2022

Figure 9. Coconut Wood Process. Source: Research Center of Biomass and Bioprocess - BRIN, 2022

should be adaptive with climate change mitigation. The following programs are proposed as climate change adaptation and mitigation programs in coconut cultivation and industry.

Research programs on coconut crops are as follows:

1. Selection of accessions and varieties of coconut that has a fast and high CO_2 absorption.
2. Selection and assembly of coconut varieties with high O_2 production potential.
3. Character selection of drought tolerant coconut varieties through photosynthetic components and coconut roots.
4. Technology for identifying Coconut tissue culture that has good quality coconut seeds.
5. Identification of dynamics of land use change and CO_2 emissions in monoculture and intercropping coconut varieties.
6. Management of coconut industry waste in a wise and sustainable way. It covers research in organic fertilizer, animal feed, and biofuel as a substitute for fossil fuels. With wise management, it is expected to reduce methane gas (CH_4) emissions.
7. Rejuvenation and expansion of coconut plantations. It is expected to have larger CO_2 absorption areas and higher water vapor for photosynthesis process.
8. Environmentally friendly cultivation by utilizing organic fertilizers and organic vegetable pesticides.
9. Technology to reduce chemical fertilizer.
10. Farmer behavior adaptation by implementing intercrop cultivation under coconut plants. It will increase profitability of the crops and adaptation to climate change.
11. Determining the right irrigation system for coconut plants in the face of drought due to climate change.

Research programs on coconut products are as follows:

1. Bio cellulose processing technology to produce biodegradable plastic active packaging, enriched with environmentally friendly preservatives,
2. Processing technology for health and beauty masks,
3. Processing technology for charcoal briquettes/ activated charcoal from all coconut plant biomass,
4. VCO advanced processing technology to produce health and cosmetic products,
5. Processing technology for coconut meat and coconut water into functional food and beverages.

The downstream policy implemented by the government in coconut industry also requires collaboration and cooperation from all parties especially coconut industries, farmers community, processing industries, government institutions, private sector, academics, NGOs, MSMEs, researcher and other beneficiary groups) through promotion of research, development, dissemination, and fair trade. Therefore, development of coconut industry in Indonesia could bring high impact and benefit to the people, including coconut farmers, industries, and entrepreneurs.

CONCLUSION

From the description above, coconut is an important plantation commodity in Indonesia. Some people depend on coconut for their livelihood, where coconut plants are spread throughout Indonesia. Utilization of coconut is not only limited to the fruit, but also all parts of the coconut tree. Economic activities from coconut are not limited to cultivation, but also the processing industry, both for food and non-food needs.

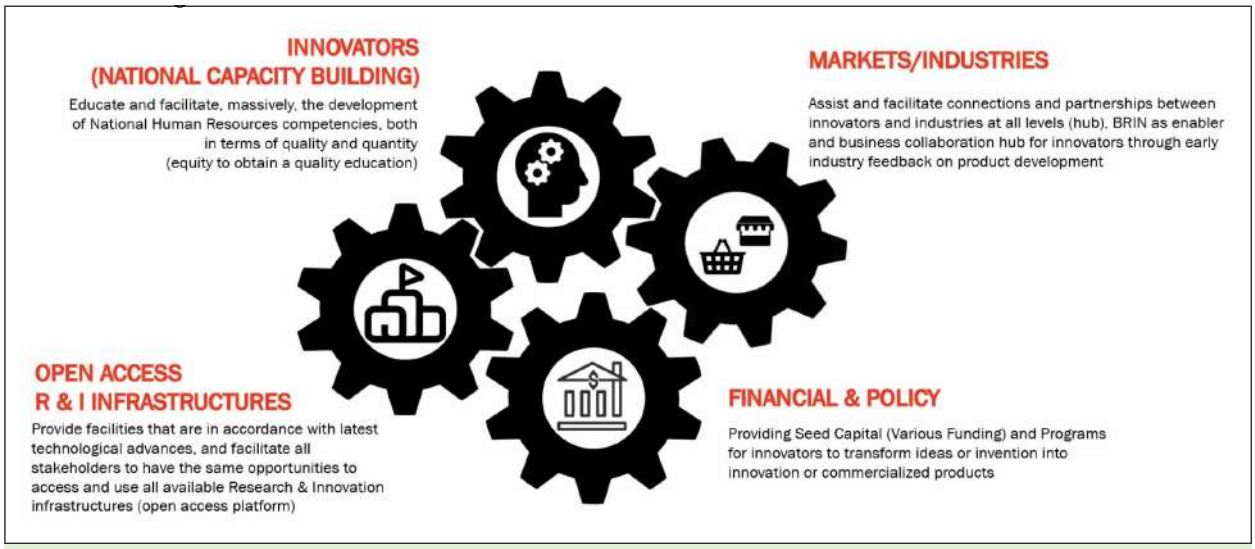

Figure 10. Research and Innovation Ecosystem. Source: BRIN, 2022

As market demand of Indonesian coconut and its products tend to increase domestically and internationally, it is important to have a good research and innovation ecosystem. It will improve the quantity and quality of coconut products. It is also needed to find effective dissemination method of new technologies to farmers and local industries in all provinces in Indonesia to produce marketable and profitable coconut products.

In brief, BRIN creates research and innovation ecosystem available for any kind of plantation, including coconut. The ecosystem covers innovators, open access of research and innovation infrastructure, market/industry, as well as financial and policy (Figure 10).

In the future, coconut research must pay attention to climate change adaptation and mitigation more than in previous years. This applies to all coconut research, both research in the coconut plantation and coconut industry.

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Photo by: Andri Kornelius (Indonesia), World Coconut Day Competition

Social Capital as a Catalyst for Collaborative Actions in Realizing a Circular Economy

Ratu Nabillah[1]

"Humanity has the ability to make development sustainable, ensuring that it meets the needs of the present without compromising the ability of future generations to meet their own needs," is one of the most widely cited definitions of sustainability from WECD (1987). This definition clearly emphasizes the importance of balancing economic, social, and environmental aspects, and the interconnection between them. However, this balance is often not reflected in practice, where the social dimension of sustainable agriculture is frequently overlooked (Janker, 2020; Janker et al., 2019). This neglect is largely due to the challenges in operationalizing and measuring social impacts, which tend to be more complex compared to the economic and environmental aspects that are more easily quantified through precise variables (Akhtar et al., 2024; Ngan et al., 2022).

Nevertheless, a positive trend has emerged recently, with growing awareness of the importance of evaluating the social aspects of sustainable agriculture (Orou Sannou et al., 2023). This evaluation becomes increasingly complex when it involves small-scale farming managed by fragmented, vulnerable entities, many of which are local communities. Without effective oversight mechanisms, small farmers often lack the same opportunities as large-scale, corporate-owned farms (Dhillon & Moncur, 2023). The absence of a unified regulatory body in small-scale agriculture means that decision-making processes tend to arise from a complex framework, where individual decisions are influenced not only by personal preferences but also by the collective dynamics within community structures.

The complexity in managing small-scale agriculture demands more intensive strategic collaboration. This collaboration is not only necessary to improve access to markets and technology but also to strengthen the bargaining position of small farmers, integrate them into broader value chains, and pro-

vide support in facing climate, environmental, and social challenges.

To achieve effective collaboration, social capital emerges as a key element (Medina & Sole-Sedeno, 2023). Social capital, encompassing networks of relationships, trust, and the norms and values within a community, plays a crucial role in fostering cooperation among individuals and groups. Established trust facilitates the exchange of information, resources, and support. In the context of small-scale agriculture, social capital helps farmers build strategic alliances with fellow farmers, local communities, the government, and the private sector. As a result, collaborations founded on social capital are more likely to be not only sustainable but also more resilient in the face of external challenges, such as climate change, market fluctuations, or policy uncertainty.

However, the role of social capital in achieving sustainable agriculture, particularly among small-scale farmers, is not without its challenges. For example, social capital can sometimes lead to nepotism, indirectly limiting access and opportunities for individuals outside the immediate family or close-knit group (Zhang & Li, 2003). Additionally, social capital can restrict individual freedom within the community to be more expressive or innovative, as they are often bound by long-standing traditional norms that are difficult to change.

Research on sustainability metrics has highlighted geography as a key factor influencing the sustainability of a region (Dasgupta et al., 2005). While there are various arguments about the role of social capital in supporting or hindering sustainability assessments, the influence of social capital in specific geographical contexts, particularly in small-scale agriculture, remains underexplored.

Coconut (*Cocos nucifera* L.) is a plantation commodity dominated by small-scale farming worldwide, including in Indonesia. Indragiri Hilir Regency in Riau Province is one of the largest coconut producers in Indonesia, contributing approximately 10.6% of the national production (Indragiri Hilir Statistical Agency, 2021). Geographically, this region is located in the strategic eastern coast of Sumatra, connected to the Malacca Strait trade route and the international corridor of Indonesia, Singapore, and Malaysia. In 2019, around 80,264 coconut farmers managed 261,232 hectares of plantation land (Indragiri Hilir Statistical Agency, 2023).

Beyond its significant economic value, coconut cultivation in Indragiri Hilir also holds deep social and cultural significance, with a history dating back to the 1800s (Cerepak, 2020), reflecting a strong bond between this commodity and the local community. This heritage binds the community through shared values, customs, and traditions, making interactions more than just transactional relationships. In this context, social capital presents an important opportunity to facilitate cooperation among farmers and other alliances, thereby strengthening the position of vulnerable small-scale farmers. The small-scale plantations on geographically isolated peatlands add to the complexity, but they also demonstrate how social capital can serve as a bridge for collaboration that benefits all parties involved.

Based on this background, this semi-academic article aims to frame how social capital can facilitate collaboration, ultimately contributing to the long-term sustainability of the coconut plantation ecosystem on the peatlands of Indragiri Hilir.

METHODS

Research Locations

Out of the 20 sub-districts in Indragiri Hilir, this study focuses on those located in the lowland to hilly areas. The selection is based on the dominance of oil palm plantations (Elaeis guineensis Jacq.) in these hilly regions. In the coastal areas, another consideration for choosing research locations is the presence or absence of large-scale coconut processing industries, which significantly impact raw material competition and the dynamics of the coconut supply chain. Additionally, the study divides the locations into northern and southern regions of Indragiri Hilir, based on initial findings that show differences in the characteristics of coconut plantations and supply chains between these two areas. Based on these criteria, eight sub-districts were selected for the study: Reteh, Batang Tuaka, Tanah Merah, Enok, Pelangiran, Teluk Belengkong, Kateman, and Pulau Burung.

