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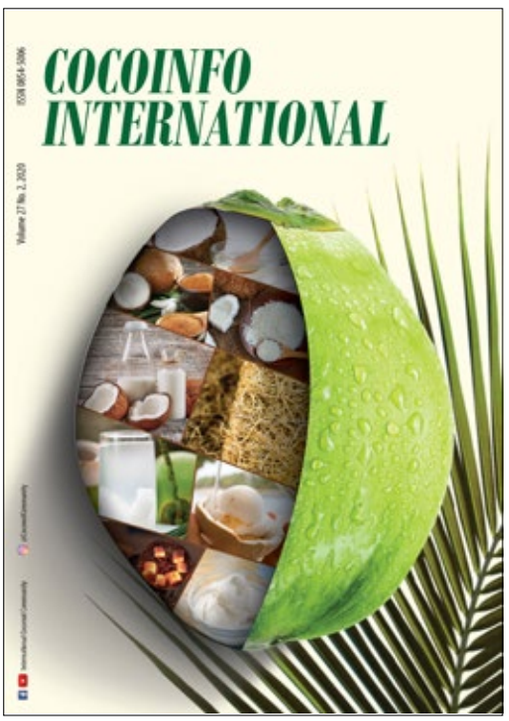

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ECONOMIC AND ECOLOGICAL SIGNIFICANCE THROUGH INTERCROPPING IN COCONUT PLANTING SYSTEM

Coconut farming provides livelihood security to several millions of people worldwide and the capacity of coconut in providing improved nutrition, employment, and income generation are well known. Since coconut growers are more exposed to economic risks due to fluctuating market prices, biotic-abiotic stresses, especially in monoculture systems, an intercropping-based farming system is seen as an option to reduce the negative impacts and to improve resilience in smallholdings.

Due to COVID-19 pandemic-induced lockdown and subsequent disruptions in the supply chain, the agriculture sector has suffered a considerable loss. Farmers are facing logistics problems due to the lockdown, where some governments have been implementing various measures. Some regions have been traditionally food insecure due to their unique agro-ecological features favoring the cultivation of perennial commercial crops, and they heavily depend on other regions to meet basic food requirements. Expanding the land area for enhancing food production is very much limited in some areas. Hence, efforts are needed to increase food security and income per unit area per unit time by intercropping and integrating livestock.

The monoculture farming system does not fully utilize the basic resources such as soil and sunlight available in the garden. The coconut's active root zone is confined to 25 percent of the available land area, and the remaining area could be profitably exploited for raising subsidiary crops. Farm resources like land, labor, sunlight, water, and nutrients can be effectively utilized in such a system. Higher productivity and sustainability could be achieved due to synergistic interaction among the crop diversity, which involves several annual, biennial, or perennial crops as inter/mixed crops in perennial stands of coconut.

Selection of apropriate planting distance pattern may increase penetration and optimize distribution of sunlight into the soil and provides opportunities for exploitation of land and solar energy for inter/mixed cropping which will significantly increase intercrops productivity. Various crops are suitable for intercropping, including food crops, tuber crops (suggested by our writers in this Cocoinfo edition), rhizome spices, cereals, vegetables, pulses, fruit crops like banana, pineapple, medicinal & aromatic plants, orchids, anthuriums, and other cut ornamental flowers. While crops suitable for multiple cropping are cocoa, pepper, clove, nutmeg, cinnamon, betel vine, jack, breadfruit, citrus, and coffee.

The benefits behind intercropping or polyculture farming system is that coconut is primarily a smallholder crop, income derived from smallholdings is quite insufficient to sustain even small families. Thus the coconut-based multispecies farming system is the alternative to boost the revenue from unit holdings from unit time.

Other advantages of the polyculture cropping system are enriching the soil fertility through organic recycling and biomass production, increasing productivity through soil enrichment, helping the farmers to get sustainable income, creating more employment generation, effective utilization of available resources, bringing competitiveness through low cost of production, and sustained income from a unit area in unit time.

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

MANAGEMENT OF LEAF BLIGHT DISEASE CAUSED BY *LASIODIPLODIA THEOBROMAE* IN COCONUT

A. Karthikeyan[1]

Coconut is an important plantation and oilseed crop grown in India with an area of 2.178 million hectares and an annual production of 21384 million nuts. The productivity was also high as 9815 nuts / ha during the year 2018-19 (Coconut Development Board, Kochi, India, 2018-19). In India, four southern states viz., Tamil Nadu, Kerala, Karnataka and Andhra Pradesh are contributing about 90 % of coconut area and production. Due to the intensification of coconut cultivation in India, incidence of pests and disease are also increasing and causing significant reduction in coconut yield.

Coconut production in India is limited due to various diseases caused by fungi and phytoplasmas. *Ganoderma* wilt or Basal stem rot (*Ganoderma lucidum*), root wilt (*Candidatus phytoplasma*), bud rot (*Phytophthora palmivora*) and stem bleeding (*Thielaviopsis paradoxa*) are the major diseases affecting the coconut palms. In addition, several pathogens including *Fusarium*, *Pestalotiopsis*, *Alternaria*, *Collectotrichum* and *Helminthosporium* have been reported to cause foliar diseases on coconut in India. Leaf blight caused by *Lasiodiplodia theobromae* (Pat.) is a serious disease in southern India especially Tamil Nadu and Kerala states which is affecting the coconut production under severe condition. The leaf blight disease was first reported at Ponnapuram and Angalakurichy villages of Coimbatore district of Tamil Nadu during the year 1995. The organism was identified as *Lasiodiplodia theobromae* based on cultural and morphological characters (IMI 321848) by Nakkeeran et al. 1998. Severe incidence of leaf blight disease was found to cause 10 to 25 per cent yield loss in adult coconut palms (Lakshmanan and Jagadeesan, 2004). Survey conducted at Coconut Research Station, Veppankulam during 2017-2019 revealed that the leaf blight disease was widespread in all the districts of Tamil Nadu and the disease incidence ranged from 20.5 to 52.4% in East Coast Tall coconut variety.

SYMPTOMATOLOGY

Leaf blight pathogen infection was noticed in coconut seedlings and adult coconut palms. The disease caused severe damage in adult palms of above 30 years old and mild damage in young palms. The symptoms on the seedlings initially appear on lower leaves as brown, spindle shaped, necrotic spots of various sizes running parallel to the longitudinal veins, with dark brown margin surrounded by yellow halo. In advanced stage of infection, the lesions extend to the rachis and the leaves become completely dried.

Figure 1. Leaf blight affected palm

Figure 2. Severely affected lower fronds

Figure 3. Affected leaflets

Figure 4. Cross section of infected petiole

Figure 5. Infected button

Figure 6. Infected Nut

The pathogen infected leaflets, petiole, buttons and nuts in adult palms. Heavily infected coconut palms exhibited delayed flowering when compared to healthy palms and the incidence was severe in older / matured fronds and the younger fronds were mostly free from disease. The affected leaflets showed yellow dots initially and start drying from the tip towards middle rachis. Drying spread to entire leaflet and shows a charred or burnt appearance from distance. Irregular necrotic spots with dark brown margins appeared on leaflets of older fronds and turned into dark brown in colour, on maturation with black powdery mass. As the disease become severe, most of the fronds would be affected and ultimately resulted in nut reduction. Under severe conditions, symptoms of dark grey to brown lesions with wavy or undulated margins appear on nuts from the apex. The affected nut was desiccated, shrunken, deformed and dropped prematurely. The pathogen penetrated into the kernel through mesocarp which resulted in decaying of endosperm.

The pathogen *Lasiodiplodia theobromae* (Taxonomy – Ascomycota; Dothideomycetes; Botryosphaeriales; Botryosphaeriaceae) affects many field and horticultural crops in tropical and sub-tropical regions including damage during storage and leads to heavy economic losses. The pathogen could cause severe damage and lead to significant losses especially when the host plants are in stress condition.

Characterization of pathogen

The fungus produces raised, uniform cottony white mycelium in 3-4 days and gradually changed to light grey colour in 4-7 days and finally become dark grey or black in 14-20 days after incubation. Fruiting body of the fungus is pycnidia which are produced at 22-24 days after incubation. The size of the pycnidia varied from 82-204 micron in diameter. Conidia are produced from pycnidia. The matured conidia are separate, oval in shape and dark brown in colour. The length and breadth of the conidia ranged from 24.86 – 26.43 micron and 12.83 – 14.35 micron respectively (Ramjegathesh *et al*., 2019).

EPIDEMIOLOGY

Information's on epidemiological factors related to leaf blight disease incidence are very limited. The disease spreads through air borne conidiophores. The disease occurs during both summer and winter seasons. High temperature (34.50C) and low relative

Figure 7. Mycelial growth

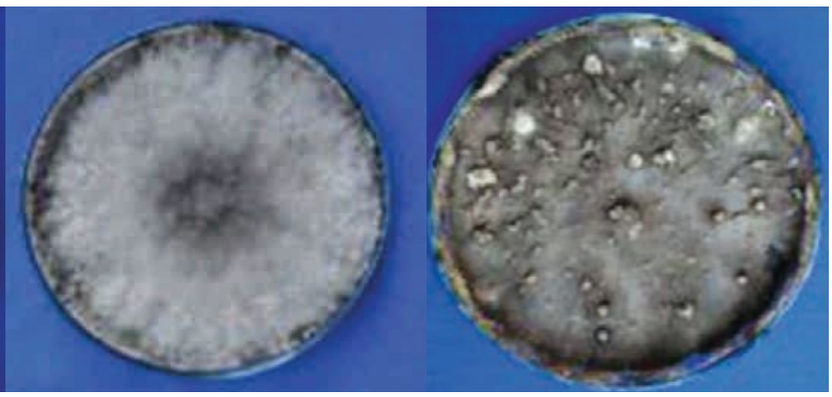

Figure 8. Matured fruiting body (scattered)

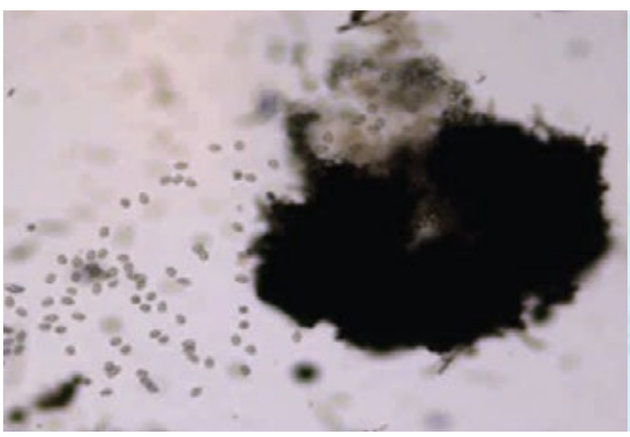

Figure 8. Releasing of spores from Pycnidia

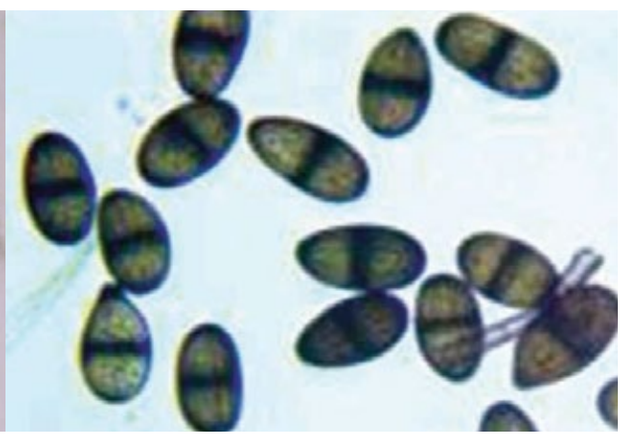

Figure 9. Matured Conidia

humidity (76.14 %) in summer months favoured disease development. In summer months, the symptom development was as small necrotic spots which coalesce together and the lesion spreads to maximum leaf are at a faster rate than during winter months. The disease incidence was more in coconut palms associated with water stress / drought condition. Even though coconut seedlings, young and adult palms were infected; adult palms of above 30 years old were badly affected. Malayan Orange Dwarf, Malayan Yellow Dwarf, Chowghat Green Dwarf and Chowghat Orange Dwarf varieties were less affected than other Tall varieties and hybrids. Ruling coconut varieties in Tamil Nadu viz., East Coast Tall and West Coast Tall were highly susceptible to the disease.

DISEASE MANAGEMENT

The following cultural, chemical and biological methods should be adopted for the effective management of leaf blight disease.

Cultural method:

Removal and burning of severely affected fronds will be helpful to prevent further disease spread.

Providing adequate irrigation to the palms during summer months in order to avoid water stress.

Application of recommended dose of NPK fertilizers at 0.56: 0.32: 1.2 kg N, P_2O_5, K_2O along with 50 kg farmyard manure per palm per year will be useful. Increased dose of potash @1.8 kg K_2O per palm per year is also suggested for providing disease resistance to the palms.

Chemical method:

Spraying of fungicide copper oxy chloride 0.25 % (or) carbendazim 0.1% (or) hexaconozole 0.1% to the young palms three times at 45 days interval is advised. Sticking agent @1 ml / litre of spray fluid should be added.

Root feeding of carbendaizm 2 g or hexaconozole 2 ml + 100 ml of water to the adult palms three times at quarterly interval.

Biological method:

Soil application of 200 g talc-based formulation of Pseudomonas fluorescens along with 50 kg of farm yard manure per palm per year is recommended.

CONCLUSION

The leaf blight pathogen *Lasiodiplodia theobromae* is not lethal but the disease severity leads to reduced photosynthetic activity causing loss in terms of coconut production. Epidemiological studies viz., weather parameters, soil nutrient status, age of palms and cropping system in relation of the disease incidence are very useful for its management. Characterization of leaf blight pathogen(s) is also essential to develop suitable integrated disease management strategies.

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METARHIZIUM FOR CONTROLLING COCONUT RHINOCEROS BEETLE
A MAJOR PEST OF COCONUT AND OIL PALM TREE

Saowanit Popoonsak[1]

Figure 1. Coconut rhinoceros beetle

Coconut rhinoceros beetle (*Oryctes rhinoceros* L.) is a major pest that damages coconut and oil palm trees. Every stage of the rhinoceros beetle: egg, larvae, pupae and adult hide themselves inside dark areas of rotting palm materials including trunks, compost heaps, sawdust and garbage dumps. Only adult beetles feed on young trees. The life cycle of rhinoceros beetle lasts for 4-9 months. The average life cycle is about 6 months.

Adult

Adults are nocturnal in nature and they look for food in the evening and before dawn. Coconut rhinoceros beetles feed on the coconut shoots or plants belonging to palm tree family (Arecaceae). The rhinoceros beetles attracted towards fluorescent light after rain. Rhinoceros beetle outbreaks usually happen because of poor management of coconut plantations which are their breeding sites. Adult beetles can fly only for a period of 2-3 hours. Adult stage lasts for 90-180 days. Female coconut rhinoceros beetle lay their eggs 10-30 eggs underground but can lay up to 152 eggs.

Eggs

Coconut rhinoceros beetle eggs are usually yellowish white. The egg is 2-3 mm wide and 3-4 mm long and are oval shape. Normally, O. *rhinoceros* eggs are laid in deep soil or in rotting materials at a depth of 5-15 centimeters. Sometime adult beetles lay eggs inside coconut shells or in dead coconut trunks. The eggs stage lasts for 10-12 days.

Larva

Oryctes rhinoceros larvae (grubs) are milky white with red heads. The body is C-shaped, with three pairs of segmented legs, and has greyish posteriorly. The larval stage is a decomposer in soil and can damage root system of young coconuts and oil palm plants. The larval stage lasts for 80-150 days.

Pupa

The *O. rhinoceros* pupa is yellowish-brown. The cocoon constructed from vegetative or soil matters, which differs in appearance depending on the breeding sites. The last stage of larva takes place inside rotting coconuts or oil palm materials, subsequently pupating within a pupal chamber made from fibers of coconuts or palms. The pupae stage lasts for 23-28 days (Chayopas, 2001).

Breeding site

The breeding sites of rhinoceros beetles are mating areas, laying egg areas and food sources. The reason for an outbreak is mostly due to poor negligence of agricultural field subsequently the tree wastes lying in the coconut or oil palm plantations which become their breeding sites. The wastes include decaying coconut or oil palm stumps, palm oil carcasses, piles of old manure, piles of compost, manures, coconut dusts, coffee bean shells, palm residues, and decaying organic materials. Moreover, the cutting down of old trees in the plantation and not clearing them may result in an increase in the number of breeding sites for rhinoceros beetles (Chayopas, 2001).

Damage

The injurious stage of the coconut rhinoceros beetles is an adult. The adult damages coconut and oil palm trees by flying and boring into the unopened fronds/

Figure 2. Damages causes by coconut rhinoceros beetle

spindle region/sphear leaf/spathes/nuts. Damages are shown in developing leaves which lead to the imperfect leaves. The affected fronds show the characteristic diamond shaped/V-shaped upon unfolding. If the growing tip has a severe damage may result in leaf dwarfing and prevents production of nuts. In the bored holes at the base of the palm fronds more than one beetle may be found. The trees may die if the growing leaves are destroyed by secondary infection by a red palm weevil, bud rot and leaf rot disease (Chayopas, 2001).

Coconut rhinoceros beetle larvae, which has a habitat in soil, damages coconuts and oil palms by feeding on plant roots resulting in stunted plants. This symptom can be observed in newly growing leaf showing wilt and brown leaves. In term of severe damage, the tip can be removed easily.

Prevention and Control

Rhinoceros beetles can be controlled at both the stages: larvae and adult. The larval stage, it can be controlled by spraying *Metarhizium* in their habitats which include piles of decomposed vegetation, piles of manure and decayed coconut logs or stumps. A piece of coconut trunk or decaying organic material can be used as a trap to attract beetle adults to laying eggs then treated with *Metarhizium* fungus providing an essential means of controlling larval and pupal stages of rhinoceros beetles that living in the soil. Traps with pheromone lures can used to control beetle infestations by collecting adults and eliminating them from the fields by burning or barrowing. However, the pheromone traps are not generally very effective because they need to implement in area wide as adult beetles can fly considerably long distances about 10 kilometres (Komsun, 1989). So, using single pheromone trap will not be effective for small-scale farms. To effectively implement the traps with pheromone lures, can be used in farmer participatory mode. Using *Metarhizium* to control rhinoceros beetles is a long-term approach because it tends to kill the insect host slowly. Eventually, it helps to reduce the number of rhinoceros beetles and can breakdown the beetles' life cycle (REF). *Metarhizium* environmentally safe and user friendly and can survive in the soil for a long time and is specific to insect pests (narrow host range).

Metarhizium

The Department of Agriculture has selected *Metarhizium anisopliae* strain DOA-M5 which was isolated from infected rhinoceros beetles in coconut plantations in Lam Luk Ka, Pathum Thani Province, central Thailand. This strain is specific to rhinoceros beetle (which is a major pest of coconut and palm trees). The laboratory experiments and the field trial, result shows that M. *anisopliae* DOA-M5 can effectively control rhinoceros beetles in all the three stages: larval, pupal and adult (Popoonsak *et al*., S. 2010).

Characteristics of Metarhizium

Metarhizium is a small microorganism. The typical characteristic of *Metarhizium* is hyaline septate hyphae and it produces conidia for reproductive purpose. Conidia morphology of the *Metarhizium* is a long oval conidiogenous cell forming chain of conidia. In the early stage, conidia are white and then turn to dark green which is where its name derived from. *Metarhizium* is a beneficial entomopathogenic fungi usually use as a biocontrol agent for soil-inhabiting insects, for example, red palm weevil and sugarcane stem boring grub. Other species of *Metarhizium* are reported that they can be used to control other insect pest group such as grasshoppers, Hemipteran insects and plant hoppers (Boucias and Pendland, 1998).

Mode of action of *Metarhizium*

There are six stages of mode of infection in *Metarhizium* including adhesion, germination, appressorium formation, penetration, colonization of haemolymph,

and extrusion and sporulation (Aw and Hue, 2017). Generally, *Metarhizium* kill the insects by penetrate into the cuticle of insects. Firstly, *Metarhizium* conidia adhere to the host cuticle, and under the favorable conditions, they germinate and thereby the mycelium develops and the hyphae that emerge penetrate the cuticle. Then host epicuticles are degraded by cuticle degrading enzymes such as chitinase, proteinase, caseinase, lipase and amylase (Boucias and Pendland 1998; Mustafa and Kaur, 2009; Aw and Hue, 2017). The fungus then develops inside the inner body of their host and drains the host nutrients. In the meantime, *Metarhizium* hyphae may damage host tissue or organ, and they proliferate throughout the host's body. The cadaver from *Metarhizium* infestation notice easily by a dry and hard body because *Metarhizium* hyphae develop inside the host body which is usually called "mummy". After that, the hyphae extrude the host cuticle to the outer environment. At first, the white mycelia cover on the insect cadavers then turn green as spores are produced (Chanpaisaeng J.,1993; McCoy, 1981).

Usage of *Metarhizium*

Previously, the Department of Agriculture has recommended using a fresh culture inoculum of *Metarhizium* culturing on cereal grains for rhinoceros beetles controlling. The advantage of this formulation is that it can be used for successful mass production of *M. anisopliae* on different grains such as rice, maize and wheat. However, crushed corns were used for the mass production of *M. anisopliae* because the highest sporulation of *M. anisopliae* was observed (when compared on different grains with the same number of media). However, there are several limitations of *Metarhizium* application using a fresh culture inoculum including shelf life, transportation, storage space and conditions. The fresh culture inoculum has a short shelf life when stores at room temperature because the *Metarhizium* grow rapidly on a media, hence, when the media run out, the fungi due to lack of nutrition die eventually.

Therefore, the Plant Protection Research and Development Office, Department of Agriculture, Thailand has developed a mass production technology that can produce pure cultures for the fresh culture of *Metarhizium* in a pellet formulation. This formulation is breakdown easily when get moist and easy to use; for example, it can sprinkle easily to breeding sites of rhinoceros beetles. Moreover, it is user friendly and safe because there is a low risk on dispersal of fungal spores into user's respiratory system. Recent experimental study showed that the pellet formulation consists of pumice, fresh fungal culture, palm oil and distilled water and are most suitable for pellet bio-pesticide. The application of pellet bio-product of *Metarhizium* showed no significant difference in rhinoceros beetle controlling effectiveness, with comparison of fresh culture inoculum (Popoonsak *et al*. 2018). Furthermore, the benefit of this formulation is having a long shelf life than fresh culture inoculum, and it is easy to transport. Taken together, the pellet bio-product is an alternative to mass production of *Metarhizium* to reduce the outbreak of rhinoceros beetles.

Figure 3. Metarhizium in a pellet form

Mass production of *Metarhizium* in fresh culture inoculum

Mass production of *Metarhizium* can be made easily by following these steps. Firstly, prepare crushed corns with water at a ratio 1:1. Then, put all ingredients into a heat resistant food storage plastic bag. After that, tighten the media bag with a cotton ball and cover the cotton ball with paper. This media bag then is sterilized with a temperature of 121°C for 20 minutes by using saturated steam under 15 pounds/square inch (lb/in2) of pressure. After sterilization, leave the media bag for a while to cool down. Then, add *Metarhizium* spores (which are taken from stock culture) into the sterilized media bag and shake it well to spread out the *Metarhizium* in the bag. The last step is incubating at room temperature for two weeks. Then the bag containing media becomes full of green fungus and it is ready to use for controlling coconut rhinoceros beetles.

Mass production of *Metarhizium* as a pellet form

A mass production technology of *Metarhizium* in a pellet formulation has developed continuously by the Plant Protection Research and Development

Figure 4. Production of a pellet

Office to obtain the suitable technology to control rhinoceros beetles. The main steps in Mass production of *Metarhizium* as a pellet form are: the first step is preparation of mass culture of *Metarhizium* by using crushed corns with water at a ratio 1:1. Then, mix the *Metarhizium* fresh culture inoculum with other ingredients such as pumice and palm oil to pelletize easily. After pelleting, the pellets are dried using an oven or a dryer at a suitable temperature to the desired moisture level. The pellet products then are packed with aluminum foil and then vacuum the bag with a vacuum sealer. The pellets should be kept in dry place to avoid moisture to increase the shelf life of *Metarhizium*. Recent study showed that *Metarhizium* as bio-agents can be stored for about a year and it is effective for controlling rhinoceros beetles.