The research locations in the coastal areas were determined based on three main geographical factors. First, accessibility: The region of Indragiri Hilir, which is predominantly covered by peatlands, has limited road infrastructure, hindering transportation and economic activities. Better infrastructure facilitates easier market access and enhances collaboration among farmers, making roads and bridges crucial factors in selecting the locations. Second, plantation conditions: Coastal plantations are more vulnerable to tidal flooding, requiring specific adaptation strate-

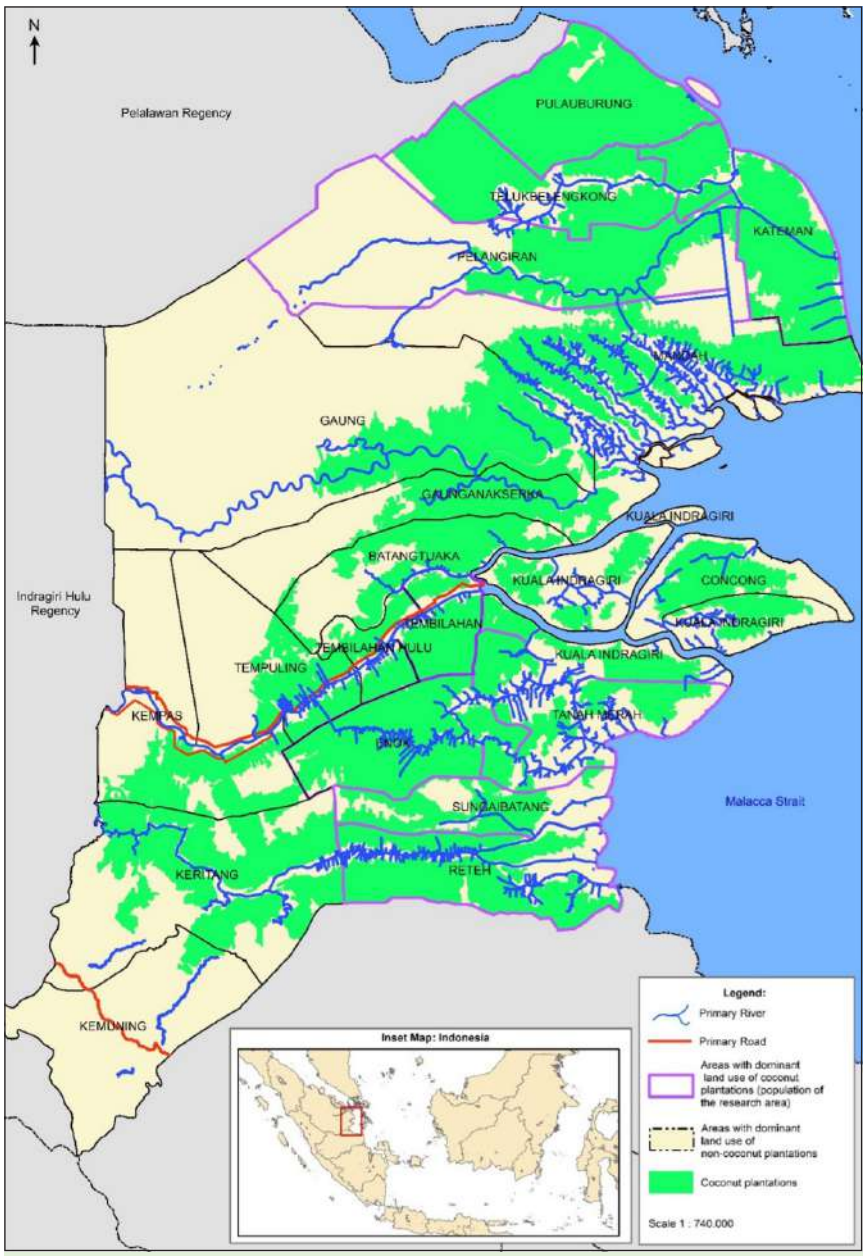

Figure 1. Research locations

gies for sustainability. Third, agricultural management systems: There are two main systems in place—the Villages Cooperative Units (Koperasi Unit Desa/KUDs) system and the farmer-managed system—each offering different dynamics of social capital. These factors serve as the guiding principles for determining the research locations. The distribution of research locations based on these considerations is illustrated in Figure 1.

Data Collection

Data were collected through in-depth interviews and small group discussions. In-depth interviews were conducted to gain a detailed understanding of individual perspectives, experiences, and views regarding the management of social capital and its impact on coconut farming practices. Meanwhile, group discussions provided an opportunity for researchers to observe participant interactions, discuss their views, and evaluate the emerging group dynamics.

The study focuses on coconut producers, including coconut farmers (comprising laborers, landowners, and plantation managers) and middlemen. The selection of these two actors is based on their operation within a flexible system structure and their significant autonomy in decision-making related to agricultural activities. The sampling strategy employed in this study is purposive sampling. For farmers, the criteria include their role in coconut farming, land size, ownership of other businesses, length of involvement in the coconut plantation ecosystem, and historical connection to Indragiri Hilir. Middlemen were selected based on the scale of their business operations. The sampling process follows the principle of saturation, meaning data collection is stopped when no new information emerges during repeated interviews. Group discussions involved 4-6 participants per group, with the number of participants determined through trial sessions to ensure effective discussions lasting between 60 and 120 minutes.

Data Analysis

This study employs a fully qualitative thematic analysis method, consisting of two main stages: coding and narrative development. The process begins with a comprehensive literature review aimed at formulating relevant research questions and establishing initial codes that serve as a foundational framework for further data analysis. After the data are collected through interviews or observations, they are transcribed and simplified to facilitate the analysis process. The

data are then aligned with the initial codes developed from the literature review. These codes are grouped and developed into key themes, considering factors such as frequency of occurrence, patterns of similarity and difference among participants, and their alignment with existing theories in the literature.

Once the preliminary themes are formed, a validation stage is conducted through consultation with other researchers, acting as supervisors or external reviewers, to ensure the accuracy and relevance of the generated themes. The refined themes then become the primary foundation for the discussion in the Results and Analysis section of the study, thereby reflecting structured findings supported by in-depth analysis.

Figure 2. Village officials and the KUD of Manunggal Jaya Village, Pulau Burung sub-district, facilitate the management of coconut plantations to enhance their effectiveness, for instance, through the coordination of harvest and transport schedules

RESULTS

The research findings illustrate how both horizontal and vertical social capital generate various activities that create opportunities for all entities involved.

Horizontal Social Capital

Horizontal social capital among farmers refers to the forms of cooperation that occur between farmers who have equal status and roles within the agricultural system. This collaboration involves the exchange of resources, knowledge, skills, and mutual support, without a clear hierarchy among the farmers. The primary goal of this horizontal collaboration is to strengthen collective capacity to address various challenges in the agricultural sector, such as enhancing productivity, resource management efficiency, and optimizing sustainable farming practices. Based on the study's findings, three main forms of collaboration have emerged: KUDs, farmers' savings groups (arisan), and tenant farmer partnerships.

1) KUD

KUDs serve as an early example of how social capital can be effectively utilized by farmers and village managers to form groups that distribute benefits more equitably, particularly for small-scale farmers. The activities managed by KUDs include coordinating harvest schedules, transporting agricultural produce to the small boats (pompong), delivering produce to processing industries, and setting the payment times for coconut sales. Beyond their role in the agricultural sector, KUDs also support supplementary economic activities that enhance the welfare of the village community. For instance, the wives of coconut farmers are often involved in preparing food to be sold around the village, providing an additional source of income for farming families. KUDs also facilitate the weekly village market, which acts as a hub for local economic activity.

The study found that the KUD collaboration scheme is present in almost all villages in the Pulau Burung sub-district, which has a different spatial setting compared to other villages in Indragiri Hilir Regency. Pulau Burung consists of 11 villages, 8 of which are transmigrant villages. Figure 2 shows how the active role of KUDs, supported by the participation of village officials, has revitalized these relatively isolated villages through the presence of village shops, mosques, and community centers. The trust estab-

lished within the community enables collaboration not only within the coconut plantation sector but also in various other economic activities, creating new economic nodes that contribute to the overall welfare of the village.

Figure 3. Enjoying a mid-day break with a communal meal under the shade of coconut trees is a common tradition among plantation workers. This activity is often carried out by informal groups of farmers working cooperatively or by laborers employed under the landowners' wage system

2) Farmers' Savings Groups and Formation of Informal Groups

These findings are particularly evident in villages with strong ethnic homogeneity, where the majority of households come from the same ethnic background. The cultural similarities and strong social ties foster a sense of community, which in turn facilitates the formation of various informal activities to support the sustainability of coconut plantations. These groups, typically consisting of 5-15 members led by a respected figure, engage in collective farming activities such as weed control through a spirit of mutual cooperation. During breaks, the landowner whose plot is scheduled for maintenance provides light refreshments for the group to enjoy together (Figure 3). However, for more labor-intensive activities like harvesting, peeling, and transporting coconuts to the pompong, the group employs a wage system.

Additionally, some informal groups conduct arisan. Each coconut farmer sets aside a portion of their income, entrusting the money to a trusted colleague. At an agreed-upon time, the collected funds are distributed to the members in a rotating manner. Beyond serving as an economic mechanism, this savings group also acts as a symbol of solidarity within the community. Interestingly, this study did not identify any conflicts arising from these activities, indicating a well-maintained social harmony within these village dynamics.

3) Tenant Farmers and Profit-Sharing System

The tenant farmer and profit-sharing system in small-scale agriculture is a common form of collaboration between landowners and tenant farmers, where farmers without land or with limited land take responsibility for managing someone else's land. In return, the harvest is shared between the landowner and the tenant farmer according to a predetermined agreement.

The profit-sharing arrangements in this scheme vary but generally follow a proportional principle based on each party's contribution. For example, the landowner typically provides the land and certain inputs such as fertilizers, while the tenant farmer contributes labor and expertise in land management. This profit-sharing scheme is often applied with a ratio of 50-50 or 70-30, depending on the agreed contribution of capital and labor. However, in some cases, dissatisfaction with the distribution of profits can lead to conflicts between the landowner and the tenant farmer. This can sometimes result in a decline in the quality of land management by the tenant farmer, such as opting for quicker methods like using chemical herbicides instead of manual weeding, which is more environmentally friendly but requires more time.

Nonetheless, this study emphasizes that the tenant farmer and profit-sharing scheme play a strategic role in supporting the sustainability of small-scale coconut plantations, especially in areas with traditional agrarian-based economic systems. This scheme not only provides land access to farmers without land but also sustains the local economic dynamics that remain reliant on the agricultural sector.

Figure 4. Local NGOs, both affiliated and not affiliated with the processing industry, facilitate the exchange of knowledge and other resources for coconut farmers

Vertical Social Capital

Vertical social capital refers to the relationships or collaborations that occur between individuals or groups occupying different positions within the social hierarchy. This often involves interactions between parties where one holds more authority or power and the other is more dependent. In the context of agriculture, vertical social capital is manifested in the collaboration between farmers and external entities with greater authority, such as agribusiness companies, cooperatives, or the government. Vertical social capital enables farmers to access resources they cannot obtain on their own. However, it also creates a dependency on larger entities, making it essential to maintain a balance of interests between both parties to ensure fair and sustainable benefits.

1) The Relationship Between Farmers and Middlemen through Debt Schemes

The relationship between farmers and middlemen through debt schemes in small-scale coconut farming serves as a tangible example of vertical social capital. This interaction involves parties with unequal economic status, where middlemen, who have broader access to capital and markets, provide loans or credit to farmers who are often in a weaker economic position. This debt scheme not only serves as a mechanism to meet economic needs—such as purchasing fertilizers or fulfilling needs beyond agriculture—but has also become deeply embedded in the socio-cultural structure of the Indragiri Hilir community.

This study reveals that middlemen do more than just lend money; they also act as intermediaries in selling the farmers' harvests in broader markets. In the context of vertical social capital, this relationship reflects an imbalance of power, with middlemen exerting greater control over the harvest and the farmers' economic decisions. However, this relationship is also supported by social and cultural elements, such as long-standing trust and social obligations. Even though this relationship has become increasingly influenced by transactional aspects, many farmers remain loyal to the middlemen, viewing them as partners who contribute to their learning and economic development, fostering a sense of loyalty even after debts are settled. It is not uncommon for small farmers to become assistants to the middlemen and eventually elevate their status to become farmers and small-scale middlemen themselves.

2) Formal and Informal Relationships Between Farmers and Coconut Processing Industry

The informal relationship between coconut farmers and the processing industry in Indragiri Hilir exemplifies vertical social capital, where interactions occur between farmers as landowners and the industry as entities with greater access to resources, technology, and markets. Coconut, as a key commodity, is still upheld by the local community. The coconut processing industry in this region adopts a social enterprise approach, focusing not only on economic gains but also on generating positive social impacts. This industry serves as the main channel for farmers to market their produce, thus facilitating easier and more efficient market access.

Moreover, the coconut processing industry has established non-governmental organizations (NGOs) dedicated to research and the empowerment of the farming community. Through these organizations,

Figure 5. A farmer, supported by a local NGO, has successfully diversified his family's income. In the heart of Indragiri Hilir, known as the "Land of Coconut Groves," he has effectively utilized peatland for food farming, creating new economic opportunities for his family.

farmers gain access to new knowledge, modern technologies, and innovations in agricultural practices. This not only enhances production efficiency but also creates an ecosystem that supports the sustainability of small-scale coconut farming (Figures 4 & 5). Therefore, the relationship between the coconut processing industry and farmers in Indragiri Hilir is not merely transactional but also represents a form of shared learning that fosters a sense of mutual ownership. Consequently, the industry is not perceived solely as an external entity exploiting resources but as a partner with a shared interest in advancing farmers' welfare and ensuring the sustainability of coconut plantations.

A BRIEF DISCUSSION

How does social capital act as a bridge in realizing a circular economy within the coconut plantations of Indragiri Hilir?

The circular economy has emerged as a paradigm offering diverse pathways and strategies for achieving sustainable development (Awan & Sroufe, 2022; Kirchherr et al., 2023). This paradigm emphasizes not only the creation of value for consumers but also the enhancement of societal well-being and the interests of various stakeholders (Boar et al., 2020; Mocanu et al., 2024). Padilla-Rivera et al. (2020) assert that a circular economy must ensure the fair distribution of resources and benefits among different community groups, thereby effectively contributing to social welfare, poverty reduction, and the prevention of inequality.

The transition from a linear to a circular economy requires companies to actively engage in more sustainable practices. To facilitate this transition, companies must encourage sustainability-oriented innovation to deliver value to customers while considering environmental and social impacts (Koval et al., 2023). This research aligns with that perspective, highlighting the role of social capital as a connector among actors within the coconut farming ecosystem, thereby fostering economic activities that focus on sustainability. For instance, the relationship between farmers and processing industries, despite differences in resource ownership, can evolve into mutually beneficial strategic partnerships. These partnerships not only provide farmers with stable market access for their produce but also involve investments in research and community empowerment activities. As a result, a more equitable mechanism for benefit-sharing is established, supporting local economic sustainability and fostering a symbiotic and mutually beneficial relationship. Amid various challenges faced by coconut farmers today, such as climate change reducing productivity (Godage & Gajanayake, 2022), enhancing the capacity of coconut farmers becomes crucial.

Resource efficiency is a vital element within the framework of a circular economy (Istiyani & Wijayanto, 2022). Social capital plays a role in facilitating the exchange of knowledge and best practices among stakeholders concerning the efficient use of resources (Prayitno et al., 2022). The findings of this study indicate that through strong networks and collaboration, farmers can share sustainable farming techniques aimed at reducing the use of environmentally unfriendly inputs and identify the most profitable markets. Additionally, social capital operates not only horizontally but also vertically; trust-based relationships among various stakeholders enable the formation of more effective long-term cooperation in managing and distributing resources efficiently.

CONCLUSION

This study underscores the pivotal role of social capital in facilitating collaborative efforts that drive a circular economy within the coconut farming ecosystem of Indragiri Hilir. By examining both horizontal and vertical dimensions of social capital, the research reveals how relationships, trust, and shared norms foster cooperation among small-scale farmers, middlemen, and processing industries. Horizontal social capital, manifested through cooperatives, informal savings groups, and tenant farming partnerships, enhances collective capacity

to address agricultural challenges. Vertical social capital, illustrated by the interactions between farmers and external entities like middlemen and processing industries, provides access to resources and markets while fostering strategic partnerships for mutual benefit.

The findings demonstrate that social capital not only supports economic activities that align with circular economy principles but also contributes to social welfare, resource efficiency, and the resilience of small-scale farming communities. However, the study also highlights the complexities and potential pitfalls of social capital, such as dependency on middlemen and the need to balance interests among diverse stakeholders. Despite these challenges, social capital emerges as a critical enabler for sustainable agriculture, fostering a more equitable and resilient coconut farming ecosystem in the face of external challenges like climate change and market fluctuations. This research advocates for leveraging social capital to build strategic partnerships that drive sustainable practices and long-term value creation in the agricultural sector.

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Prize winning article of the competition conducted by ICC, Writing Category, during World Coconut Day Celebration 2024

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Highlights of the 51st International COCOTECH & Exhibition

Otniel Sintoro[1]

The 51st international COCOTECH Conference and Exhibition 2024 is the largest technical conference dedicated solely to showcasing the different development activities in the coconut sector. The conference is conducted once every two years. This year it is organized jointly by the International Coconut Community (ICC) and the Ministry of Trade, Republic of Indonesia, which provides hosting facilities. Many ICC member countries that have experienced hosting this event in earlier years are India, Indonesia, Malaysia, Philippines, Samoa, Sri Lanka, Vanuatu, Vietnam, and Thailand. The major goal of this event is to provide a platform for sharing of experience, expertise, technology and also spark creative ideas among academic scientists, engineers, researchers and industry players that will encourage future cooperation among attendees.

The 51st COCOTECH Conference & Exhibition is held from 22–25 July 2024 at Westin Hotel, Surabaya, Indonesia. The 2024 theme is ***"Harnessing Coconut Potential as the Tree of Life and Green Energy"***. Recognizing the vast potential of coconut in driving sustainable development, this theme underscores the critical importance of leveraging coconuts not only as a food source but also as a cornerstone of renewable energy solutions to foster a more sustainable and resilient energy landscape.

The inaugural address was delivered by H. E. Ir. H. Joko Widodo, President, the Republic of Indonesia. The green economy in the coconut industry offers great opportunities for Indonesia. With a coconut plantation area of more than three million hectares and an annual production of 2.8 million tons, Indonesia has significant potential. To increase coconut production, it is important to ensure seed quality, maintenance, and effective harvesting methods. Down streaming is the key to increasing the added value of coconut products, supporting industry, and creating jobs. He invited the

H. E. Dr. (H. C). Zulkifli Hasan, S. E., M. M., during his welcome address

H. E. Ir. H. Joko Widodo, during his inaugural address

international coconut community to work together in advancing a sustainable coconut industry and supporting the global green economy.

The welcome address was delivered by H. E. Dr. (H. C). Zulkifli Hasan, S. E., M. M., Minister of Trade, Republic of Indonesia. He mentioned that downstreaming can increase the added value of commodities. We also must stop merely exporting raw coconut. Currently, we are exporting nata de coco, charcoal, and coconut shells. Therefore, this event offers participants opportunities to discuss innovations and share best practices in the coconut sector.

Dr. Jelfina C. Alouw, Executive Director, ICC, underlined that the International Coconut Community (ICC) is committed to supporting the development of technological and product innovations, comprehensive standards, capacity building and policy tools that enhance productivity, and maximizing the socio-economic and ecological benefits of coconuts. ICC's goal is to ensure that the coconut sector continues to thrive and contribute to global sustainability and food security efforts, providing a greener future for all.

The subjects covered in the eight Sessions during the Conference by 39 eminent resource speakers, will share their ideas, knowledge, and experience to assist in preparing farming communities to counter the challenges and maximize benefits from the opportunities that are presented. Mr. Jatmiko B. Witjaksono, Director General of Trade Negotiation, Ministry of Trade, Republic of Indonesia was Chair of the first session of the first day of COCOTECH, on policy frameworks and international support for the sustainable growth and development of the agriculture and coconut sectors. The second session is on promoting Technological Advances in Coconut-Based Industries.

An exhibition is also arranged in which the development departments, farmer organizations and industry stakeholders will showcase the latest technology development of food and non-food products, services, machinery, and build brand proximity. A daily business matching to connect companies and people with common business interests, create valuable business relationships, and strengthen business networks is also provided. There are 36 private sector and government booths from six member countries with

around 600 participants from 31 countries. On the first day, COCOTECH also presented ICC awards to five inspiring coconut entrepreneurs, farmers, and manufacturers.

On the second day of the COCOTECH, there were 6 sessions wherein 15 eminent resource speakers shared their ideas, knowledge, and experiences with the latest technologies and development. The subjects covered during the Conference assisted in preparing farming communities to counter the challenges and maximize benefits from the opportunities that are presented.

Continuing the 1st and 2nd Session on the 1st day of the conference, topics discussed by five resource speakers in the 3rd Session was empowering sustainability: coconut-based renewable energy solutions for addressing global climate change, overcoming fossil fuel limitations, and enhancing Farmer's Welfare.

The topics discussed in Session 4th were on exploring the power of coconut: from culinary delight to functional food and curative solutions.

The 6th Session was on innovative programs and strategies to sustain coconut production and enhance income generation through carbon incentive.

Each session was followed by an open forum and discussion. The participants gained new insight into cutting-edge technology and scientific evidence on the usefulness of coconut, ranging from innovation in bioenergy, utilizing coconut waste for various products, including biofuel, synthetic gas, biochar, the use of non-standard coconuts for sustainable aviation fuel and the potential for coconut oil as a pathway to a carbon neutral society, to health benefits of coconut's probiotic and anti-inflammatory for gut health and brain function. The Sessions also covered the economic benefit of coconut in carbon sequestration and carbon credit for coconut producers. These diverse topics have demonstrated that the coconut as the tree of life is not merely a utopian platitude.

Moving on from the topic of the versatility of the coconut usefulness and benefits explored on the 2nd day of the COCOTECH, on the 3rd day 15 prominent speakers in 3 consecutive sessions shared their extensive knowledge and experience in the coconut sector.

Resource speakers in the 7th session discussed the global market trend and prospect, fair trade and market sustainability, empowering small farmers and women, social enterprises, opportunities and challenges.

The following 8th Session discussed the innovate to sustain coconut sector: advancing global coconut germplasm conservation and utilization, enhancing productivity, and fostering sustainable ecosystems.

The 9th Session was exclusively arranged as a parallel session wherein call for papers were invited from the researchers of universities and research institutes who are involved in the research on the coconut sector. Six such presenters presented their works at the conference.

In the closing session remarks, H. E. Reza Pahlevi Chairul, Director General of Interregional Trade Negotiation, Ministry of Trade, Republic of Indonesia, mentioned that the coming of the President of the Republic of Indonesia to open the COCOTECH has shown the government support to the community and coconut sector.

The three-day Conference concluded with the adoption of the policy recommendations crafted from the presentations for implementation by the member countries, the announcement of the 52nd International Cocotech Conference in 2026 to be hosted by the Phillippines, and the Acceptance Speech by Host of the 52nd International COCOTECH Conference.

The conference adjourned with a vote of thanks by Dr. Jelfina C. Alouw, Executive Director, in which she expressed her heartfelt gratitude to all parties who have supported and contributed to the event. She concluded with a wisdom word that reflected the unity in the event: "Coming together is beginning, staying together is progress, and working together is success. Coconut is the tree of life and a source of green energy, let us continue our journey together with unity and collaboration."

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[1] *Information & Publication Director, International Coconut Community*

60th Session & Ministerial Meeting
A Landmark Event for the Global Coconut Industry

Otniel Sintoro[1]

The 60th Session and Ministerial Meeting of the International Coconut Community (ICC), the highest decision-making body of the organization, officially commenced at the Hilton Hotel in Colombo, Sri Lanka. This prestigious four-day event, held from November 25–28, 2024, brought together ministers, policymakers, industry leaders, researchers, and stakeholders from 21 member countries, collectively representing over 90% of global coconut production. Representatives from various international organizations and observer groups also attended, making this session a pivotal gathering for the future of the coconut sector.

The session commenced with the traditional illumination of the oil lamp, followed by the Sri Lankan national anthem. In his welcome address, Mr. B. K. Prabath Chandrakeerthi, Secretary of the Ministry of Plantation and Community Infrastructure, emphasized Sri Lanka's commitment to the coconut industry. He highlighted the sector's significant contribution to the country's economy and discussed challenges such as attracting younger generations to plantation work, land underutilization, limited access to technology, market access restrictions, and climate change.

Dr. Jelfina C. Alouw, Executive Director of the ICC, acknowledged the global challenges facing the industry, including climate change, food security, and economic resilience. She stressed the importance of fair farmer incomes while maintaining affordability and competitiveness.

The session was officially opened by Hon. Samantha Vidyarathne (MP), Minister of Plantation and Community Infrastructure, who reaffirmed Sri Lanka's dedication to sustainable coconut development and emphasized the need for international collaboration and modern technology adoption.

The keynote speech by Dr. Sanathanie Ranasinghe, former Director of the Coconut Research Institute of

Sri Lanka (CRISL), focused on global opportunities and challenges in the coconut industry. National delegates from Côte d'Ivoire, Fiji, India, Indonesia, Jamaica, Kenya, Papua New Guinea, and the Philippines presented their national coconut development agendas, covering topics such as farm productivity, farmer incomes, reforestation, and rehabilitation programs. The day concluded with interactive discussions among delegations.