Application of *Metarhizium* for rhinoceros beetles controlling

Trap preparation:

1. Prepare raw materials that is available locally, such as logs or branches. Then make a trap pile with 2 meter long, 1.5 meter wide and 1.5 meter high.
2. Mix the manure and chopped coconut at ratio of 0.5: 1, and then put the mixture into the prepared traps.
3. Water the pile to increase humidity and facilitate the fermentation process, then leave the pile for 1-2 months. After that, some female rhinoceros beetles start lay eggs, and eggs can be found in the pile.

How to use *Metarhizium* to control rhinoceros beetles:

1. Once larvae of rhinoceros beetles are found in the trap, *Metarhizium* in a fresh culture inoculum or in a pellet form can be applied at the rate of 400 grams per trap pile.
2. Spread out *Metarhizium* and ensure that the fungi are over the pile and then water the pile to increase humidity.
3. Cover the trap pile with coconuts leaf or leaf litter to protect the sunlight and maintain humidity in the trap.
4. After that, the larva of rhinoceros beetles is infected initially by *Metarhizium*, showing brown scars on the insect body. After 3-4 weeks, the complete infestation of *Metarhizium* can be found, covering with green conidia on the insect body.
5. The insect trap piles should be made continuously by fulfilling the pile with some organic matters and manures and adding *Metarhizium* to control the newly emerged rhinoceros beetle. The pile should be fulfilled or replaced the organic matters every 3-4 months, as well as adding the *Metarhizium* into the pile to improve the controlling effectiveness.

In brief, the introduction of *Metarhizium*, as a biological control agent, using fresh pellet formulation to control the coconut rhinoceros beetles, a destructive insect pest of coconut and palm tree. It is an alternative method for coconut and palm growers and can avoid using insecticide. On March 9, 2017, the Department of Agriculture (DOA) Thailand, registered for a petty patent for "The *Metarhizium* fungal fresh cultures in a pellet formulation", and the petty patent was approved from Department of Intellectual Property, Ministry of Commerce, Thailand for a Petty Patent serial no.16907 on 6th November 2020. This petty patent under supervision of DOA and will be distributed to the coconut growers, general interested parties and entrepreneurs who interested in using the fresh pellet technology for commercial productions.

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Figure 5. Infected larva

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DOUBLING THE FARMERS INCOME THROUGH COCONUT FARMING BY INTERCROPPING OF TURMERIC: A PROFITABLE SPICE CROP UNDER COCONUT GARDEN

P. P. Bhalerao[1] and H. P. Maheswarappa[2]

Coconut (*Cocos nucifera L.*) is the major plantation crop of coastal India which is often remunerative under crop diversification. Coconut farming provides livelihood security to several millions of people across the world and the capacity of coconut in providing improved nutrition, employment and income generation are well known. The coconut palm exerts a profound influence on the rural economy of the many states where it is grown extensively and provides sustenance to more than 10 million people in the country. The processing and related activities centered on the crop generate employment opportunities for over three million people in India. Since coconut growers are more exposed to economic risks due to fluctuating market price, biotic-abiotic stresses, only systematic coconut-based cropping and farming system make it an economically viable crop in small holdings.

CROPPING/FARMING SYSTEMS

Coconut interspaces provide ample scope for mixed and intercropping and about 70-75% of the plantation area can be utilized for cropping systems. The pioneering effort of ICAR-CPCRI and All India Crop Research Project has resulted in the development of technologies for coconut based inter/mixed, multi-storied, multi-species cropping systems and these are being widely adopted by the farmers. The high-density multi-species cropping system and coconut-based mixed farming system, involving annuals/biennials/perennials grown in different tiers by exploiting soil and air space more efficiently and integrating with poultry and animal husbandry, helps to maximize profits and can even buffer the price crash of the main crop. For maximizing economic returns, high value turmeric spice crop has been recommended in the palm-based cropping system. The net return per rupee invested from the cropping/farming system ranges from 1.7 to to 2.7 and already proved by researchers that growing of turmeric crop in coconut improve the productivity of coconut. Many sustainable cropping system models incorporating various intercrops have been identified for coconut plantations that can provide more than 75% light intensity. Growing turmeric crops of higher market demand and requiring lesser light is a promising venture which can be effectively adopted in coconut plantations. Growing turmeric in the interspaces of coconut improved availability of soil moisture in coconut rhizosphere due to

frequent irrigation which also resulted in reduced button shedding and increased fruit setting in such palms. Intercropping also encourages crop diversity, by providing habitat for a variety of insects and soil organisms that would not be present in a single-crop environment. This gives ample opportunity to grow turmeric as an intercrop in the coconut gardens. The recyclable biomass from coconut-based cropping system varies from 15-20 t/ha., which can be conveniently converted into vermicompost and can be recycled in the system, which will pave way for organic nutrition for improving the health of the soil and for sustained productivity.

TURMERIC

Turmeric (*Curcuma longa L.*) commonly known as Haldi is an annual herbaceous plant and belongs to Zingiberaceae family. India is a leading producer and exporter of turmeric in the world. It is cultivated throughout India covering an area of 2.08 lakh hectares with an annual production of 1029 million tonnes and productivity of 5.1 metric tonnes per hectare. In India, Andhra Pradesh, Maharashtra, Orissa, Tamil Nadu, Karnataka, Gujarat and Kerala are the important states which cultivate turmeric. Although coconut area of coastal states has potential scope for cultivating turmeric, it has not been done commercially but for few farms. Utilization of available inter space in coconut which is otherwise fallow by cultivating improved varieties of turmeric will fetch good profit to the coconut farmers.

VARIETIES

A number of cultivars are available in the country and are known mostly by the name of locality where they are cultivated. Some popular cultivars suitable for cultivation are: Suvarna, Suguna, CO-1, BSR-1, Sugandham, Roma, Suroma, Rajendra Sonia, Krishna, IISR Prabha, IISR Prathibha, Salem, Kesar, GNT-1, GNT-2 etc.

IMPROVED PACKAGE OF PRACTICES FOR CULTIVATION OF TURMERIC UNDER COCONUT GARDEN

1. Land preparation and planting

The land is prepared with the receipt of early monsoon showers, wherin soil is brought to a fine tilth by giving about one deep ploughing. The ideal time of planting would be the month of May or upto last week of June. Immediately with the receipt of pre-monsoon showers, beds of 1.0 m width, 15 cm height and of convenient length are prepared with spacing of 50 cm between beds. Planting is also done by forming ridges and furrows.

2. Seed material

Whole or split mother and finger rhizomes are used for planting and well developed healthy and

disease-free rhizomes are to be selected. The planting should be done on the beds with a spacing of 30 cm x 15 cm. The optimum spacing in furrows and ridges is 45-60 cm between the rows and 25 cm between the plants. A seed rate of 800-1000 kg of rhizomes is required for planting one hectare of turmeric under coconut garden.

3. Manuring and fertilizer application

Farmyard Manure (FYM) or compost @ 20-25 t/ha is applied by broadcasting and ploughed at the time of preparation of land or as basal dressing by spreading over the beds or into the pits at the time of planting. Fertilizers @ 60 kg N, 60 kg P2O5 and 60kg K2O per hectare are to be applied in split doses i. e. 60 kg P and K may be applied at the time of planting (basal) and 30 kg of N is apply at 30 DAS and remaining half dose of N may be applied at 60 DAS. The other organic manures like Neem cake or castor cake may also be applied @ 200 kg/ha at the time of planting. In such case, the dosage of FYM can be reduced. Integrated application of coir compost (@ 2.5 t/ha) combined with FYM, biofertilizer (Azospirillum) and half recommended dose of NPK is also recommended.

4. Mulching

The crop is to be mulched immediately after germination with green leaves or sunhemp green manure or paddy straw @ 12-15 t/ha.

5. Weeding and irrigation

Weeding has to be done thrice at 60, 90 and 120 days after planting depending upon weed intensity. In the case of irrigated crop, depending upon the weather and soil conditions, about 15 to 23 irrigations are to be given in clayey soils and 8-13 irrigations in black soil.

6. Harvesting and Yield

Depending upon the variety, the crop becomes ready for harvest in 7-9 months after planting during January-March. Early variety mature in 7-8 months, medium varieties in 8-9 months and late varieties after 9 months. Yellowing and drying of leaves are the signs of crop maturity. The land is ploughed, and the rhizomes are collected by hand picking or the clumps are carefully lifted with a spade. The harvested rhizomes are cleared of mud and other extraneous matter adhering to them. The yield of turmeric depends on soil type, management practices etc. but the average yield of turmeric under coconut garden is about 10-12 t/ha in Gujarat coastal region.

Economics of coconut- turmeric cropping system (Rs. /ha)	
Cost of production	114000 [78000(Coconut) +66000(Turmeric)]
Gross income	218500 [143500(Coconut) +150000(Turmeric)]
Net income	149000 [65500 (Coconut) +84000 (Turmeric)]

7. Estimated income from turmeric as an intercrop in coconut

At AICRP on Palms centre, Navsari, turmeric was grown as intercrop in coconut garden. The expected yield of turmeric under coconut garden is about 10-12 t/ha, and as per the present price @ Rs. 15-20 per kg for turmeric, the minimum average additional gross income per hectare of turmeric is Rs. 1,50,000/- per year which is an additional income besides regular income from coconut. If the rhizomes and fingers (seed material) are processed to powder form and can be sold in market @ Rs. 150-200 per kg. The main crop i.e. coconut gives a gross income of Rs. 1,43,500 (@ 82 nuts per palm per year and @ Rs. 10 at the present price of coconut). In addition, turmeric adds valuable biomass like leaves which can be utilized for composting and recycling in the system thus reducing fertilizer costs.

Thus, coconut garden offers tremendous scope for intercropping with turmeric, the shade loving crop, which possesses sustained demand. Agro climatic condition congenial for coconut-turmeric cultivation is vastly available in South as well as few pockets of Saurashtra region of Gujarat state.

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FOOD SECURITY THROUGH INTERCROPPING OF TUBER CROPS IN COCONUT GARDENS
OPPORTUNITIES UNDER 'SUBHIKSHA KERALAM' INITIATIVE

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Agriculture sector has suffered huge loss due to the COVID-19 pandemic induced lock down and subsequent disruptions in the agricultural supply chain. Taking into cognizance the problems experienced by farmers and other stakeholders due to the lock down, the Government of Kerala has been implementing various measures to overcome the crisis in farm sector. Kerala State has been traditionally food insecure due to its unique agroecological features favouring cultivation of perennial commercial crops and it heavily depends on other States to meet its basic food requirement. Of course, there has been an impressive gain in vegetable production in the State during the last few years due to implementation of specific schemes. In spite of this, the State produces only 60 per cent of its vegetable requirement. Further, Kerala depends on other States for 85 percent of the total quantity of its total food grain requirement. It is a risk in the long run for the State to depend heavily on other States for the supply of food commodities especially considering the continuing COVID 19 pandemic scenario.

Under these circumstances, Kerala government has initiated a comprehensive programme viz., 'Subhiksha Keralam' with the aim to increase food production and attain food self-reliance to the extent possible. Effective utilization of available land; fallow land, homesteads or terraces of houses, to increase food production is the basic approach of the initiative. Besides enhancing food production,

interventions for processing and value addition to enhance income and employment opportunities are also envisaged under the initiative.

It is envisaged to implement the initiative ensuring large scale people's participation and through the coordinated efforts of various government departments viz., Agriculture, Animal Husbandry, Dairy Development, Fisheries, Water Resources, Cooperative, Industries and various LSG institutions. It is also proposed to link the initiative to the activities under Haritha Keralam Mission, Kudumbasree Mission and MGNREGA, ensure involvement of Agriculture, Veterinary and Fisheries universities in the State and seek cooperation of educational institutions, public sector institutions, cooperatives, youth clubs, mass organizations and residents associations for effectively implementing the interventions under 'Subhiksha Keralam'. Reports from various districts about the implementation of 'Subhiksha Keralam' initiative clearly indicate that it is quite possible to achieve the objectives of the project.

Food security through intercropping of tuber crops in coconut gardens

The scope for expanding the land area for enhancing food production is very much limited in Kerala and hence, efforts are needed to increase food and nutritional security and income per unit area per unit time through intercropping and integration of livestock and related enterprises. Moreover, area under food crops is declining and the general trend in the state depicts a shift in the cropping pattern from food crops to cash crops. Under these circumstances, utilisation of the potential for multiple cropping in coconut gardens to enhance food production in the state assumes much significance. Coconut plays a vital role in the agrarian economy of Kerala state and it occupies about 37.4 % of the net area sown in the state. It is highly amenable for multiple cropping and hence it is highly relevant that strategies for promoting cultivation of food crops as intercrops in coconut gardens are implemented to enhance food security in the state. Details of area under coconut cultivation in different districts in Kerala state is given in Table 1.