In-Depth Discussions on Coconut Sector Development

The second day featured presentations from Malaysia, Solomon Islands, Sri Lanka, Thailand, and Tonga, outlining their national strategies. A diverse group of international organizations and experts shared their insights. Mr. Diar Nurbiantoro of NAM CSSTC championed South-South cooperation for knowledge sharing and skills development. Mr. Reynaldo V. Ebora from DOST-PCAARRD in the Philippines highlighted collaborative research and development programs. Dr. Vinod Pandit from CABI provided expertise on pest and disease control. Mr. Gregory Bardies from SCP advocated for sustainability standards. Dr. Sarada Krishnan from Crop Trust emphasized the importance of coconut genetic diversity. Dr. Jean-Marc Roda from CIRAD discussed digital innovation in plantations. Dr. Carmel A. Pilotti

from SPC focused on regional collaboration and market access. Mr. Masato Fujii from GPDJ showcased aviation fuel production from coconuts. Dr. Jairo Villamil-Diaz from UNIDO presented an economic case for investment in Sri Lanka's coconut sector. Dr. Daniel Manzella from ITPGRFA emphasized global collaboration on coconut genetic conservation. Mr. Dilip Tambyrajah from INFO called for a holistic approach to coconut value chains.

The presentations led to engaging discussions on funding opportunities, technology transfer, and market access for value-added coconut products. Delegates also examined branding and certification strategies to enhance competitiveness.

Strategic Planning and Future Directions

The third day focused on strategic planning, sustainability, and resilience in the coconut sector. Mr. Benjamin Madrigal, Chairman of the ICC Technical Working Group (TWG), addressed key challenges such as climate change, competition from vegetable oils, and misinformation about coconut oil.

The TWG revised the ICC's five-year strategic plan and participated in international conferences. Dr. Fabian Dayrit, Chairman of the ICC Scientific Advisory Committee on Health (SACH), tackled misinformation about coconut products and proposed publishing scientific research and collaborating with health ministries. Mr. Aluthwala Hewa Nuwan Chinthaka, Assistant Director of COGENT (International Coconut Genetic Resources Network), presented a roadmap for coconut germplasm exchange, research, and gene bank strengthening. Dr. Jelfina C. Alouw, Executive Director of the ICC, outlined resilience strategies, including diversification, improved farming techniques, and expanded market access.

Leadership Transition and Future Plans

A significant highlight was the handover of the ICC Chairmanship from Sri Lanka's Mr. Prabath Chandrakeerthi to Dr. Wilawan Kraikruan of Thailand, represented by Mr. Thongchai Khamkhot. Discussions focused on restructuring the ICC Secretariat to improve efficiency, adopting UN-aligned leadership structures, and extending the Director General's tenure to four years.

The 60th ICC Session concluded with the announcement that Thailand will host the next ICC Session in November 2025. The symbolic handover of the ICC chairmanship to Thailand marked the beginning of a new chapter in ICC leadership, reinforcing the organization's commitment to sustainable coconut development worldwide.

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[1] *Information & Publication Director, International Coconut Community*

Experts' Finding on the Health Benefits of Coconut

Dr. Fabian M. Dayrit

Chairman of ICC Scientific Advisory Committee on Health and Professor, Department of Chemistry, Ateneo de Manila University, Academician, National Academy of Science and Technology and President, Integrated Chemists of the Philippines

Virgin coconut oil is effective in lowering C-Reactive Protein levels among suspect and probable cases of COVID-19. There were two main indicators used: recovery from COVID-19 symptoms and level of C-Reactive Protein (CRP) in the blood. These two indicators showed that VCO can be used to treat mild COVID-19 cases.

CRP is a protein that is analyzed in the blood as a quantitative measure of inflammation or infection. CRP level less than 5 mg/L indicates recovery from inflammation or infection. The recovery from COVID-19 symptoms was more rapid in the VCO group compared with the Control group: 17% in the VCO group showed improvement compared to only 4% in the Control group. Full relief from COVID-19 was attained by day 18 in the VCO group compared to day 23 in the Control group.

The level of CRP in the VCO group dropped much more rapidly and completely compared to the Control group. By day 14, the CRP level in the VCO group had fallen below the 5 mg/L, and this continued to show a decreasing trend at day 28. In comparison, the CRP level in the Control group fell slowly to 5 mg/L at day 14 and stayed at this level until day 28.

Other beneficial effects of VCO were noted from the blood assay:

- HDL-cholesterol ("good cholesterol") increased
- LDL and triglycerides remain within normal range
- Fasting blood sugar (FBS) decreased

These results show that VCO, indeed, is a healthy oil.

Source: Proceedings of the XLIX Cocotech Conference, 30 August-2 Sept 2021, Jakarta, Indonesia.

Dr. Faizal C. Peedikayil

Professor & Head Department of Pedodontics & Preventive Dentistry, Kannur Dental College, India

Coconut oil rinsing reduces gingival inflammation. Oil rinsing is a type of traditional procedure that involves swishing edible oil in the mouth and then spitting it out. Virgin and regular coconut oil can be used to reduce plaque related gingivitis. However, the study shows that virgin coconut oil has better taste, odor, and texture in the mouth than regular cooking coconut oil. The advantage of coconut oil or virgin coconut oil as natural oils is that they neither cause any staining as seen in the use of mouthwashes nor there is any after taste or allergic reactions. and are readily available. Such practices cure about 30 systemic diseases and have an effect on the overall well-being of the individuals practicing it.

Source: CORD Journal, Vol. 37 2021

Experts' Finding on the Health Benefits of Coconut

DR. D. P. Athukorale

Cardiologist, Pharmacologist, Academician, Colombo, Sri Lanka

Green Coconut has much water and is rich in proteins, minerals, vitamins, calcium, phosphores, iron, iodine, chlorine, sulphur, potassium, carbohydrates and vitamins, B1, B2, B5 and magnesium. The water also helps the hydration of the body. The green coconut has a ratio of amino acids arginine, alanine, cisteína (essential) and serina, greater than those found in cow's milk. It is perfect and natural isotonic to restitute energies in the human body.

Tender coconut water has been used in other areas of the world where intravenous solutions cannot be obtained. Japanese have used tender coconut water (T. C. W.) intravenously in Sumatra, Indonesia in World War I. Pradera et. al. have used intravenous T. C. W. for pediatric patients in Havana, Cuba without any serious reactions.

Source: Dr. D.P. Athukorale 2008. Tender Coconut Water – Its Health Benefits Cocoinfo International, 15 July: 14-16

Prof. Dr. Rabindarjeet Singh

Lifestyle Science Cluster, Advance Medical and Dental Institute, Universiti Sains Malaysia, Bertam 13200 Kepala Batas, Penang, Selangor, Malaysia

Coconut water (Cocos nucifera L.) is an ancient tropical beverage whose popularity has been increasing in recent years. This 'naturally canned' beverage is a sweet refreshing drink obtained directly from the inner part of the fruit. It is a beverage that has drawn the attention as a natural functional drink. Coconut water is sterile at source, and is very rich in potassium, and contains sodium, chloride, magnesium and carbohydrates. Therein, making it a healthier alternative to carbonated drinks including isotonic sports drinks. Apart from the lower calories due to lower sugar content, the non-carbonated coconut water is also a great source for replacing the electrolytes lost during sweating when compared to carbonated drinks. Ingestion of carbonated drinksis known to be associated with gastrointestinal discomfort in certain individuals. This "Mother Nature's" gift of coconut water, could be prized as the beverage above all other beverages for its health renewing properties.

Source: Proceedings of the XLVI Cocotech Conference 7-11 July 2014, Bandaranaike Memorial International Conference Hall Colombo, Sri Lanka.

Experts' Finding on the Health Benefits of Coconut

Dr. (Mrs.) E. R. H. S. S. Ediriweera

Senior Lecturer, Department of Nidana Chikithsa, Institute of Indegenous Medicine, University of Colombo, Rajagiriya, Sri Lanka

- Young coconut water could be drunk to alleviate the burning sensation during micturition
- Young coconut water, breast milk, treacle of Saccharum officinarum (*F. Graminae*) and sugar are mixed together and given for hiccough
- Leaves of Dregia volubilis (*F. Asclepiadaceae*) are to be pounded and mixed with tender nut water. The juice is extracted and given in treatment of poisoning of Nerium indicum (*F. Apocyanaceae*)
- Water of young king coconut (before flesh is formed inside) is given for fever and it can be consumed as a diuretic in dysuria.
- A King coconut is to be opened by slicing off the top 30 gms of powdered fruits (without seeds), of Terminalia chebula (*F. Combretaceae*) are added to the King coconut water inside and stirred. Sliced top is then replaced (as a cover) and kept outdoors in the dew overnight. Following morning, the mixture inside is to be filtered and drunk as a purgative. This is called El Vireka by Sri Lankan traditional physicians. The number of bowel motions will increase as the person continues to drink cold water from time to time during the morning. He should not consume hot or warm food and liquids. This is good for purifying blood and cooling the body.

Source: Cocoinfo International, Vol. 10 No. 1, 2003

Dr. Bruce Fife

Certified Nutritionist and Doctor of Naturopathic Medicine, and Director, Coconut Research Center, based in USA

You cannot say LDL (low density lippoprotein) is bad and HDL (high density lippoprotein) is good. It is more complex than that. There are actually two types of LDL: one small and dense the other large and soft. The large LDL is a good cholesterol the type used to make bile, hormones, and vitamin D--it is essential to life! The small dense LDL is the type that becomes oxidized and can be harmful, as all oxidized lipids can be. Eating coconut oil (and other saturated fats) increases both HDL and the "good" LDL, thus lowering the risk of heart disease. This is one of the reasons why populations that eat a lot of coconut oil have the lowest heart disease rates in the world.

Source: Press Statement, APCC, 21 June 2017

Bullish Market of Coconut Oil in the First Half of 2025

Alit Pirmansah[1]

The coconut oil market is set to experience a dynamic first half of 2025, shaped by moderate production levels, stable trade patterns, and firming prices influenced by supply-demand dynamics and broader market trends in lauric oils. Key data indicate a market characterized by steady consumption growth and pricing shifts, which reflect the sector's resilience amid climatic and economic challenges.

Global production of coconut oil is expected to stabilize at 3.24 million metric tons (MMT) in 2025, slightly lower than the 3.28 MMT projected for 2024. This modest decline stems from the lingering effects of climate variability, including unpredictable rainfall patterns and the aftermath of adverse weather events in key producing regions. The Philippines, the largest producer, is forecasted to reduce output from 1.33 MMT in 2024 to 1.25 MMT in 2025, while Indonesia and India are expected to

Table 1. Coconut Oil Production, 2023-2025 (000MT)

Countries	2023	2024[p]	2025[f]
Philippines	1,245	1,331	1,250
Indonesia	893	850	868
India	511	503	500
Mexico	131	129	129
Sri Lanka	43	36	55
Malaysia	56	55	56
Vietnam	41	41	41
Papua New Guinea	44	40	42
Thailand	29	29	29
Other countries	**269**	**268**	**267**
World	3,262	3,282	3,237

Source: Oil World and ICC estimates
p: preliminary figures, f: forecasted figures

Bullish Market of Coconut Oil

Table 2. Coconut Oil Imports, 2023-2025 (000MT)

Countries	2023	2024[p]	2025[f]
EU-27	654	641	650
USA	410	480	460
Malaysia	262	216	209
China	182	180	200
UK	20	23	20
Other countries	**650**	**792**	**724**
World	2,178	2,332	2,263