Sl. No.	District	Area (ha)
1	Kasaragod	65,999
2	Kannur	83,663
3	Wayanad	10,121
4	Kozhikode	115,706
5	Malappuram	104,685
6	Palakkad	55,502
7	Thrissur	79,776
8	Ernakulam	39,275
9	Kottayam	25,514
10	Idukky	14,514
11	Pathanamthitta	15,816
12	Alappuzha	33,755
13	Kollam	45,473
14	Thiruvananthapuram	71,158
	Total	**7,60,946**
(Source: Agricultural Statistics 2018-19, Department of Economics and Statistics, Thiruvananthapuram)		

Table1. District wise area under coconut in Kerala state (2018-19)

Arrowroot

Cassava

Dioscorea

Agronomic feasibility of coconut based multiple cropping

Coconut as a monocrop does not fully utilize the basic resources such as soil and sunlight available in the garden. The active root zone of coconut is confined to 25 per cent of the available land area and the remaining area could be profitably exploited for raising subsidiary crops. The orientation of leaves in the coconut crown helps penetration of sunlight into the soil and provides opportunities for exploitation of land and solar energy for inter/mixed cropping. Coconut offers scope for intercropping in the initial stages of the growth of palms and mixed cropping in the later part of life of palms. The light incident on the interspaces in coconut decreases with the increase in the age of the plantation, and very little light reaches the ground when the palms are around 8-10 years because of short stature of palms and greater foliage. This intensely shaded situation lasts up to the age of 20 years. Thereafter, increasing amount of slant light and filtered light reaches the lower profile of the coconut canopy due to the leaf orientation and at about 30 years of age 30% of the total light incident in the area reaches the ground. The amount of light penetrating the canopy, thereafter increases with the age of the palm as the tree height increases. This characteristic feature of coconut offers scope for crop intensification in coconut gardens. In a coconut plantation, maximum solar energy is received for intercropping during the early stages (<8 years), minimum quantity is received at the early production stages (8-25 years), during which shade tolerant/loving crops can be intercropped and again it increases with the age of the trees.

Different tuber crops which can be raised along with coconut as intercrops depending on the availability of solar energy are listed in Table 2.

Desirable traits of roots and tubers as intercrops

- They have higher biological efficiency and ability to produce higher dry matter per unit area per unit time.
- They are adapted to marginal environments, poor soil and adverse climatic conditions and have great flexibility to adapt to mixed farming systems.
- Tropical tuber crops especially arrowroot, yams and aroids are shade tolerant or shade loving.
- They are shorter in stature than coconut and will hence never over-grow the main crop.
- Tuber crops such as cassava and yams are resilient to climate change and can withstand drought and heat to a certain extent and are less water demanding crops.
- These crops can be grown with less external chemical inputs and instead help to recycle the organic wastes available in the coconut garden.
- The harvested tubers of arrowroot, yams and aroids have good shelf life under well aerated storage and great market demand.

Tuber crops as intercrops in coconut

Experimental evidences indicates that yield was promoted by 5-15% in coconut under intercropping with tuber crops. In general, indigenous yams (greater yam and lesser yam), edible aroids (especially tannia and elephant foot yam) as well as arrowroot were suitable for intercropping. Of the various tuber crops, arrowroot produced higher rhizome yield (7%) under intercropping.

Age of coconut palms	Tuber crops
< 8 years	Cassava, Elephant foot yam, Yams
8-25 years	Elephant foot yam, Taro, Tannia, Arrowroot
> 25 years	Cassava, Elephant foot yam, Taro, Tannia, Yams, Arrowroot and Chinese potato

Table 2. Options of tuber crops for intercropping in coconut at various stages

Crop management practices for tuber crops intercropped in coconut gardens

A brief summary of the management practices to be followed for intercropping tuber crops in mature coconut gardens of more than 25 years under rainfed conditions is given in Table 3.

The tuber crops partially meet the food requirements of a farm family and have always found a place in the homestead gardens in Kerala state. The agronomic feasibility and economic viability of coconut based multiple cropping, which involves growing a large number of crops including tuber crops, has been demonstrated under various research projects implemented by ICAR-Central Plantation Crops Research Institute in farmers' field. Growing tuber crops as intercrop is one of the options to increase the productivity and economics of the coconut based cropping system. Elephant foot yam, cassava and dioscorea were intercropped in selected coconut gardens under the NAIP project on 'Value chain in coconut'. These tuber crops are cheap source of food and energy and are capable enough to withstand biotic and abiotic stresses. The yield of tuber crops as intercrops in coconut garden in farmers' field varied between locations and mostly influenced by the level of crop management and planting density of coconut palms. Analysis of interventions carried out by CPCRI in farmers' field under the IPGRI – COGENT project on 'Developing sustainable coconut based income generating technologies in poor rural communities in India' also revealed the feasibility of intercropping tuber crops in coconut gardens. There is huge potential for growing tuber crops profitably as intercrops in coconut gardens and hence, 'Subhiksha Keralam' initiative needs to have specific strategies for promoting intercropping of suitable tuber crops in coconut gardens to attain food self-reliance to the extent possible as envisaged.

Strategies for promoting intercropping of tuber crops in coconut gardens under 'Subhiksha Keralam' initiative

Farmer Producer Organisations (FPOs) in coconut sector and women SHGs under Kudumbasree Mission can be facilitated to take up interventions on intercropping of tuber crops in coconut gardens under 'Subhiksha Keralam' initiative. Apart from the coconut gardens owned by farmers who are willing

Intercrop	Time of planting	Suitable variety	Method of planting, spacing and plant population per ha	Manures		Duration (months)
				FYM T HA-1	NPK KG HA-1	
Cassava	May-June	Sree Pavithra Sree Reksha Sree Vijaya Kalpaka	Mounds 90x90 cm (9,000 plants)	9	50:50:100	8-10
Elephant foot yam	March-April	Sree Athira Sree Padma Gajendra	Pits 90x90 cm (9,000 plants)	20	26:20:33	8-9
Greater yam	April-May	Sree Keerthi Sree Swathy Indu	Pits 90x90cm (9,000 plants)	9	80:60:80	8-9
Lesser yam	April-May	Sree Latha	Pits 75x75cm (12,000 plants)	8	60:30:60	7
White yam	April-May	Sree Priya Sree Haritha	Pits 90x90cm (9,000 plants)	9	80:60:80	8-9
Arrowroot	May-June	Local selection	Raised beds 30x15cm (1,30,000 plants)	10	50:25:75	9-10

Table 3. Management practices for tuber crops intercropped in coconut gardens

to take up intercropping of tuber crops, coconut gardens neglected by land owners due to various socio-economic factors also need to be utilised for promoting tuber crops under 'Subhiksha Keralam'. Appropriate institutional arrangements are to be made for utilising such coconut gardens for intercropping. LSGIs and State Department of Agriculture Development & Farmers' Welfare can formulate and implement suitable schemes to incentivise intercropping of tuber crops in coconut gardens. Timely availability of quality planting materials of tuber crops is to be ensured for effective implementation of such interventions besides providing support for marketing. Awareness creation among farmers about the benefits of intercropping needs to be emphasized and interventions for promoting intercropping of tuber crops in coconut gardens need to be implemented in a campaign mode with active participation of farmers, FPOs and women SHGs.

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TEXAS A&M UNIVERSITY RESEARCHER REVEALS: COCONUT OIL MAY MITIGATE THE FEATURES OF METABOLIC SYNDROME

Dr. Annie Newell-Fugate, an assistant professor in the Texas A&M College of Veterinary Medicine & Biomedical Sciences' (CVM) Department of Veterinary Physiology and Pharmacology (VTPP), recently presented research that offers insight into the potential benefits of dietary coconut oil.

Approximately 40% of American women are obese and are at risk for metabolic syndrome, which is characterized by increased blood pressure, high blood sugar, excess body fat around the waist, and abnormal cholesterol and triglyceride levels, all of which increase the risk of heart disease, stroke, and type 2 diabetes.

Newell-Fugate's work focused on improving the metabolic health of obese females struggling with metabolic syndrome, rather than focusing on weight loss alone.

She added that "Most people in the nutrition and kinesiology fields are focused on weight loss to improve the health of obese patients," "There are researchers looking at different types of diets—like the Mediterranean diet or Keto diet—and their effects on weight loss and overall health. However, the notion that can potentially change the diet without causing weight loss yet still improve an individual's health has not received much attention."

In her study, Newell-Fugate and her team sought to determine whether a high-fat diet that incorporates coconut oil, a plant fat source, could improve the overall health and metabolism of obese females in comparison to the health of obese females fed a Western-style diet containing lard, an animal fat source.

The research conducted over an eight-month period. The study was carried out in female pigs. Newell-Fugate and her team fed two groups of

female pigs high-fat diets consisting of 4,500 calories per pig per day. Both the Western-style diet and the coconut oil diet received 9 percent of their daily caloric intake from their respective fat sources. A third group was fed a low-calorie, lean diet as a control.

Newell-Fugate explained "We established each animal's baseline before they went on their diet,". "Then, we assessed their blood glucose, cholesterol, and weight throughout the study; at the end, we were able to compare how much difference each of the diets had on these metabolic health parameters over time."

The researchers found that the obese group, which received coconut oil had decreased features of metabolic syndrome, specifically with respect to cholesterol and blood glucose levels, in comparison to the obese group fed the lard-containing diet. "Our research suggests that dietary coconut oil may be used in conjunction with lifestyle modifications and anti-diabetic drugs to treat metabolic syndrome, at least in women, with obesity," Newell-Fugate said.

She concluded that one thing she set out to understand with this particular project is to determine whether coconut oil can modulate these metabolic parameters despite the fact that the females are still obese?" she said. "And the answer is yes."

The findings were presented by Dr. Newell-Fugate virtually at the annual Endocrine Society meeting, ENDO 2020.

Source: Story by Madeline Patton; Texas A&M University

A REBUTTAL
COCONUT OIL IS NOT LINKED TO HEART DISEASE

Otniel Sintoro[1]

In response to an article published in the Sunday Times Sri Lanka, on October 25, 2020, the International Coconut Community, Jakarta, has submitted the following statement:

On behalf of coconut stakeholders in Sri Lanka and beyond, the International Coconut Community (ICC) strongly refutes claims aired in the Sunday Times article headlined 'Now coconut oil is bad for your heart', by Kumudini Hettiarachchi (the Sunday Times, Sri Lanka, October 25, 2020).

Ms. Hettiarachchi cites a research review paper: Jayawardena et al -"Effect of coconut oil on cardio-metabolic risk: A systematic review and meta-analysis of interventional studies". Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 2020: Volume 14:6; 20072020.

The ICC does not believe that the article has effectively 'sift[ed] fact from assumption'. The cited review is based on a meta-analysis, but Jayawardena et al's analysis mixes short-term and small studies with long-term and large studies and treats them as if they are of equal significance. He has committed the error of 'comparing apples and oranges'. Second, he makes conclusions based on questionable criteria, like LDL-C, while ignoring others which are well established, like HbA1c and triglyceride levels. Thirdly, the review raises questions about the selective bias and quality of the data used. Their analysis leads to a flawed conclusion. This paper is misleading for several reasons.

First, the conclusion focused exclusively on changes in LDL-C levels but ignored the more important point regarding whether the resulting LDL-C levels were unhealthy; they were not. In fact, the consumption of coconut oil did not result in unhealthy levels of LDL-C. In January 2020, Astrup and co-authors questioned the use

The article about negative campaign and the rebuttal submitted by ICC on coconut oil health facts

of LDL-C as a link to heart disease. The concern with LDL-C is a theory that is not universally accepted and remains unproven.

Second, the Jayawardena study downplayed the beneficial changes in lipid parameters that were due to coconut oil. In particular, coconut oil raised HDL-C and gave a favourable ratio of total cholesterol to HDL-C. HDL-C, the so-called "good cholesterol" is associated with heart health. The article also acknowledged that coconut oil lowered the levels of HbA1c, the average level of blood sugar, and did not raise triglyceride levels. High triglycerides appear to be more strongly linked to heart disease than LDL-C. Why is the article discounting these beneficial effects of coconut oil?

In one statement, Prof. Jayawardena, stresses that "we have to understand the level of evidence. Systematic review and meta-analysis of randomised clinical trials (RCTs) are the ultimate evidence, although isolated small studies have different conclusions". Systematic reviews and meta-analyses present results by combining and analysing data from different studies conducted on similar research topics. The high level of evidence produced by RCTs overrides the isolated evidence, he says. In their review, the team had examined over 1,000 research articles, selecting only 23 of the human clinical trials for inclusion in the analysis.

Of the few publications on coconut oil and cholesterol, there had been two local interventional dietary studies by Prof. Shanthi Mendis and co-workers from three decades ago. However, stressing that their results came from a systematic review and meta-analysis from findings of studies considered to be of the "highest quality evidence", he says there is no value in comparing the results of isolated evidence. We do not agree: putting aside such evidence is just a way of ignoring an inconvenient truth. In the same way, Prof. Jayawardena ignored a recent meta-analysis by Eyres (2016) on 8 clinical trials and 13 observational studies concluding that coconut-based diets are not linked to an increase in the risk of cardio-vascular disease (CVD).

The best way to counter such an argument is by using the same "highest-quality evidence", by providing other meta-analysis studies. In 2017 Lancet published a meta-analysis study involving a team of 37 researchers from 18 countries. They gathered data on 135,000 subjects to evaluate heart disease risk in relation to fat intake and found no correlation between saturated fat consumption and cardiovascular disease; they recommended that current dietary restriction on saturated fat should be revised.

In 2010, a groundbreaking study was published in the American Journal of Clinical Nutrition. This meta-analysis study combined the data from 21 previously published studies, involving over 347,000 subjects.

The study showed that there was no connection between saturated fat consumption and heart disease. Those people who ate the greatest amount of saturated fat were no more likely to suffer a heart attack or stroke than those who ate the least. No matter how much-saturated fat one ate, the incidence of heart disease was not affected. This was the most complete review of the medical research on saturated fat ever done up to this time.

Four years later, a different group of researchers from the University of Cambridge published another meta-analysis study. This time the researchers combined the data from 72 previously published studies involving more than 600,000 participants from 18 countries.

The results confirmed the previous meta-analysis there is no connection between saturated fat intake and heart disease. The studies are clear, neither saturated fat nor coconut oil causes or even promotes heart disease. Because they raise good HDL-C and lower the cholesterol ratio, if anything, they help to protect against heart disease.

The Jayawardena study committed the serious error of comparing populations from countries such as South Asian, Southeast Asian and Pacific island states (which consume coconut oil in their normal diet) with short-term studies conducted in Western countries that do not normally consume coconut oil. How could they use data from these small one to four-week studies done in the West to infer health outcomes in Asian countries and draw conclusions about the prevalence of CVD in South Asia? Jayawardena cited a long-term study but did not give it the significance that it deserved. Vijayakumar and co-workers (2016) reported their results of a study that involved 200 participants who used coconut oil or sunflower oil as cooking oil for two years. The study showed that coconut oil gave comparable LDL-C values compared to sunflower oil.

Clearly, a critical assessment of the Jayawardena paper and other supporting evidence show that coconut oil is not linked to heart disease.

The rebuttal published in the 22nd November 2020 edition of Sunday Times Sri Lanka.

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HIGHLIGHTS OF
THE 56TH ICC SESSION AND MINISTERIAL MEETING

Mridula Kottekate[1]

In unprecedented time amid COVID-19 pandemic which poses the greatest threat to global public health, the 56th ICC Session and Ministerial Meeting was held virtually on 24 – 26 November 2020 at Jakarta. The Government of Samoa holds the Chair of International Coconut Community (ICC) for the CY 2019-2020 and was host of the 56th ICC Session & Ministerial Meeting.

ICC Session/Ministerial Meeting is the highest policy-making body of the Community and is held annually to discuss, deliberate, and take policy decisions on the activities to be undertaken by the Community for the sustained development of the global coconut sector. The countries are represented at the Session by the Honorable Ministers of Agriculture/Trade/Commerce, Plenipotentiary Delegates authorized by the National Governments, and senior officials from the concerned Ministries.

The ICC Session was inaugurated by the Prime Minister, of the Independent State of Samoa, **Hon. Dr. Sailele Malielegao Tuilaepa**. **Hon. Lopaoo Natanielu Mua**, Minister of Agriculture and Fisheries Government of Samoa, chair of the Session welcomed the Delegates. **Hon. John Simon, M.P.**, Minister of Agriculture & Livestock, Papua New Guinea attended the inaugural session.

Hon. Dr. Sailele Malielegao Tuilaepa, in his opening speech, expressed that to face the challenges of coconut community we must continue to support the collaboration of all coconut growing countries through the ICC Secretariat, which brings us together in one platform to focus on the most important strategies to sustain good livelihoods, industries, environments, and cultural heritage. It is a time to consult, dialogue, establish, and re-establish all associations with our traditional and new interested partners to design and develop technologies that will foster mutual benefits.

He highlighted that the Community needs to prepare and to stay productive during this COVID-19 pandemic. He appreciated the activities taken up by the ICC secretariat for the welfare of the coconut

Hon. Dr. Sailele Malielegao Tuilaepa,
Prime Minister, Independent State of Samoa

Dr. Jelfina C. Alouw, Executive Director, ICC and
Ms. Mridula Kottekate, Assistant Director, ICC

community, the development and sustainability of the coconut resources and industries

Dr. Jelfina C. Alouw, Executive Director, ICC officially launched the CORD Journal of ICC dedicated website for the Research & Development of Coconut and the webpage of Statistics of ICC. She mentioned that cord is an annual journal solely devoted to completed work on coconut research and development; and the journal has been indexed in DOAJ, Portal Garuda; Google Scholar; soon in Web of Science, Scopus and other reputable indexing agencies. The webpage of statistics shall provide the information related to the market promotion and weekly price of coconut and its value-added products.

Country statements presentation by member countries gave a brief update on the policies and programs for coconut development undertaken by the National Governments including the legislation to promote the development of the sector. The delegates also presented the updates on the coconut replanting, new planting and rehabilitation programs implemented, processing and export in their countries; the policies and programs implemented in the country to enhance farm productivity and increase production and the farmer's income; the constraints and challenges faced by the sector and the road map for the way forward for the coconut sector. The most actual substance was sharing the impact of the COVID-19 pandemic outbreak in the country's coconut sector.

The country papers helped in understanding the developmental work undertaken by countries and identify the replicable models for customized implementation in other countries. They helped in the exchange of ideas and technology and paved the way for possible collaborations between member countries.

Dr. Fabian Dayrit, Chair of ICC Scientific Advisory Committee on Nutrition & Health, presented the programs and activities of the SACH in detail: the Continuing Threats on Coconut Oil: the different studies conducted on this was presented by citing the reference; updates on the use of VCO vs. COVID-19 and the result. The Committee also proposed actions and strategies which include: follow-up the aborted meeting, with FAO and WHO, expand the membership of expert committees to include representatives of FAO and WHO from developing countries, strengthen links of national coconut agency with the health ministry, propose VCO as a functional food.

Dr. Ponciano A Batugal, Chair, ICC Technical Working Group presented the Strategic Plan of ICC; programs and Projects status of different major coconut growing member countries; the ICC priority projects, which directly resulted in benefits of the farmers; potential collaboration with member countries Coconut Coalitions and Alliances. The Session also endorsed the TWG priority projects to be implemented in all the ICC member countries.

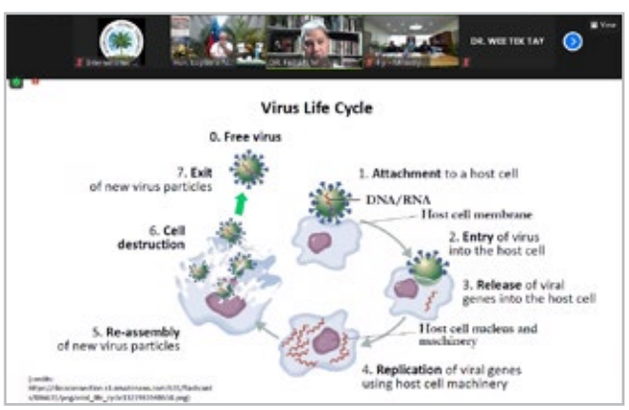
Observer organizations participated is CICY; NAM CSSTC; ACIAR;ITC; CARDI; CABI; CSIRO and presented statements on their activities, potential programs and projects for the development of the coconut sector to be implemented in the member countries with collaboration of ICC.

The ICC Annual Reports for the year 2019 were presented by Dr. Jelfina C. Alouw, Executive Director. The Session discussed the various programs and

Hon. Lopaoo Natanielu Mua,
Minister of Agriculture and Fisheries, Samoa

Participants of the Session

Dr. Ponciano's presentation



Dr. Dayrit's presentation

projects proposed to be undertaken by ICC. The Executive Director also presented the global scenario of the Coconut sector during the Covid-19 pandemic and beyond; Highlights of 2019 activities; update on major activities in 2020; and activities planned for 2021.

COGENT, as one of the major program under ICC, **Mr. Vincent Johnson**, Interim COGENT Coordinator presented Report & Plan of Activities of International Coconut Genetic Resources Network (ICC-COGENT); new Steering Committee members; four ITAGs and the ACIAR /DFAT fund in detail; including proposed ITAG research projects.

The Executive Director informed the Session of Delegates that the Government of Malaysia continues to host the 49thInternational COCOTECH Conference during 2021, which was postponed from 2020 amid COVID-19 pandemic. The date proposed is 7-11 September 2021 at the Royale Chulan Hotel, Kuala Lumpur, under the theme: *"Promoting Smart Farming Eco-Friendly and Innovative Technologies for Sustainable Coconut Development"*. The other program proposed in 2021 is the International Symposium on IPM, in association with the Philippines Coconut Authority and the International Training Course for Coconut Development Officers in collaboration with CRI, Sri Lanka.

The Session approved the extension of tenure of ICC Incumbent Assistant Director, Ms. Mridula Kottekate for another term of three years effective from 15 January 2021 -14 January 2024. The 57th ICC Session & Ministerial Meeting in 2021 will be hosted by the Government of Papua New Guinea and the ICC chair for 2020-2021.

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[1] *Assistant Director,*
International Coconut Community

ONLINE TRAINING PROGRAM
PROCESSING AND MARKETING OF COCONUT SUGAR

Otniel Sintoro[1] and Mridula Kottekate[2]

On 6th October 2020, the International Coconut Community (ICC) in collaboration with the Non-Aligned Movement Centre for South-South Technical Cooperation (NAM-CSSTC) conducted the second Online Training Program with the theme **"Processing and Marketing of Coconut Sugar"**. More than 350 people from 20 countries took part in the training. The participants were from the ICC and NAM-CSSTC member countries in Asia, Australia, Pacific, and Africa and nonmember countries like the USA, Egypt, UK, and Saudi Arabia.

The training was under the agreement between both parties with respect to providing cooperative services to the member countries in research and development programs, capacity-building, technology transfer and webinars or workshops, under the theme of: **"Stay Healthy and Productive during Covid-19 Pandemic"**. This training program's main objective was to provide the necessary guidance and technical assistance to the farmers and to provide information on the domestic and international market prospects to the SMEs.

Dr. Jelfina C. Alouw, Executive Director, ICC, in her welcome speech mentioned that in 2001-2018, the average annual growth of world sugar consumption was about 2%, mostly driven by population growth. The global coconut sugar market value was estimated at USD 1.8 billion in 2019 and was projected to grow at a compound annual growth rate of 5.5% from 2019 to 2025. Coconut sugar as one of sap-base products was growing and expanding both in the domestic and international market, it has caught many health-conscious people's attention because of its low glycemic index, as an alternative sweetener which was beneficial for people who suffered for diabetic. A great advantage of coconut sugar production was that it could be undertaken by villagers or SMEs, including cooperatives and women.

His Excellency Ambassador, Mr. Ronny Prasetyo Yuliantoro in his opening remarks said that NAM-CSSTC has been funding 115 initiatives, and agriculture sector was associated with 9% of the total programs. By the training, NAM-CSSTC and ICC would play a crucial role in improving the

Panelists of the Program

technology, innovation, and competitiveness of coconut industry. This training was to encourage the farmers to increase production to meet the domestic and global coconut sugar demands, while maintaining the coconut sugar business sustainability, and to mitigate the global economic impact of COVID-19.