Source: Oil World and ICC estimates

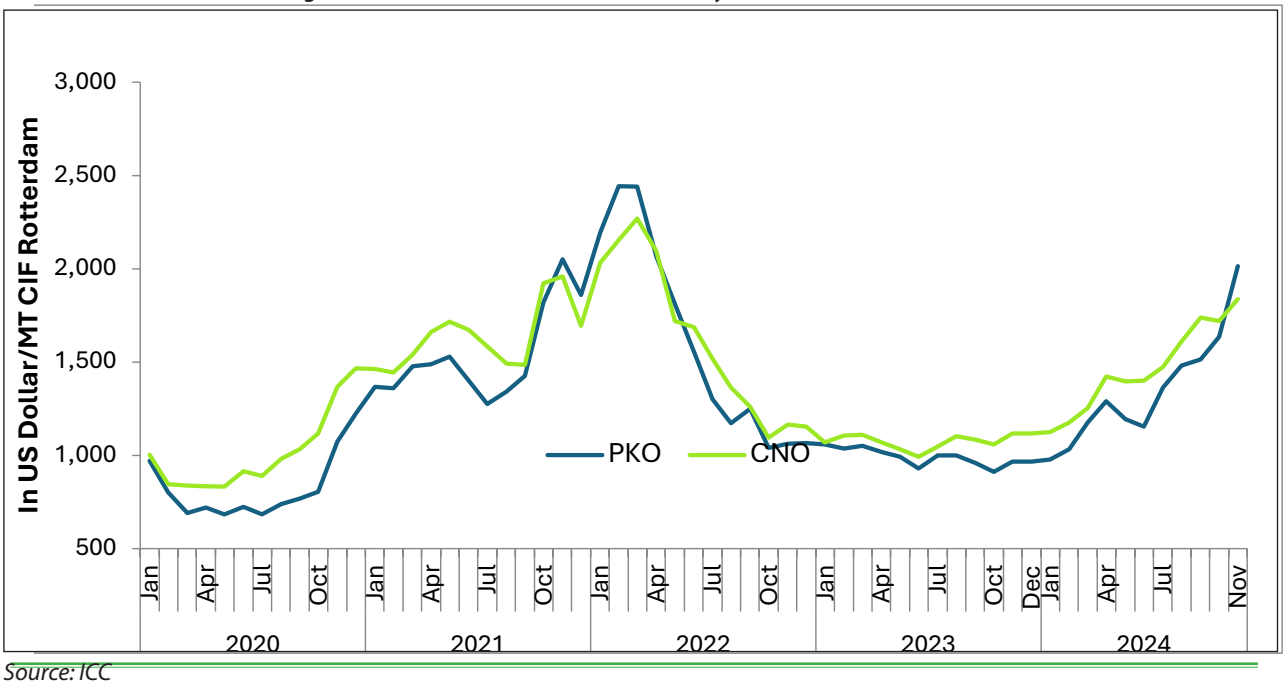
see marginal changes, with outputs of 0.87 MMT and 0.50 MMT, respectively. The combined contributions from smaller producers are unlikely to offset the decline in major producing countries, leading to constrained supply in the global market.

Demand for coconut oil remains robust across food, industrial, and specialty sectors. Consumption is forecasted to rise slightly from 3.20 MMT in 2024 to 3.29 MMT in 2025, reflecting steady demand in premium markets such as the United States and the European Union. These regions continue to prioritize sustainably sourced and high-quality oils, driven by health-conscious consumer preferences and the expanding use of coconut oil in plant-based and natural products. Emerging economies, particularly China, are also expected to increase their import volumes, further supporting global demand. However, the competitiveness of palm kernel oil, a key substitute, will play a crucial role in influencing trade and pricing patterns for coconut oil.

Trade flows are expected to remain stable in the first half of 2025, with the EU and the United States leading import activity. EU imports are projected to reach approximately 650,000 metric tons (MT) for the year, with a consistent flow in the first half, while U.S. imports are expected to average around 460,000 MT annually. China's import demand is anticipated to grow, with total imports for 2025 likely exceeding 200,000 MT, reflecting its increasing reliance on coconut oil for both food and industrial applications. However, imports from Malaysia and other smaller markets are expected to continue declining, emphasizing a shift in trade dynamics favoring large and emerging economies.

The price outlook for the first half of 2025 reflects tight supply and resilient demand. Coconut oil prices are estimated to range between $1,900 and $2,050 per metric ton, representing a significant premium over historical averages. This price strength is driven by reduced beginning stocks, forecasted at 550,000 MT by mid-2025, and constrained production growth. Meanwhile, palm kernel oil, which

Figure 1. Price Trend of Lauric Oils, January 2019-June 2024 (USD/MT)



Source: ICC

competes closely with coconut oil in industrial applications, is projected to trade between $1,850 and $1,950 per metric ton. The narrowing price gap between these two lauric oils reflects increased competition and the substitutability of palm kernel oil in cost-sensitive industries.

The firming of coconut oil prices in early 2025 is attributable to tightening global supplies and steady demand growth. The carryover stock from 2024, projected at 600,000 MT, is expected to decline to 550,000 MT by mid-2025, indicating reduced availability in the market. This drawdown in stocks, coupled with modest production levels, is likely to support higher price levels during the first half of the year. Palm kernel oil, with slightly stronger production prospects and a beginning stock of 1.43 MMT in 2025, is anticipated to face less upward pressure, although its price trajectory will still reflect broader edible oil market trends.

One of the critical drivers influencing the market outlook is the interplay between supply chain resilience and environmental factors. Coconut oil production continues to face challenges from climate variability, including erratic rainfall and increasing pest pressures, which are particularly acute in smallholder-dominated sectors like those of the Philippines and Indonesia. These disruptions contribute to the uncertainty surrounding production recovery and could exacerbate supply tightness if adverse weather conditions persist. On the demand side, the increasing incorporation of coconut oil into renewable energy applications, such as sustainable aviation fuel (SAF), adds a layer of complexity, as it creates competition between traditional and emerging uses.

Another factor shaping the outlook is the global economic environment, which impacts disposable incomes, purchasing patterns, and trade flows. The continuing emphasis on sustainability in developed markets is expected to underpin demand for certified and responsibly sourced coconut oil, which commands a premium. However, the economic pressures in price-sensitive regions could dampen growth in consumption, as consumers may opt for lower-cost alternatives like palm oil or other vegetable oils.

In conclusion, the first half of 2025 is likely to witness steady demand growth, tight supplies, and firm prices in the coconut oil market. The estimated price range of $1,900 to $2,050 per metric ton for coconut oil reflects a combination of constrained production and robust global demand, while palm kernel oil's competitive positioning at $1,850 to $1,950 per metric ton underscores its role as a vital substitute. The market's ability to balance these dynamics will depend on continued investments in sustainable production practices, advancements in agricultural resilience, and strategic collaboration among stakeholders across the value chain. These efforts will be critical in ensuring the coconut oil sector remains competitive and capable of meeting evolving global needs.

[1] *Market and Statistics Director, International Coconut Community*

Table 3. World Balance of Lauric Oils (000MT), 2024-2025

Attribute	Coconut Oil		Palm Kernel Oil		Lauric Oils	
	2024[P]	2025[F]	2024[P]	2025[F]	2024[P]	2025[F]
Beginning Stocks	530	600	1,540	1,430	2,070	2,030
Production	3,282	3,273	8,366	8,438	11,648	11,711
Imports	2,332	2,263	3,316	3,345	5,648	5,608
Total Supply	**6,144**	**6,136**	**13,222**	**13,213**	**19,366**	**19,349**
Exports	2,340	2,300	3,350	3,330	5,690	5,630
Domestic Consumption	3,204	3,286	8,442	8,433	11,646	11,719
Ending Stocks	600	550	1,430	1,450	2,030	2,000
Total Distribution	**6,144**	**6,136**	**13,222**	**13,213**	**19,366**	**19,349**

Source: Oil World, USDA, and ICC estimates

Coco Events

COCONUT FESTIVAL 2024: PROMOTING SUSTAINABLE AGRICULTURE AND CIRCULAR ECONOMY IN INDIA'S COCONUT SECTOR

Dr. Jelfina C. Alouw, Executive Director of the International Coconut Community (ICC), and Mr. Alit Pirmansah, Market and Statistic Officer, participated in the Coconut Festival 2024, held at the Anna Auditorium of Tamil Nadu Agricultural University (TNAU) in Coimbatore, India. The event was a collaborative effort between TNAU, the Parachute Kalpavriksha Foundation, and the Coconut Development Board (CDB), featuring a symposium, exhibition, and an awards ceremony honoring key stakeholders for their significant contributions to India's coconut sector.

The event was inaugurated by Coimbatore Collector Kranthi Kumar Pati, who emphasized the importance of mechanization in coconut farming. He encouraged farmers to adopt technologies such as harvesters, coconut peeling machines, and fertilizer-spraying drones to enhance productivity and reduce costs, particularly in light of the current labor shortages.

Dr. Jelfina C. Alouw delivered the keynote address. She said that this year, we are celebrating the coconut festival under a timely and visionary theme "Coconut for a Circular Economy & Partnership for Maximum Value." This theme reflects the essence of what the coconut industry must aspire to in the years ahead—a sustainable, inclusive, and innovative approach that maximizes the value of every part of the coconut, from the tree to the fruit, and beyond. She expressed the ICC's commitment to fostering partnerships and supporting initiatives that drive the transition to a circular economy. Other distinguished speakers included Dr. V. Geethalakshmi, Vice-Chancellor of TNAU, Nitin Kathuria, Director of the Parachute Kalpavriksha Foundation; Kamatchi Chellammal, recipient of the 2024 Padma Shri Award and Dr. Hanumantha Gowda, Chief Coconut Development Officer at CDB.

The symposium was divided into two sessions. The first session underscored the importance of collaboration within the coconut industry to promote sustainable agriculture, featuring nine speakers, including Dr. Alouw, who shared insights on global opportunities and partnerships within the coconut industry. The second session, with eight speakers, focused on the role of coconuts in a circular economy, highlighting innovations aimed at fostering a sustainable future.

HONORING THE TREE OF LIFE DURING THE COCONUT WEEK

The nation celebrates Coconut Week this August, a long-standing tradition that recognizes the immense value of the coconut, often referred to as the "tree of life." The Philippine Coconut Authority (PCA) leads the celebration with the theme Molding the Filipino Coconut Farmer: The Path to Economic Upliftment and a Prosperous New Philippines." This annual event highlights the crucial role that the coconut industry plays in the country's economy, culture, and the daily lives of millions of Filipinos, particularly coconut farmers.

Coconut Week is more than just a celebration; it's a time to reflect on the past, present, and future of the coconut industry. Various activities showcase the versatility and sustainability of coconut-based products throughout the week.

This year's theme emphasizes the support of coconut farmers, who are the backbone of the industry. Through the PCA, the government is committed to empowering these farmers through a variety of programs aimed at improving their livelihoods. These initiatives include distributing high-yield coconut seedlings, promoting intercropping practices, and providing financial assistance to help farmers recover from the challenges posed by climate change and other adversities.

A notable addition to this year's Coconut Week celebration is the involvement of Negosyo Advocates, an association of entrepreneurs promoting locally made products and encouraging consumers to "#buyfilipino" and "#buylocal". Negosyo Advocates hosted a roundtable discussion where entrepreneurs shared their experiences, challenges, and aspirations as micro, small and medium enterprises (MSMEs) that use coconuts as their product base. They also organized "Good Food Sundays" in Mandaluyong City, showcasing coconut products and foods from various entrepreneurs and culinary enthusiasts. The event included an insightful discussion about the coconut industry and

entrepreneurs' role in promoting coconut-based products for farmers.

The culmination of Negosyo Advocates' activities was a coconut culinary show at the PCA grounds. During the event, chefs prepared coconut-inspired recipes using high-quality coconut ingredients, providing nutritious and delicious food for PCA officials and employees to enjoy. The event highlighted the need for more entrepreneurs to advocate for coconut-based products, especially in the food industry.

The history and cultural heritage of the Philippines deeply embed coconuts. When Magellan's remaining ships reached Leyte Gulf, they discovered the coconut tree, which they called the "Tree of Life." They were amazed by how the natives used the tree for food, nutrition, medicine, shelter, and many other purposes. Today, modern technology has expanded the uses of coconuts, producing essential products such as soap, medicine, shampoo, jet fuel, cooking oil, and countless others.

Prior to Indonesia overtook it as the world's leading coconut producer, the Philippines boasted the greatest land area in the world planted with coconuts.

The coconut represents the Philippines' natural competitive advantage over other nations, with 69 out of the country's 82 provinces producing coconuts. Remarkably, just three countries, including the Philippines, account for over 80 percent of the world's coconut supply.

It's astonishing to learn that, according to PCA data, there are 345 million bearing coconut trees in the Philippines, producing 15 billion nuts annually. Yet, it's uncertain whether the country is fully utilizing this resource or merely scratching the surface of its potential.

Traditional coconut products, like coconut oil, are a major export from the Philippines to 57 countries. The country is the world's second-largest exporter of coco shell charcoal and supplies coco shell-based activated carbon to 99 international markets. Non-traditional products like coconut water are also significant, with exports reaching 78 countries. The Philippines is the top exporter of virgin coconut oil globally, further solidifying its natural competitive advantage.

Despite these achievements, more than 2.5 million coconut farmers in the Philippines face significant challenges. Unfortunately, despite the abundance of coconuts and success in both local and international markets, 90 percent of coconut farmers live below the poverty line, as stated in the Philippine Coconut Industry Roadmap 2021-2040. The coconut value chain appears to have overlooked coconut farmers. While businesses and entrepreneurs have grown wealthy, coconut farmers continue to struggle in poverty. With the average age of Filipino farmers between 57 and 59 years old, there is a growing concern that future generations may abandon farming altogether, leading to the conversion of agricultural lands for commercial and residential use, further threatening the nation's food security. Reports indicate that many farmers no longer wish their children to inherit the farming lifestyle, as it often leads to a life of hardship.

President Ferdinand R. Marcos Jr.'s administration has committed to planting 100 million more coconut trees to replenish the country's coconut supply. However, Philippines must synchronize this initiative with efforts to develop and open more markets for both traditional and non-traditional coconut products. Additionally, there is a growing need to promote coconut-based foods and condiments developed by entrepreneurs in both domestic and international markets.

Now in its 38th year, the celebration of Coconut Week is a testament to the enduring importance of the coconut industry in the Philippines. It honors the ingenuity, hard work, and dedication of the millions of Filipinos who have made the coconut a vital part of the nation's heritage and future. We encourage every Filipino to honor the Tree of Life and ensure that it continues to thrive for generations to come. *(Philippine News Agency)*

FIRST SHIPMENT OF FRESH VIETNAMESE COCONUTS HEADING FOR CHINA THIS MONTH

Ben Tre province, located in the Mekong Delta, is set to hold a ceremony this month to celebrate its first shipment of fresh coconuts to China. This development comes less than two months after fresh Vietnamese coconuts were officially granted market access to China.

Ben Tre province currently has around 16,000 hectares of land dedicated to coconut production, including 133 designated growing areas spanning nearly 8,400 hectares. The province exports over 100 types of coconut products to approximately 100 countries and regions.

In the first nine months of this year, the province exported 22 million coconuts to overseas markets such as the United States, the European Union, Japan and South Korea. The goal for the province's coconut industry is to further increase its export value, with a particular focus on the newly opened Chinese market.

Doan Van Danh, director of the Department of Agriculture and Rural Development of Ben Tre, stated that China sent an official delegation to the province in September to inspect 13 local coconut-growing areas and confirm their eligibility to export coconuts to China.

Nguyen Dinh Tung, general director of Vina T&T Group, said that the company is confident in its ability to compete on the Chinese market with other coconut suppliers such as Thailand, the Philippines and Malaysia on account of its considerable experience exporting fresh coconuts to other major markets like the United States and Canada. Nguyen added that Vietnamese coconuts have the advantage of being "sweeter and cooler" than coconuts from other countries. Furthermore, advances in preservation technology mean that Vietnamese coconuts can now be stored for up to 80 days, ensuring their quality. The company is also now building a large factory in Ben Tre dedicated to exporting fresh coconuts to China, with construction reportedly 70% complete.

Vietnamese coconut growers typically differentiate between fruit intended for drinking the coconut water and those used for processing into products such as coconut milk and coconut oil. The former is harvested every 21 to 22 days, and leaving the coconuts on the tree for too long can stop further fruit production. By contrast, the latter has a much longer harvest cycle lasting several months, and harvesting too early can also halt production. Therefore, Vietnam's coconut industry must implement appropriate management in growing regions to prevent improper harvesting. In addition to oversight from relevant authorities, companies should also collaborate with each other to ensure the industry's efficiency and sustainable development.

In September of this year, the Vietnam Coconut Association led a delegation of over 10 companies and cooperatives to participate in various fruit and food fairs in China. The association also signed a memorandum of understanding with Guangzhou's Jiangnan Fruit and Vegetable Wholesale Market and the Guangdong Fruit and Vegetable Association to assist Vietnamese enterprises in accessing the Chinese market.

Vietnam is the world's sixth-largest coconut producer, with 15 provinces cultivating coconuts on a large scale across approximately 200,000 hectares of land to generate a total annual output of about 2.1 million metric tons. The country currently has over 800 companies involved in coconut production and processing, including around 90 exporters. In 2023, Vietnam exported approximately 30,000 metric tons of fresh coconuts as well as 320,000 metric tons of coconut products, including candies, cosmetics, wooden goods and handicrafts, generating a total export revenue in excess of $1.06 billion. *(Produce Report)*

COCONUT SHELL MANUFACTURERS KEEN TO EMBRACE GREEN TECHNOLOGIES

Over 100 manufacturers of coconut shell charcoal and activated carbon have expressed eagerness to adopt green technologies in their production processes, reflecting commitment to the environment and social responsibility of moving to greener pastures in charcoal production, during a seminar at TNAU.

Suba Nagarajan, Chairman, Coconut Development Board (CDB), who inaugurated the seminar and the keynote speaker B. Hanumanthe Gowda, Chief Coconut Development Officer, highlighted the salient features of the board's project based assistance at 25% of the total project cost for green ventures.

Titled 'Prospects for Green Technology in Coconut Shell Charcoal Production', the seminar organised by the Coconut Development Board, witnessed presentations by officials of Tamil Pollution

Control Board led by K Ravichandran, Joint Chief Environmental Engineer.

His talk on elevated pit technology promoted by TNPCB and validated by Anna University delved into innovative environment-friendly technologies developed in collaboration with various reputed research institutions.

A new technology developed through Organic recycling system and validated by CUSAT (Cochin University of Science and Technology) was explained by Manju Tanwar and Srikanth Venkateshan. The particulars of Green Finance offered by SIDBI (Small Industries Development Bank of India) was presented by Paramasivam, Assistant General Manager. Director, Coconut Development Board Aravazhi and S. Deepti Nair, Director-Marketing also addressed the participants.

The presentations, the organisers said, enabled manufacturers to gain first-hand knowledge on the various technologies available for clean charcoal production.

Officials of TNPCB and CDB called for a consensus on the way forward for transitioning to green technology. The sustainable mode of production of shell charcoal using green technology would serve as a healthy example for creating wealth from waste. This augurs well in the current era of sustainable agriculture what with the world advocating for circular economy, they pointed out. *(The Hindu)*

PHILIPPINES PARTNERS WITH JAPANESE FIRM TO EXPLORE SUSTAINABLE AVIATION FUEL PRODUCTION

The Philippine Coconut Authority (PCA) has taken a significant step towards establishing the country as a major player in the global biofuel industry by partnering with Japan-based Manryu Co. Ltd. to explore the production of sustainable aviation fuel (SAF) using local coconut oil.

The partnership, formalized through a memorandum of understanding, aims to leverage Manryu's innovative Maeda Method for biodiesel and SAF manufacturing. This method promises enhanced safety features and cost-efficient production, making it a promising avenue for the development of SAF in the Philippines.

The PCA's initiative aligns with the Department of Energy's (DOE) mandate to increase the use of biofuels in the country. The agency has already required all diesel fuel sold in the Philippines to be a 3% blend of coco methyl ester (CME). This requirement will further increase to 4% by October 1, 2025, and to 5% a year later.

By partnering with Manryu, the PCA seeks to optimize the use of local coconut oil in the production of biofuels. The agency will provide access to its research facilities and high-quality coconut oil, while Manryu will supply its technology and equipment. Together, they will conduct research, experiments, and testing to refine the process and ensure that the produced SAF meets global aviation fuel standards.

Last year, DOE had also pushed the aviation sector in Philippines towards using sustainable fuel derived from coconut oil blend. It is working closely with industry stakeholders and international partners to establish the necessary framework and regulations to support the adoption of SAF. For this, the DOE is actively participating in the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), established by the International Civil Aviation Organization (ICAO). CORSIA allows airlines to offset their carbon emissions by using SAF derived from biomass or waste resources.

Philippines is also a part of CORSIA since 2018 and. The DOE is working closely with the country to ensure that it is well-prepared to meet this deadline by promoting the development and adoption of SAF. The DOE believes that coconut oil, a readily available and abundant resource in the Philippines, presents a promising feedstock for SAF production.

The development of SAF is a crucial step towards reducing greenhouse gas emissions from the aviation industry. By utilizing locally sourced coconut oil, the Philippines can contribute to a more sustainable and environmentally friendly transportation sector.

The Carbon Offsetting and Reduction Scheme for International Aviation is designed to offset carbon emissions and reduce CO_2 output from international flights, aiming to mitigate the aviation industry's impact on climate change. *(ChemAnalyst)*

PNG'S COCONUT INDUSTRY: HIGH DOMESTIC DEMAND AND UNTAPPED EXPORT POTENTIAL FOR GLOBAL MARKET

During a press conference held today by the Kokonas Indastri Koporesen (KIK), Managing Director Mr Alan Aku highlighted the significant potential of Papua New Guinea's coconut industry.

He emphasized that coconut farming could become a highly profitable cash crop for the country.

"Coconut is the fourth-largest cash crop industry in the country, behind palm oil, cocoa, and coffee," Aku stated.

"PNG's coconut industry generates an average of K130 million annually from international markets."

Despite the industry's success abroad, Mr. Aku pointed out an even greater demand for coconuts domestically.

Papua New Guineans consume approximately K380 million worth of coconuts each year, with individual coconuts typically sold at markets for K3 or K4.

Combining both international and domestic markets, the total annual revenue for PNG's coconut industry is estimated to be around K500 million.

"The global demand for coconuts is through the roof," Mr. Aku stated.

"All coconut-producing countries put together cannot meet the global demand."

The cash crop is highly lucrative, with the ability to be utilized for different products.

Mr. Aku mentioned that two products from the coconut husk are coconut peat and coconut fiber. The coconut shell can be used to make barbeque briquettes and activated carbon, while the kernel is used to produce coconut oil and other cosmetic products, including lotions and creams. Coconut water also serves as another product.

Currently, PNG only exports copra, crude oil, and coconut oil, but the country has the capability to fully utilize the cash crop to export a variety of products derived from both the plant and the fruit.

The history of copra plantations in New Guinea dates back to the late 19th century, initially established by German colonialists. After World War I, Australian interests took over, continuing the cultivation of this valuable crop. *(Post Courier)*

INDONESIA TARGETS COCONUT BIOFUEL PRODUCTION WITH JAPAN'S TECHNOLOGY

The Indonesian government has laid out a roadmap for the downstream processing of coconut products as part of its National Long-Term Development Plan (RPJPN) for 2025-2045.

One of the key areas of focus is the development of environmentally friendly aviation fuel, known as bioavtur, which derived from coconut oil.

Leonardo A. A. Teguh Sambodo, Special Advisor to the Minister of National Development Planning for Leading Sector Development and Infrastructure, said that the bioavtur initiative comes from Japanese investors, who possess the technology to process coconut oil into bioavtur.

"The initiative is being driven by the Indonesia-Japan Business Network (IJBNet), which has found a Japanese partner to produce bioavtur. IJBNet is currently preparing to build a crude coconut oil (CNO) factory in Banyuasin, South Sumatra," Teguh said on Friday, September 27, 2024.

While the name of the company that will develop bioavtur in Indonesia has not yet been determined, production can only begin once the CNO factory is established.

Teguh highlighted that coconut is being chosen for biofuel production due to its international certification and approval, which palm oil has not yet received.

"Coconut is safe and approved for use. This gives it an advantage over palm oil, which has yet to obtain certification. Therefore, this potential needs to be harnessed," Teguh added.

The CNO factory will process non-food-grade coconuts, providing an opportunity to utilize lower-quality coconuts that would otherwise go to waste.