Ms. Erlene C. Manohar, Deputy Administrator, Research and Development Branch, Philippine Coconut Authority, presented **"Coconut Sugar Industry in the Philippines"**. She explored the importance of the coconut sap sugar industry, process technology, opportunities, feasibility study, and the industry's supply value chain. She projected increasing demand for coco sap sugar due to the rising health consciousness of consumers worldwide due to the increasing number of diabetic people as possible users of the product, growing interests of consumers on natural and healthy products in the global market. Her presentation was followed by a video demonstration on the collection and processing of coconut sugar.

Ms. Sarapee Yuadyong, Managing Director Chiwadi Products Co., Ltd., Thailand, presented **"Marketing of Coconut Sugar"**. She called coconut sugar as the world most wanted sweetener due to its growing demand as a preferred sweetener from lower glycemic index than cane sugar. Besides used in tea, coffee, beverage, cosmetic industry, and herbal skin and hair care in Korea, China, and India, it's also used as body scrubs, shaving gels, face, and body creams. The prices for the products were likely to increase owing to the surging demands in the international market.

Dr. C. Anandharamakrishnan, Director, Indian Institute of Food Processing Technology, Ministry of Food Processing Industries, India, presented **"Sustainable Supply Chain of Raw Materials for Sugar Production"**. He explained utilization and value addition, changing consumer preferences, coconut sugar production global trend, market-leading players, production technology, and market prospects. The challenges in the coconut sugar supply chain were raw material availability, quality, and price issues; policies for SMEs, quality consistency, resilient supply chains, digitalization and ICT application. He also addressed the sustainability strategies and future food trends.

The online training was moderated by Mr. Vincent Johnson, Interim COGENT Coordinator, ICC. The webinar concluded with a closing remark by Ms. Mridula Kottekate, Assistant Director, ICC.

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[1] *Information and Publication Officer, International Coconut Community*

[2] *Assistant Director, International Coconut Community*

ONLINE TRAINING PROGRAM
GOOD AGRICULTURAL PRACTICES, REPLANTING PROGRAM & INTEGRATED PEST MANAGEMENT TO SUSTAIN COCONUT DEVELOPMENT

Otniel Sintoro[1] and Mridula Kottekate[2]

Under the theme **"Stay Healthy and Productive during Covid-19 Pandemic"** a series of online training has been conducted since September 2020 by ICC in collaboration with NAM CSSTC. There was an enthusiastic response from hundreds of participants. The 3rd Online Training Program conducted on **"Good Agriculture Practices, Replanting Program and Integrated Pest Management to Sustain Coconut Development"** on 3rd November 2020. More than 150 people from 18 countries participated in the training, including the representatives from ICC and NAM-CSSTC member countries. This training program aims to provide knowledge and tools on Good Agriculture Practices (GAP) to increase the coconut production and encourage farmers to increase their income by adopting these practices.

In her welcome speech, Dr. Jelfina C. Alouw, Executive Director, ICC, addressed that coconut has contributed directly to the amenity and income for more than 20 million smallholder farmers and their dependents. The overall impacted population in the coconut value chains was estimated at 700 million people. The domestic and global demands for coconut water only were expected to grow at a CAGR of over 26%

Dr. Jelfina C. Alouw, during Welcoming Speech

H. E. Ambassador Ronny P. Yuliantoro, delivering Closing Speech

during 2019-2025. Unfortunately, the production hasn't significantly increased in response to the growing demand. Most of today's palms were planted 60 years ago. The productions tend to decrease, and the fruits were more challenging to harvest. Smallholder farmers would need technical and financial assistance. The yield losses caused by pests and diseases were also reported from most of coconut producing countries. Through integrated pest management we could effectively and efficiently manage the pest and disease population, optimize the agricultural productivity, improve farmers' welfare, and guarantee environmental protection. She believed that many countries have developed their innovative technology also, which could be harmonized as an international standard. She hoped that the coconut stakeholders together could accelerate the exchange of ideas, technologies, and scaling up of good and acceptable practices through the event to sustain their effort and support of sustainable coconut development in their countries.

Dr. Ponciano A. Batugal, Chair, ICC Technical Working Group, presented **"Challenges and Opportunities for the Coconut Industry for a Happier Future"**. The challenges coconut farmers facing were inadequate access to technology, capital and market, low farm productivity and profitability, living below the poverty line. The challenges processing for the industry were raw materials were lacking, many factories were operating below capacity, senile palms needed to be replanted urgently, lacked of high-quality planting materials, and negative campaigns against coconut oil. The opportunities were: rapidly increasing demand for coconut products, innovative technologies for increasing yields, capacity building and technology transfer. He also briefly presented the ICC strategic plan and programs, focusing on the potential projects to be taken for the sustainable development of coconut.

"Good Agriculture Practices to Sustain Coconut Development" was presented by Dr. P. Subramanian, Principal Scientist, CPCRI, India. Good Agricultural/Manufacturing Practices are a set of principles, regulations and technical recommendations applicable to production, processing and food transport, addressing human health care, environment protection and improvement of worker conditions and their families. The presentation addressed the topics of ideal site selection, production of planting materials, planting and aftercare, water management, nutrient management, soil and moisture conservation, cropping /farming system, pest and disease management, harvesting, and processing. Adopting a holistic approach by employing Good Agricultural Practices would enable sustaining the coconut productivity and income of the farmers.

Dr. Nayanie S. Aratchige, Principal Entomologist CRI, Sri Lanka presented **"Integrated Pest Management to Sustain Coconut Development"**, a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic, health and environmental risks. She presented various methods for the avoidance and prevention of pests in coconut. The biological control was the most environmentally friendly and ecologically sound method, with slow action but long-lasting effects. Host plant resistance for pest and disease management was also proposed as one of the most effective and perhaps the safest method, especially in a perennial crop. She cited example of India, the development of resistant varieties for eriophyid mites.

Panelists of the Program

Prof. Jimmy Botella from the University of Queensland, Brisbane, Australia presented on **"Lethal Yellowing Disease in Coconuts: A Diagnostic Tool, and the Potential of Satellite based Surveillance"**. He explained that monitoring was essential to control and eradicate the disease, involving surveillance to identify suspicious trees and confirmation to confirm/deny a disease. He introduced the use of drones and satellites to do the monitoring. Drones were good for small-scale local surveillance, high resolution, fast and cheap. Satellites were good for large/national programs, with lower resolution and more expensive. In addition, he also introduced an innovative dipstick technology developed as a quick and straightforward tool for coconut Lethal Yellowing Disease (LYD) detection in the field and even the remote locations. Prof. Jimmy Botella said that the technology could extract DNA and RNA from living organisms is as little as 30 seconds without specialized equipment or personnel.

H.E. Ambassador Diar Nurbintoro, Acting Director, NAM-CSSTC in his closing remarks appreciated the speakers and the ICC. He comprehended the problems faced by developing countries in coconut industry, among others, low productivity in order to meet global demand. He emphasized the urgency for a transformation that will be implemented into technical cooperation which enabling many countries and millions of agricultural farmers to increase productivity and sustainability. The NAM-CSSTC valued a collaboration with all parties. He also appreciated the inclusive and collective solidarity, reflected in the event as an effort to increase the sustainable production of coconut through the knowledge shared by the speakers under the agreement with the ICC, by conducting trainings, workshops, technology transfer, research and development cooperation.

The online training was moderated by Mr. Vincent Johnson, Interim COGENT coordinator, ICC.

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[1] *Information and Publication Officer, International Coconut Community*

[2] *Assistant Director, International Coconut Community*

ICC HOLD THE 2ND WEBINAR
HEALTH AND ECONOMIC BENEFITS OF VCO DURING COVID-19 AND BEYOND

Otniel Sintoro[1] and Mridula Kottekate[2]

Webinar on **"Health and Economic Benefits of VCO during COVID-19 and Beyond"** was organized on 8th December 2020. This is in continuation of the agreement between the International Coconut Community (ICC) in collaboration with the Non-Aligned Movement Centre for South-South Technical Cooperation (NAM-CSSTC) in providing cooperative services to the member countries in research and development programs, capacity-building, technology transfer, under the theme: **"Stay Healthy and Productive during Covid-19 Pandemic"**.

More than 75 people from the ICC and NAM-CSSTC member countries in Asia, Australia, the Pacific, and Africa took part in the webinar.

Dr. Jelfina C. Alouw, Executive Director, in her welcome speech, addressed that the pandemic has restricted our mobility, but at the same time has triggered us to find ways to stay productive and has enabled scientists and medical doctors to reveal the coconut oil as an adjuvant against COVID-19. All member countries and national bodies are encouraged to do more studies to reveal more excellent potential of coconut oil and other coconut-based products to improve the previous findings and get more benefits. The diversification of coconut-derived products and value-addition help the small and marginal farmers who depend on coconut for their livelihood to realize a better return.

VCO has gained its popularity during early 2000 because of lauric acid's antimicrobial properties, the major fatty acids in VCO. Coconut oil has been endorsed by the World Dental Association as an antibiotic against tooth decay. The antibacterial activity of coconut oil takes on a special significance today when the number of antibiotic-resistance bacteria is rapidly increasing. VCO has anti-inflammatory, skin-protective activities, effective therapy for Alzheimer's, and most recently as an adjuvant against COVID-19. She hoped that the participants also come forward to consume, promote, and set up a VCO processing unit in their area as the source of

Panelists of the Program

functional food for their families and they can sell them as a source of income. We look forward to a global economic recovery from COVID-19 and sustainable coconut development.

Dr. Atmarita, MPH. Ph, Member of Expert Team, Indonesian Nutrition Association, presented **"Health Benefits of VCO against COVID-19"**. She explained the composition, purity, and benefits of VCO. VCO had an antithrombotic effect, a significant beneficial impact on blood coagulation, which could help prevent cardiovascular diseases, has the same anti-inflammatory, analgesic, antipyretic, antioxidant, anti-stress, and antimicrobial properties.

Dr. Fabian M. Dayrit, Professor Emeritus, Ateneo de Manila University, Philippines, and Chairman, ICC Scientific Advisory Committee on Health, presented **"Clinical Trial on the Impact of VCO as Adjuvant Against COVID-19"**, the beneficial effects of Virgin Oil and its characteristics. Dr. Toby explained the mechanism, how the VCO fights against the COVID-19 virus through its antiviral, immunomodulatory, and anti-inflammatory activities. He also presented the results from clinical studies on COVID-19 cases, proved that VCO is an affordable, readily available, and healthy functional food. Still, it needs further R & D to study whether VCO is effective in protecting persons with comorbidities and can improve the efficacy of vaccines.

Mr. Annas Ahmad, Marketing Manager, Vico Bagoes, presented **"Manufacturing & Marketing with Economic Benefits of VCO"** which explained the production and marketing process of VCO. The VCO can be processed by both dry and wet processes (fermentation or centrifuge). There are some concerns from the production aspect: taste and aroma, quality, certification, and cost-benefit analysis. The VCO market is rising, accelerated by the back-to-nature lifestyle trend, COVID-19, new research findings, and social media. There are more than 100 new brands founded in the market now. VCO still needs more development and innovation. Digital marketing could increase market awareness and promote the benefits of coconut oil.

In his closing remarks, Ambassador Diar Nurbintoro, Acting Director, NAM CSSTC, mentioned that the collaboration between NAM-CSSTC and ICC webinar and online training program commenced from September 2020 has gained positive responses from participants. The webinar has created a bridge that linked the agriculture and the health sectors. He hoped that the research on VCO against COVID-19 would inspire the coconut stakeholders to increase VCO production as a value-added product that will improve farmers' welfare, especially in the NAM-CSSTC and ICC member countries.

The webinar was moderated by Mr. Vincent Johnson, Interim COGENT coordinator, ICC.