This push for coconut downstream processing is supported by Law No. 59/2024, which emphasizes the use of domestic raw materials to drive the growth of Indonesia's processing industries.

"Before 2020, Indonesia was the world's largest coconut producer by volume and yield, but the Philippines has since overtaken us, especially during the pandemic," Teguh noted.

The Philippines now leads with 3.7 million hectares of coconut plantations, compared to Indonesia's 3.3 million hectares. In addition to volume, the Philippines has also surpassed Indonesia in exporting coconuts and related products, further highlighting the challenges Indonesia faces in the sector.

Teguh emphasized that Indonesia's coconut industry suffers from stagnant productivity, averaging 1.1 tons per hectare, with many of the plantations still relying on conventional cultivation methods. Around 378,000 hectares of coconut trees are old and in need of replacement.

However, Indonesia's current capacity to produce seedlings falls far short of demand. While the nation can produce 1 million seedlings per year, the need stands at 41 million, creating a significant gap.

"If we aim to replace all the old coconut trees, it would take 38 years at the current pace. Therefore, there is a need for acceleration, driven by growing demand from markets in the U.S., Europe, and China, particularly for coconut milk," Teguh said. *(Indonesia Business Post)*

MODI TO RELEASE 2 NEW COCONUT AND COCOA VARIETIES DEVELOPED IN KARNATAKA

The unveiling will take place at the Bharat Ratna C Subramaniam Auditorium, NASC Complex in New Delhi. These varieties will be part of the 109 crop varieties developed by ICAR which will be released by the PM.

The varieties to be released are coconut varieties—Kalpa Suvarna and Kalpa Shatabdi.

A release from CPCRI, Kasaragod, said the Kalpa Suvarna is a dwarf, high-yielding, dual-purpose coconut variety with green-coloured, oblong fruits, with sweet tender coconut water and good quality copra. It is an early flowering variety (30-36 months after planting), suitable for processing for tender coconut water and copra production. The variety yields 108-130 nuts/palm/year, under good management and it is recommended for cultivation in Kerala and Karnataka.

The Kalpa Shatabdi is a tall, dual purpose coconut variety, with large fruits, suitable for copra and tender nut production. It bears greenish-yellow fruits with greater volume (612 mL) of good quality tender nut water. It yields high copra content (273 g). The variety yields 105-148 nuts/palm/year, under good management and is suitable for cultivation in Kerala, Karnataka and Tamil Nadu. *(Deccan Herald)*

COCONUT SHOWCASE SEEN TO HELP FARMERS INNOVATE

The Philippine Coconut Authority (PCA) is confident that showcasing new coconut products will inspire more farmers to produce beyond copra.PCA Eastern Visayas Regional Manager Joel Pilapil admitted that copra remains the primary product from coconut in the region.

"Copra has an unstable price in the market, which makes it hard for coconut farmers to earn and improve their living conditions. We hope that through this activity, coconut farmers will have an idea that they can produce more than just copra from coconut, considering the potential of tree of life," Pilapil said in an interview.

The movement of copra prices has been affecting 367,234 coconut farmers in the Eastern Visayas region. Copra is the dried meat or kernel of the coconut.

As of first week of July 2024, the average farmgate price of copra per kilogram in the region is PHP24.27.

Premium oil is extracted from copra. It also yields coconut cake after oil extraction, which is mainly used as feed for livestock.

The PCA has no available data on the current copra production in the region.

At the Coconut Creations showcase in Region 8, various coconut-based products were displayed, including tuba bahalina (fermented coconut wine), coconut vinegar, virgin coconut oil, and coconut sugar."These are marketable products and have a better price in the market," Pilapil said.

At least 22 exhibitors joined the exhibition at the People's Center on Aug. 27 to 28. Their products have been developed with assistance from the Department of Trade and Industry.

Pilapil said that, in order to catch a wider market for coconut-based products, the Department of Tourism (DOT) is helping them promote the industry by introducing them to local and foreign guests.

DOT Eastern Visayas Regional Director Karina Rosa Tiopes shared that during visits of expedition cruise ships in the region, coconut is one of the products they promote to foreign visitors.

In Capul Island, Northern Samar, locals demonstrated to the guests how to plant, harvest, and the various uses of the coconut, as well as cooking various dishes mixed with coconut.

"Let us look at the coconut with fresh eyes, see it not just as a product but as a source of inspiration. A testament to what we can achieve when we unite our efforts across different sectors," Tiopes said in a separate interview.

Pilapil said that currently, the region is harvesting more than 1.7 billion nuts every year, but this is still way lower than the more than 2 billion nut harvested before Super Typhoon Yolanda struck the region in 2013.

Eastern Visayas is in the 5th rank among the coconut-producing regions in the country. An estimated 65,601,699 coconut trees are planted in the region. *(Philippine News Agency)*

MINISTER HASAN SENDS OFF COCONUT PRODUCT EXPORTS WORTH US$1.5 MILLION

The Indonesian Trade Minister, Zulkifli Hasan, released export consignments of Lampung-produced coconut derivative products, with a total value reaching Rp25.3 billion (around US$1.5 million), to Australia, the Netherlands, China, and Tanzania.

Speaking in South Lampung District, Lampung Province, Hasan stated that the exported products included coconut water, coconut milk, and desiccated coconut.

Hasan stated that the government would continue helping domestic businesses export Indonesian goods to countries that cannot produce them.

"As a coconut-producing country, we wield a comparative advantage of having the capacity to send coconuts to non-producing countries," he affirmed.

The minister also spoke highly of Indonesia's downstreaming policy, which has pushed the country to boost the value of its commodities.

"Through downstreaming processes, we can now process more coconuts into various derivative products besides copra, such as coconut flour, coconut milk powder, liquid coconut milk, coconut water, and nata de coco (coconut gel)," he stated.

Moreover, he affirmed that the downstreaming policy encourages people to ensure that no part of the coconut is wasted. In this context, Hasan said that coconut shells can be processed into activated carbon while coconut fiber can be used as a material for vehicle seats.

Meanwhile, Agus Susanto, a representative for the exporting company PT Sari Segar Husada, remarked that his side would make the send-off activity a routine.

"Today, we dispatched 1,500 metric tons of export consignments for the August period. We will make this activity a routine," he remarked.

Susanto further stressed that his company will maintain product quality to keep importing countries' trust.

"We have received demands from other countries as well, such as France, the United States, and the Philippines. Coconut drinks, desiccated coconuts, and coconut milk have been the most demanded products," he remarked. *(Antara)*

INDONESIA EYES COCONUT-BASED JET FUEL

In an effort to increase the value of the fruit, Indonesia, the world's second-largest producer of coconuts, is investigating the possibility of producing sustainable aviation fuel. Reports showed that Indonesia produced 2.8 million metric tons of coconut in 2023, just behind the Philippines. Indonesia exported $1.55 billion of coconuts that year, representing about 38.3 percent of the global market share. China, Malaysia, and Singapore were among the top Indonesian coconut buyers.

President Joko "Jokowi" Widodo said that there still remained room for growth in exports, and capturing greater added value out of coconut through bioenergy could help Indonesia boost what it ships overseas annually. According to Jokowi, Indonesia needs to take a look at coconut-based jet fuel as the green economy holds great potential for the country.

"Creating greater added value is pivotal to job creation. Research is incredibly important. We need to make use of technologies, especially those related to the coconut downstream sector. I have seen coconut waste used for bioenergy. I think we really need to develop this. We can even turn coconuts into jet fuels," Jokowi told an international coconut conference in Surabaya.

"This is a huge task that we have to address. So we can promote the use of sustainable or coconut-based aviation fuel in other countries," Jokowi said.

Indonesia has begun using sustainable jet fuel, although its content derives from palm oil rather than coconuts. The state-run energy firm Pertamina produces this palm oil-based sustainable aviation fuel. Flag carrier Garuda Indonesia launched its first commercial flight using this type of jet fuel last October.

In his campaign promise, Prabowo Subianto, Jokowi's successor, mentioned sustainable aviation fuel. The letter states that Prabowo, who will take office in October, intends to continue Jokowi's initiatives regarding sustainable jet fuel and biodiesel. However, the report once more demonstrates that Prabowo's bioenergy plan is mostly focused on palm oil. One of the biggest producers of palm oil worldwide is Indonesia. *(Jakarta Globe)*

TRÀ VINH PROVINCE DEVELOPS HIGH-QUALITY COCONUT FARMING

Trà Vinh Province plans to expand coconut areas which are planted to high quality standards and have linkages between farmers and coconut processors to improve farmers' incomes.

The Cửu Long (Mekong) Delta province has more than 27,350ha of coconut and is the country's second largest coconut producer, after neighboring Bến Tre Province.

Coconuts are planted mostly in Tiểu Cần, Càng Long, Cầu Kè and Trà Cú districts.

The province has about 5,100ha of organic coconut.

It aims to have an additional 200ha of coconut planted to organic, following global good agricultural practices (GlobalGAP) or other high-quality standards, according to the provincial Department of Agriculture and Rural Development.

Lê Văn Bá, a member of Tuấn Hằng Agriculture Co-operative in Tiểu Cần District's Tân Hoà Commune, said most farmers growing organic coconuts in the commune have participated in the co-operative.

"When participating in the co-operative, farmers are provided growing techniques and guaranteed sales at a price of 3 - 5 per cent higher than market prices," he said.

Võ Quang Cường, deputy head of the Tiểu Cần Bureau of Agriculture and Rural Development, said his agency has encouraged farmers to grow coconuts to organic standards to increase yield and quality and meet export requirements.

Tiểu Cần has 2,740ha of its 5,800ha of coconut planted to organic standards.

Lê Văn Đông, deputy director of the province Department of Agriculture and Rural Development, said the province has nine coconut growing areas with a total of 1,240ha which meet criteria to apply for growing codes to export to China.

It has a 150ha coconut farm which has been granted a growing area code for export in Cầu Kè District.

Farmers are getting high prices from selling mature coconuts as their prices increased to VNĐ100,000 (US$4) per dozen nuts, up VNĐ30,000 against two weeks ago.

Farmers can harvest about 1,500 mature coconuts per hectare a month, and if their price are VNĐ50,000 - 100,000 ($2 - 4) per dozen nuts, farmers can earn a profit of VNĐ6 - 12 million ($240 - 480).

Sáp coconut

Trà Vinh is well-known for its specialty sáp coconuts, which have soft and thick pulp that qualify them as sáp (sáp literally means wax).

The coconut is used mostly for desserts such as shakes of coconut mixed with milk, sugar and ice, and other products such as candy, jam, cake and dried sáp coconut.

The province has eight products made from sáp coconut that have been recognised as four- and five-star products under the country's "One Commune – One Product" (OCOP) programme.

They are sold nationwide and exported.

Cầu Kè District, which is the province's largest sáp coconut growing area, has more than 1,000ha of the specialty nut.

Companies and co-operatives buy sáp coconut at a price of VNĐ100,000 – 120,000 ($4-5) a nut.

Nguyễn Hoàng Khải, secretary of the Cầu Kè Party Committee, said the district aims to develop sáp coconut cultivation following the province's zoning plan.

It is encouraging farmers to grow sáp coconut with clean farming methods to improve value, he said.

The province will organise the 100-Year Sáp Coconut Tree Festival in Cầu Kè District at the end of this month to hounor and promote sáp coconut.

This coconut has been planted in the district for 100 years.

To develop organic coconut and sáp coconut, the province has strengthened links with coconut processing companies in Bến Tre Province to expand cultivation.

Many coconut processing companies in Bến Tre have contracts with farmers in Trà Vinh through co-operatives to develop more than 2,000ha of organic coconut.

The province has implemented many programmes to support farmers to link with processing companies to grow organic coconut and expand sáp coconut growing area.

It is calling on companies to invest in coconut processing projects.

It plans to expand coconut growing areas to 30,000ha in 2030. *(Viet Nam News)*

JAMAICAN COCONUT FARMERS ARE URGED TO REPORT LOSSES DURING HURRICANE BERYL

The Coconut Industry Board (CIB) is urging registered farmers to reach out to advisory officers within their region to report damage to farms, caused by Hurricane Beryl.

General Manager of the Board, Shaun Cameron, said that with telecommunications down and persons without power across sections of the country, farmers should reach out where they can with information.

Cameron said that the focus currently is on proper damage assessment, which is crucial to effectively planning recovery efforts for the sector.

"We are asking all the registered coconut farmers to reach out to their advisory officers in their region and provide them with any possible information based on damage done to their farms. They should provide the number of trees, the size of their farm and the location, as soon as possible," he said.

As of July 9, the damage across the island is still being assessed, and preliminary figures are not yet available, Cameron said."We haven't got the official numbers yet. My team members are still assessing the damage, but based on preliminary information, we are estimating five to 10 percent damage, so far," he said. *(Loop)*

NIGERIA'S COCONUT PRODUCTION IN LAGOS HAS THE POTENTIAL TO GENERATE $100 BILLION ANNUALLY

According to Dapo Olakulehin, General Manager of the Lagos State Coconut Development Authority, Nigeria may generate more than $100 billion a year from the production of coconuts.

The General Manager stated this on the sidelines of the 2024/2025 Rotary tree planting coastal restoration initiative aimed at planting 1000 coconut seedlings in Lagos and Ogun states.

According to him, Nigeria is currently producing close to 300,000 metric tonnes of coconut per annum representing about $10 billion worth of business transactions.

He went on to say that Nigeria has the potential of operating at $100 billion per annum in coconut production.

"Nigeria is currently operating close to 300,000 metric tonnes of coconut per annum representing a $10 billion worth of business transactions in terms of what we are producing now, but ultimately, coconut has the potential of operating at $100 billion per annum.

"Lagos State government has done a lot and is doing a lot to boost coconut production, processing, commercialization and utilization in the state and the country at large. Lagos is the coconut hub in the whole of West Africa due to the interventions of the state government.

"Just recently, the governor approved the release of 50,000 coconut seedlings to Lagos farmers, so a lot of support has been given to coconut growers, processors and stakeholders. We are also certifying some of these processors to export their coconuts across the country," he noted.

In addition, Femi Adenekan, the District Governor of Rotary International, District 9112, stated that the project to plant 1000 coconut trees along the Atlantic Ocean's coastlines is an effort to preserve the environment.

"We are here to prepare members of the public ahead of our event on Sunday, the 21st of July where we plan to plant 1000 coconut trees along the coastal shores of the Atlantic Ocean.

"This is an initiative we have taken up to protect ourselves because we often think it is to protect the environment, but we all know the environment will remain the way it is, but we are the ones changing the environment, and if care is not taken, the environment will revolt against us.

"So we need to prepare ourselves against the calamity before humanity and this is why we are planting the 1000 trees along the coastal shores. We expect all members of the public to join us in this effort, but our target is to plant 10,000 trees throughout the year," Adenekan noted.

On his part, the District Chair, Public Image Committee of Rotary International, District 9112, M.r Ehi Braimah, said the event was to discuss how to protect the environment, stating the urgent need to save the environment against the devastating impact of climate change.

"What we are doing is to focus on one of the seven areas of focus for Rotary International, which is protecting the environment. We are planning to plant 10,000 seedlings of coconut, mango or any other seed all over the state, public institutions, coastal areas, private estates, schools and everywhere," he averred.

The Chair, Tree Planting Committee, District 9112 Rotarian, Rotary International, Gboyega Bada, said the District is determined to be strongly involved in helping to combat the challenges of climate change to have a safer and cleaner environment.

He added that the vision of the Rotary District on the tree planting for this year is achieving a safer and cleaner environment by planting 10000 seedlings of coconut, mango and other related crops that have economic, health and environmental benefits. *(Punch Nigeria)*

Statistics

Table 1. WORLD Exports of Coconut Oil, 2018-2024 (MT)

COUNTRY	2018	2019	2020	2021	2022	2023	2024[F]
A. ICC Countries	**1,814,092**	**2,056,935**	**1,697,123**	**1,732,641**	**2,152,220**	**2,073,099**	**2,276,255**
Côte d'Ivoire	7,850	11,028	12,539	4,920	4,023	3,344	4,096
F.S. Micronesia	57	-	-	-	-	-	-
Fiji	3,261	2,487	2,533	1,460	1,210	1,948	1,540
India	7,323	6,814	7,870	12,270	20,755	16,202	17,234
Indonesia	675,138	610,812	577,645	611,452	685,797	739,922	699,746
Jamaica	5	6	9	16	29	2	16
Kenya	36	44	55	665	215	74	318
Kiribati	3,493	3,561	2,517	1,829	1,528	1,116	1,491
Malaysia	121,914	223,078	203,362	186,606	134,871	165,973	162,488
Marshall Islands	2,229	1,085	1,115	402	709	-	-
Papua New Guinea	12,566	20,975	17,732	10,099	30,184	31,424	39,000
Philippines	951,320	1,146,642	842,533	881,085	1,252,054	1,090,418	1,327,404
Samoa	141	424	8	115	100	12	76
Solomon Islands	5,432	4,561	5,272	5,225	4,554	5,974	5,251
Sri Lanka	4,606	4,056	5,180	3,825	4,712	5,518	6,973
Tonga	-	-	-	-	-	-	-
Thailand	1,268	1,337	1,745	1,686	740	836	725
Vanuatu	3,669	3,498	1,367	711	428	317	485
Vietnam	13,784	16,527	15,641	10,275	10,311	10,019	9,412
B. Other Countries	**310,031**	**306,380**	**326,681**	**341,093**	**365,705**	**276,542**	**367,435**
TOTAL	**2,124,123**	**2,363,315**	**2,023,804**	**2,073,734**	**2,517,925**	**2,349,641**	**2,643,690**

F: Forcasted figures; Source: ICC, ITC and Oil World

Table 2. Prices of Coconut Products and Selected Vegetable Oils, December 2023 – November 2024 (US$/MT)

Products	2023	2024										
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Copra	626	628	635	654	682	647	632	680	780	838	859	928
Coconut Oil	1,118	1,126	1,175	1,254	1,420	1,396	1,400	1,473	1,610	1,740	1,718	1,836
Copra Meal[2]	252	249	244	232	191	154	135	116	94	87	135	183
Desicc. Coconut[2]	1,749	1,764	1,800	1,874	1,874	1,911	2,006	2,012	2,124	2,131	2,131	2,190
Mattress Fiber[1]	58	56	64	68	67	65	57	64	68	63	73	72
Shell Charcoal[2]	360	360	363	361	365	367	363	370	381	390	393	397
Palm Kernel Oil	966	978	1,034	1,177	1,290	1,196	1,156	1,365	1,480	1,515	1,636	2,015
Palm Oil	814	845	857	943	936	859	874	896	933	983	1,077	1,169
Soybean Oil	1,062	971	912	965	959	988	1,011	1,079	1,031	1,044	1,095	1,145

1: Sri Lanka (FOB); 2: Philippines (FOB); r: revised; Source: ICC and Oil World

Statistics

Table 3. World Oil Balance 2022-2024 (million tons)

Oil/Year	Jan/Dec 2024[F]	Jan/Dec 2023	Jan/Dec 2022
Palm Oil			
Opening Stocks	15.17	14.91	12.69
Production	80.85	81.58	79.16
Imports	48.94	51.69	49.43
Exports	49.15	51.25	50.56
Disappear	81.94	81.77	75.68
Ending Stocks	13.86	15.17	15.04
Soybean Oil			
Opening Stocks	6.85	6.41	7.03
Production	63.99	59.68	59.54
Imports	12.59	11.55	12.24
Exports	12.65	11.43	12.61
Disappear	64.01	59.36	59.75
Ending Stocks	6.78	6.85	6.45
Groundnut Oil			
Opening Stocks	0.33	0.37	0.37
Production	4.51	4.44	4.68
Imports	0.37	0.35	0.36
Exports	0.38	0.34	0.39
Disappear	4.48	4.49	4.67
Ending Stocks	0.36	0.33	0.35
Sunflower Oil			
Opening Stocks	4.32	3.89	3.05
Production	23.13	22.67	20.09
Imports	15.72	14.42	11.58
Exports	15.76	14.48	11.60
Disappear	23.29	22.19	19.14
Ending Stocks	4.12	4.32	3.99
Rapeseed Oil			
Opening Stocks	4.31	3.31	3.42
Production	31.35	30.96	26.82
Imports	7.18	7.49	5.41
Exports	7.28	7.43	5.44
Disappear	31.49	30.02	26.78
Ending Stocks	4.07	4.31	3.43
Cotton Oil			
Opening Stocks	0.36	0.35	0.34
Production	4.52	4.44	4.37
Imports	0.12	0.11	0.16
Exports	0.12	0.10	0.15
Disappear	4.52	4.43	4.37
Ending Stocks	0.36	0.36	0.35

Oil/Year	Jan/Dec 2024[F]	Jan/Dec 2023	Jan/Dec 2022
Palm Kernel Oil			
Opening Stocks	1.54	1.50	1.34
Production	8.37	8.41	8.24
Imports	3.32	3.19	2.96
Exports	3.35	3.24	3.19
Disappear	8.44	8.32	7.88
Ending Stocks	1.43	1.54	1.48
Coconut Oil			
Opening Stocks	0.53	0.44	0.38
Production	3.28	3.26	3.38
Imports	2.33	2.18	2.35
Exports	2.34	2.21	2.52
Disappear	3.20	3.14	3.15
Ending Stocks	0.60	0.53	0.44

Source: ICC and Oil World *F: forecast figures*

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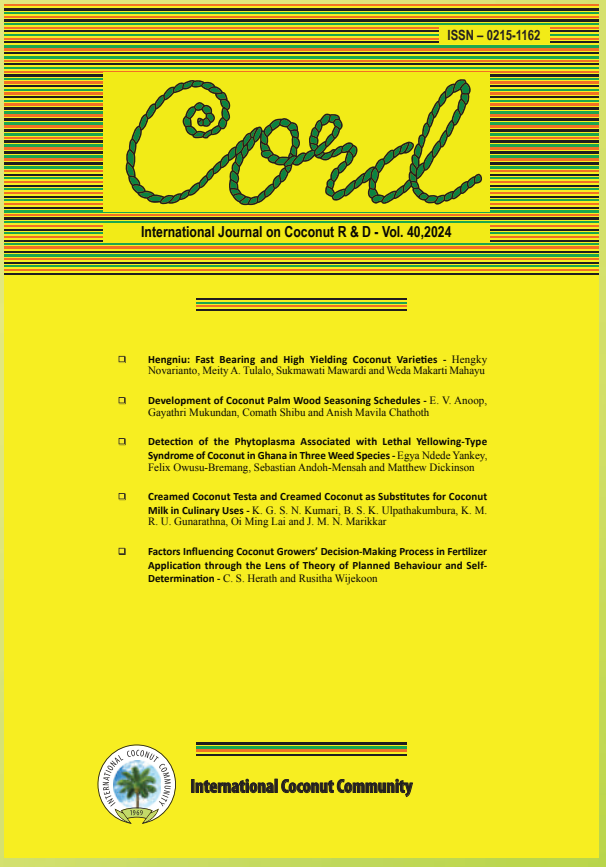

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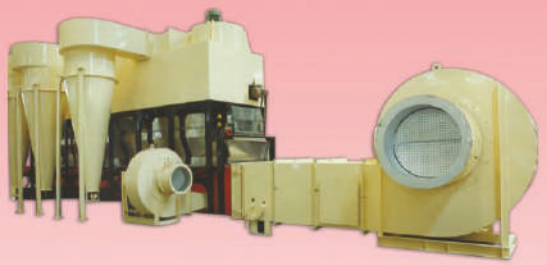

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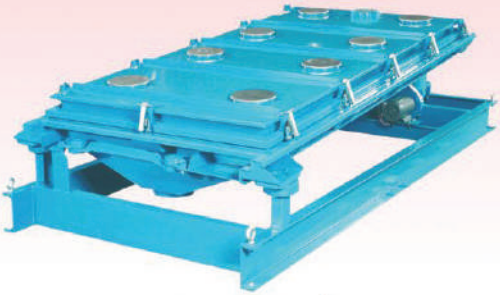

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