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[1] *Information and Publication Officer, International Coconut Community*

[2] *Assistant Director, International Coconut Community*

INTERNATIONAL WEBINAR ON
COCONUT IN SMART AGRICULTURE

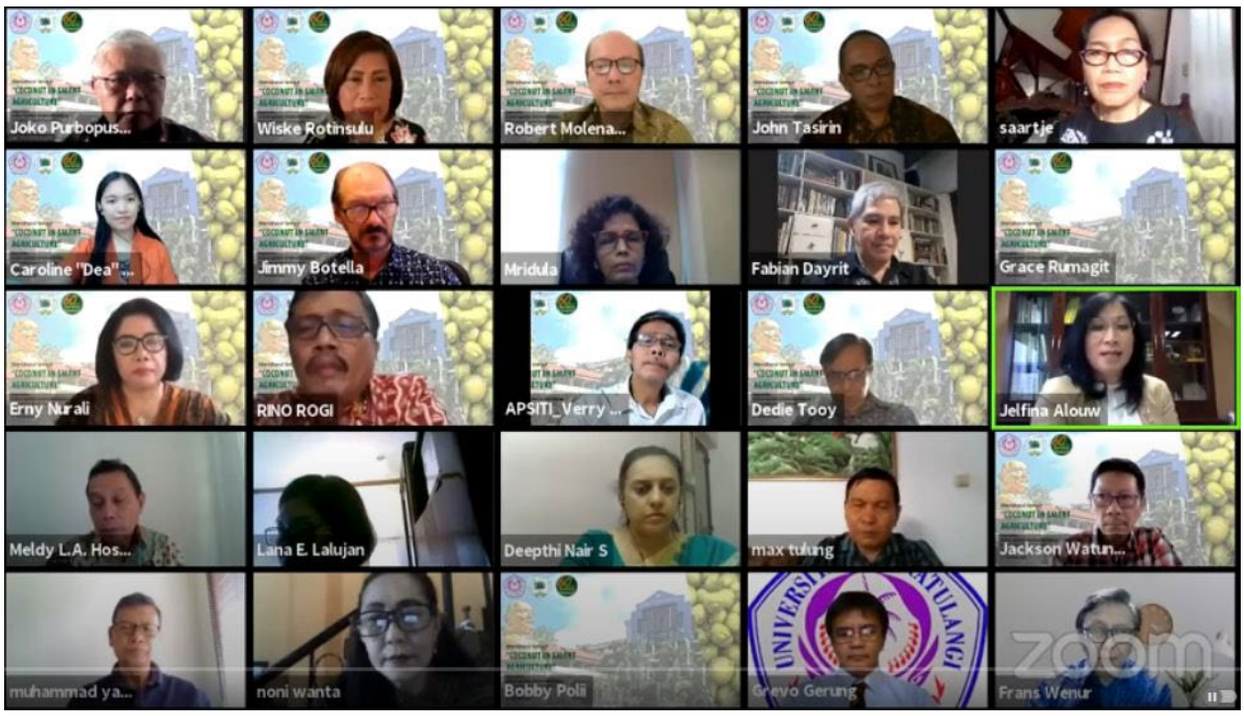
Otniel Sintoro[1]

Prof. Dr. Ir. Grevo S. Gerung, M.Sc., during Welcoming Speech

To celebrate its 60th Anniversary, the Faculty of Agriculture, Sam Ratulangi University, North Sulawesi, in collaboration with the International Coconut Community convened an international webinar with the theme **"Coconut in Smart Agriculture"**. More than 185 participants from the ICC member countries and other parts of the Globe from Asia, Australia, the Pacific, and Africa took part in the webinar.

Dr. Jelfina C. Alouw, M.Sc., Ph.D., Executive Director, ICC, in her welcome speech, expressed her gratitude towards the Anniversary organizing committee for choosing coconut as the main topic of this webinar. She added that North Sulawesi Province, which is famously known as the "Province of Nyiur Melambai" (waving coconut trees), has prioritized coconut as the main program. The university's role in revealing the considerable potentials of coconut to the health aspect and environmental protection continues to grow in importance, as future demands for coconut-based products are increasing, and an intensive unjustifiable negative campaign of coconut and its products. She hoped that more innovative technologies and products will be generated from the Faculty of Agriculture and through the webinar participants could accelerate the exchange of technologies and ideas and scaling up good practices in the coconut sector.

In his opening remarks, Prof. Dr. Ir. Grevo. S. Gerung, M.Sc., Vice Rector of Academic Affairs, Sam Ratulangi University, addressed that in North Sulawesi Province coconut has become the main crop, contributing 60% of the non-oil and gas sector. The Coconut Research Unit in the University of Sam Ratulangi continues to study and develop the technology for developing nursery, cultivation practices, and post-harvesting in collaboration with the private sectors, supported by the local and national government. The university is ready to collaborate with any institutions at National and International level, because knowledge is universal, belonging to all the institutions. He hoped the knowledge and experience shared in the webinar would create insights for all participants.



Speakers and Participants of the Program

As keynote speaker, Dr. Jelfina C. Alouw, M.Sc., Ph.D., Executive Director, ICC, presented **"Global Scenario of Coconut Sector during COVID-19 Pandemic and Beyond"** which addressed the present situation: contribution of coconut and its products; coconut in smart agriculture, precision agriculture (or smart farming) can significantly boost the agriculture production both in terms of productivity and sustainability, in align with 9 of the 17 SDGs; global production, price and market/export of coconut and its various products. She also presented the sustainability strategies. The outlook market for higher-value products is exceptionally positive, but low in the availability of raw material, so the strategies are innovative product development, diversification, quality including R&D expansion to face major challenges of coconut sector, including senility, pest/disease infestation, lack of investment in planting.

Dr. Fabian M. Dayrit, Professor Emeritus, Ateneo de Manila University, Philippines, and Chairman, ICC Scientific Advisory Committee on Health, presented **"The Coconut: Treasure of the Tropics"**, which covered three main issues: the coconut is the fruit of the tropics, the coconut as the tree of life and prosperity, and the Coconut against COVID-19, in which he explained the origin of coconut, history of coconut, coconut cultivation and derivative products as the tree of life and prosperity. He added the mechanism, how the VCO fights against the COVID-19 virus through its antiviral, immunomodulatory, and anti-inflammatory activities. He enlighted the results from clinical studies on COVID-19 cases, proved that VCO is an affordable, readily available, and healthy functional food. He shared the strategies against COVID-19 and solidarity studies of VCO, further R & D of VCO.

Mrs. Deepthi Nair S., Deputy Director, Coconut Development Board, Ministry of Agriculture and Farmers Welfare, Government of India, presented **"Good Agriculture Practices in Coconut and Coconut Farmer Organizations in India"**. Sustainable agriculture must ensure social progress, economic growth, and environmental protection. She also explored the good agricultural practices which included seed development, productivity enhancement, soil health, conserve natural resources, micro irrigation, crop protection, crop diversification, extension and transfer of technology, insurance and credit, and mechanization. She outlined the concept of Farmer Producers Organization successfully framed in India and their role in the sustainable development of the coconut sector.

Dr. Nguyen Quang Thien, Ph.D., Coconut Biotechnology, In Vitro Plant Cloning, School of Biotechnology, The International University,

Vietnam National University presented **"Coconut Cloning for Worldwide Replanting Urgency"**. He focused on the health-conscious lifestyle, increasing market demand for coconut products, which is the driving force to the urgency. The possible solutions are rapid multiplication of varieties, through cultural tissue culture technology; embryo culture, haploid culture, somatic embryogenesis, and cryopreservation. Though there is still a challenge in the acclimatization. Automation by robot technology for subculture will reduce labor cost and time consumption for cloning.

Prof. Jimmy Botella, the University of Queensland, Brisbane, Australia presented **"Lethal Yellowing Disease in Coconuts: A Diagnostic Tool, and the Potential of Satellite-based Surveillance"**. He explained that monitoring was essential to control and eradicate the disease, involving surveillance to identify suspicious trees and confirmation to confirm/deny a disease. He introduced the use of drones and satellites to do the monitoring. He also introduced an innovative dipstick technology developed as a quick and straight forward tool for coconut Lethal Yellowing Disease (LYD) detection in the field and even the remote locations. The technology could extract DNA and RNA from living organisms is as little as 30 seconds without specialized equipment or personnel. The technology is trying in other crops like Cocoa and sugarcane besides coconut.

Dr. Joko Purbopuspito, Lecturer, Faculty Agriculture, Sam Ratulangi University, spoke on **"Soil Management for Coconut Smart Agriculture"** and mentioned that sustainable development is a development that meets the present needs of this generation without compromising the ability of future generations to meet their own needs. To achieve soil management for coconut smart agriculture, he introduced the acronym SMART: Specific - should follow climate and land/soils suitability's criteria protocol; Measurable - manages to pay attention to details and specific coconut requirements; Achievable - acquires all necessities for coconut rejuvenation in an organic way of life; Relevant - revolves and involves all Stakeholders in five pillars to proceed for consolidating, connecting, integrating and modernizing the coconut system; Time-bound - timely target oriented on the circular economy and added benefits.

In his closing remarks Prof. Ir. Robert Molenaar, MS., Ph.D., Dean of Faculty of Agriculture, addressed that Indonesia has the largest coconut plantation in the world, but the productivity is only a half of India. It is our challenge to increase the production. Smart technology is available to overcome problems in a smart way. Implementation of the smart strategy is the solution, such as synergetic efforts of the international coconut stakeholders, also multi-stakeholders' partnership where the Sam Ratulangi University and the ICC and many other institutions involved. He hoped that the webinar could function as the drive to facilitate the development and relationship to real collaboration, a constant exchange of information and technologies regarding issues of coconut farming and development.

The webinar was moderated and chaired by Prof. Ir. Robert Molenaar, MS, Ph. D, Dean of Faculty of Agriculture, Unsrat and Dr. Johny Tasirin, Deputy Dean for Academic Affairs and Cooperation, Faculty of Agriculture, Unsrat.

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[1] *Information and Publication Officer, International Coconut Community*

GET CLOSER TO NATURE
AND REDUCE YOUR CARBON FOOTPRINT FOR A GREENER AND HEALTHIER TOMORROW

With the New Year Resolution - get closer to nature, reduce your carbon footprint- iD Fresh Food , a Bangalore based food product company has started in 2020 with the launch of iD Smart Sip Tender Coconut and iD Grated Coconut in a Coconut, marking India's largest fresh food brand's maiden effort in finding sustainable packaging solutions for a greener and healthier tomorrow. And what better products than tender coconut and grated coconut – that too in their natural packaging – is better to drive home the new year resolution.

The company has sought to reduce the weight of the coconut to 400-500 gram by removing the husk. Priced at Rs.60 a piece, the tender coconut can be opened by just a hard-press on the slit provided on top. Mounted atop cardboard, it comes with information on water content, pulp, sweetness level and edible quantity.Similarly, grated coconut is packed in the coconut shell itself with a soft opening on top, and can be emptied easily in to a vessel.

With Know Your Coconut as its core message, iD Fresh's Smart Sip Tender Coconut empower customers with valuable information without opening the coconut, offering them a choice to purchase on the basis of their need. The Tender coconuts are priced based on the edible content and sweetness level.

iD Fresh offers consumers not just convenience, but also a healthier alternative to chemically preserved frozen or desiccated coconut that is currently available in the market. Musthafa PC, CEO and co-founder of iD Fresh Food affirms that their vision for 2020 is to go green. As a consumercentric company committed to preserving the tradition of Indian cooking with healthy and fresh ingredients, the company is constantly looking for ways to reduce the use of plastic in product packaging. With the Smart Sip Tender Coconut and Grated Coconut in a Coconut, they have taken baby steps towards a gradual reduction of plastic waste. Last year, when iD Fresh Organic was launched, the consumers were assured their best to find more environment-friendly and sustainable solutions. By 2022, iD Fresh aims to capture 60-70 percent of the organised packaged coconut market share.

Initially the company plans to make available, iD Smart Sip Tender Coconut and iD Grated Coconut in a Coconut at retail outlets as well as at iD Kiosks where consumers can experience the taste, freshness and quality of the products before making the purchase. In the next phase of the launch, iD fresh will be empowering the street hawkers selling tender coconut by helping them set up a hygienic cart with a cooler, giving fair price margins and even collecting the waste from them at the end of the day.

With increased awareness on health and rising consumer preferences towards natural and healthy food and beverages, Musthafa, is well aware of the huge opportunities of the coconut industry in India. Initially the products will be introduced in Bengaluru, followed by other key markets including Kerala, Tamil Nadu and Andhra Pradesh, among others. A revenue of INR 100 crore from both the

coconut products is expected by the iD fresh in the ensuing three years.

Since iD Fresh's inception in 2005, the company has consistently offered customers easy-to-cook, preservative-free and traditional Indian foods. Similarly the grated coconut offers customers a healthier and eco-friendly alternative to frozen grated coconut and frozen desiccated grated coconut. The tender coconut promises not just health benefits, but also greater transparency in terms of product volume, sweetness and the like. iD Fresh believes that these unique products will have a strong consumer resonance as they are brought out with a valuable offering vis-à-vis quality, convenience and natural packaging.

Started in 2005, as a small establishment in Bangalore, iD Fresh Food has come a long way and set several milestones along the way. The company has presence in 45 + cities across India, US and UAE, with a team of more than 1500+ employees. The company provides 55,000 kgs of Idly/Dosa batter per day, with other products like Parotas, Vada batter, Chapati and paneer among others to more than 30,000 retail outlets.

The company has been awarded certifications from the Agricultural and Processed Food Products Export Development Authority (APEDA), National Programme for Organic Production (NPOP), United States Department of Agriculture (USDA) and Jaivik Bharat, under the Food Safety and Standards Authority of India (FSSAI).

iD Fresh Grated coconut

Press your thumbs on the side of the cork and push upwards for freshly grated coconut.

Replace cork tightly after use & store in the refrigerator.

iD Fresh Tender coconut

For water, peel the sticker and pierce with straw.

For pulp, use thumb or spoon on the groove.

Consume immediately and grow a plant in the empty shell.

** This article is through the courtesy of Indian Coconut Journal of Coconut Development Board, India.*

AN INTERVIEW WITH MR. ASEP JEMBAR MULYANA, CEO OF PT. TOM COCOCHA INDONESIA

Otniel Sintoro[1]

Mr. Asep Jembar Mulyana

Coconut charcoal is one of the healthiest sources of bioenergy. The industry is flourishing and having good demand in the export market. As we all know coconut is the "Tree of life", and each part of the coconut is being utilized. Briquette made from coconut shell is a potential value-added product and can be explored by each country where the shell is getting waste.

Cocoinfo International got an opportunity to interview Mr. Asep Jembar Mulyana, the owner and CEO of PT. Tom Cococha, Bogor, Indonesia. He is an expert and practictioner on coconut charcoal briquettes industry since 1998 and the Chairman for Association of Indonesian Coconut Charcoal Briquette Indsutries (HIPBAKI). PT. Tom Cococha Indonesia currently has around 400 employees who work in 3 shifts (24 hours), one of the big players in the briquette industry. The total production capacity of PT. Tom Cococha is 1.000 tons per month, with orders that it shares with five other fostered factories are around 1.000-1.500 tons per month and the total routine orders that get every month range from 2.000-2.500 tons.

About the Impact of Covid-19 on Company

Mr. Asep could you tell how Covid-19 affects the performance of your company?

As we know this covid-19 has hit and even destroyed almost all business sectors in the world without exception, including in Indonesia. But Alhamdulillah, we didn't experience that at all, even during this covid-19, demand for our product's orders has been increased and we have a waiting list of orders for the next few months.

Do you experience a reduction or cancellation of orders?

The experience of reducing or canceling orders has certainly been experienced by us, but very rarely even lately the trust of buyers towards our company tends to increase, and we have very good "brand image", so it makes buyer more confident deal business with us.

Some regions in Indonesia are imposing lockdowns now, does it disrupt the operation of your company/factory?

Not at all, it is because one hundred percent of our products are intended to meet export demand, and the message of President Jokowi was very clear that export companies should not be disturbed, so Alhamdulillah even though many areas under

Aerial view of PT. Tom Cococha Indonesia factory

lockdowns, our company continues to operate normally 24 hours per day (3 shifts).

Does it affect the supply of materials to your factory and the finished products from your factory to buyers and do you still maintain the number of your employees?
Not at all. As I have mentioned earlier that our company is not affected at all, and there is no reduction in the number of employees, in fact we recruit some new employees.

Do you experience an increase in transport costs and other costs because of Covid?. If so by what percentage?
Up to now since covid-19, transportation costs remain same and there is no increase, so are the others. But we expect that in next one or two months the main raw material, i.e coconut shell charcoal cost may increase. In the last three months the shell charcoal availability became difficult, this is because the export of whole round coconuts has been increased massively.

How did you deal with increasing costs?
Usually, if there is an increase in production costs or an increase in raw material cost we are always transparent and discuss them with our buyers, so that the purchase prices can also be adjusted.

Where do you source your materials? From traders or directly from farmers?
Both from farmers and traders.

Does the raw material availability match the production capacity?
At present the raw material availability is very difficult because most of Indonesia's coconuts from the major coconut-producing provinces are being exported in large quantities as a whole round coconut.

Do you have any plan to increase the price of your products?
At the moment our selling prices are not increased. The covid-19 impact are being experienced by all our target markets. Moreover the price increase is going to be very sensitive.

How do you see the prospect of market for the next six to twelve months? Improving or worsening?
We are very optimistic that in the next six to twelve months the prospect of this briquette business

PT. Tom Cococha Indonesia factory

will going to be increase. Even during the covid-19 period, our product demand has been increased.

About the Company and Its History

Mr. Asep, could you tell us when did you established your company?
I started this business in 1998 about 22 years ago, but PT. Tom Cococha Indonesia was established in December 2016.

What difficulties did you experienced when you started the business?
When I started this business 22 years ago, it was certainly not an easy thing, because everything I started from "zero", and at that time the industry was still relatively rare in Indonesia. There were no references that could be used, even for technical and technology information. So we have learned from other countries like India, Sri Lanka and the Philippines.

How did you overcome the difficulties?
A high enthusiasm for learning, is the key of our success in building this business.

What strategies have you taken to expand your business?
There is no specific strategy that we have adopted in building this business, but honesty and transparency are our main capital in building this venture, besides "teamwork". We focus on good human resources which is the biggest assets of our company. This has proven to make our company to overcome various obstacles and able to withstand the competition in the global market.

How many factories you are operating now and how many employees are there in your company?
PT. Tom Cococha Indonesia currently here around 400 employees who work in 3 shifts (24 hours), and we have 5 fostered factories which so far have received 100 percent of the orders from PT. Tom Cococha Indonesia and also responsible for overseeing the quality of those factories. We have done this cooperation for a long time and one of the factory started working with me since 2001. The other five factories are CV. Lautan Tempurung Abadi, PT. Coco Carbon Indonesia, PT Arkelindo Bara Sejahtera, PT. Solindo Singgih Gemilang and PT. Golden Briquettes Indonesia.

PT. Tom Cococha Indonesia's big family

What is the annual capacity of your company?
The total production capacity of PT. Tom Cococha is 1.000 tons per month but so far achieved is around 600 tons per month. This is because we still have lack of drying machine to reach the capacity up to 1.000 tons. We are very optimistic that we will achieve the full capacity of 1.000 tons by the end of this year. The orders that we share with our fostered factories are around 1.000-1.500 tons per month, so the total routine orders that we get every month range from 2.000-2.500 tons.

Is it possible to reveal the annual sales of your company?
If the average sales of PT. Tom Cococha is 600 tons per month multiplied by 12 months so in a year we export 7.200 tons of briquettes with an average sales value of US$1.150 per ton FOB Indonesia.

What makes you to choose only shell charcoal instead of other coconut products?
When I first started this coconut business (1998), I started with coconut value-added products. We used to buy whole coconuts from Farmers, process the coir into coir fiber and cocopeat, shell to briquettes and activated carbon; converting coconut to copra. But in later stage I decided only to focus on one product i.e briquette charcoal products by considering the following benefits:

1. Charcoal briquette is one of the coconut derivative products where no organization or country in the world regulates the price of this product, so an industry with strong resources of raw materials can even fix their prices.
2. Never been experienced any decline in the price of charcoal briquette products, and are always on brighter side.
3. The market demand is very large and continue to increase along with more human awareness on the environment safety.
4. In the export destination countries, this charcoal briquette (both BBQ and Shisha) is included in the category of basic needs (consumer goods), so the demand keep on increasing.
5. Charcoal briquette product is one of the coconut value-added products with no shelf life and expiry date.

Do you have any plan in the future to expand to other coconut products?
No, because as explained earlier, we have started with other coconut value-added products and ends with one product, coconut charcoal briquettes.

[1] *Information and Publication Officer, 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

Alzheimer's disease is the most rapidly increasing public health problem in the world and there is no accepted cure for it. Pharmaceutical companies have poured millions to develop a cure with no success. Coconut oil may well be the lowest-cost solution to Alzheimer's disease and the evidence is increasing. The lipid content of coconut, being mostly MCFA, offers an energy source that bypasses the usual glucose pathway, in the form of ketone bodies, and without the associated fat deposition often caused by LCFA.

The lauric acid treatments increased the total ketone body concentration in the cell culture supernatant to a greater extent the oleic acid. Lauric acid can directly and potentially activate ketogenesis in astrocytes. Since lauric acid makes up about half of the fatty acid composition of coconut oil, coconut oil intake may improve brain health by directly activating ketogenesis in astrocytes and thereby providing fuel to neighboring neurons.

Source: "Coconut Oil, Ketone Bodies and Alzheimer's Disease", Proceedings of the XLVIII Cocotech Conference and Exhibition, Bangkok, Thailand, 2018.

Dr. Amit Ghosh

Department of Physiology, All India Institute of Medical Sciences (AIIMS), Bhubaneswar, India

Several studies indicate the anticancer effect of Virgin coconut oil (VCO), especially in the colon, breast, lung, liver and oral cavity. Coconut oil was far more protective than unsaturated oil in chemically induced colon and breast cancer. VCO consumption during chemotherapy helped improve the functional status and global quality of life of breast cancer patients. It also reduces the symptom related to the side effect of chemotherapy. MCFA compositions are altered in breast cancer tissue. Lauric acid-induced apoptosis in a colon cancer cell by triggering oxidative stress. The protective role of coconut oil in colon cancer is induced by azoxymethane/dextran sulfate sodium.

Comparative Toxicogenomics Database (CTD) curated and integrated data for more than 5,700 gene-disease and 2,000 chemical-disease relationship, by which VCO-disease direct relationship was explored. It found that SCFAs of VCO can target almost 17 cancer-associated proteins. Almost 50% of VCO is Lauric Acid which interacts with 18 genes and associated with several diseases among which cancer, digestive disease, metabolic disease, nervous system disease, and urogenital diseases are the top five. (VCO regulated the expression of several genes indicating VCO may have modulated disease pathology of cancer.

Source: Pruseth, B., Banerjee, S., & Ghosh, A. (2020). Integration of in silico and in vitro approach to reveal the anticancer efficacy of Virgin Coconut Oil. CORD, 36, *1-9. https://doi.org/10.37833/cord.v36i.415*

EXPERTS' FINDING
ON THE HEALTH BENEFITS OF COCONUT

Dr. Bruce Fife

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

In recent years numerous studies have exonerated saturated fat as a cause of heart disease and put to rest the outdated diet-heart disease hypothesis. However, when researchers combined all the highest quality studies on fats and diet that had been done for the past several decades and analyzed them together, they found no correlation between saturated fat consumption and cardiovascular disease and that current dietary restrictions on saturated fat should be revised: In 2018 the Lancet (one of the most prestigious medical journals), published a study involving a team of 37 researchers from 18 countries, gathered data on 135,000 subjects; American Journal of Clinical Nutrition (2017), involved 35,597 participants and in 2010, combined the data from 21 previously published studies, involving over 347,000 subjects; University of Cambridge (2014) combined the data from 72 previously published studies involving more than 600,000 participants from 18 countries. They all concluded that high saturated fat intake was not associated with increased risk of ischemic heart disease. The results confirmed there is no connection between saturated fat intake and heart disease.

It is clear, neither saturated fat nor coconut oil cause or even promote heart disease. Because they raise good HDL cholesterol and lower the cholesterol ratio, if anything, they help to protect against it.

Source: "Is Coconut Oil A Poison?", Cocoinfo International, Golden Jubilee, Special Edition 2019

Dr. Narong Chomchalow

Chairman, Conservation and Development of Coconut Oil of Thailand Forum, Bangkok, Thailand

High level of cholesterol is not the cause of athero-sclerosis that leads to the deposition of plague in the artery, which ends up in having heart disease. The real cause of heart disease is the injury in blood vessel leading to the heart, which is caused by various factors, such as toxin, disease, high blood pressure and stress. If the blood vessel is injured, platelets will be circulated to cure the injury and deposited there to stop bleeding. Other substances such as protein, fats (particularly unsaturated fat such as VCO) and calcium also move there, but not cholesterol, in which only a small amount is circulated and deposited there to be used to constitute the membranes of the newly formed cells.

Source: The Truth about Good, The Bad and The Ugly Fats", Cocoinfo International, Golden Jubilee, Special Edition 2019.

BULLISH MARKET
OF COCONUT OIL IN THE FIRST HALF OF 2021

Alit Pirmansah[1]

A considerable increase in the price of coconut oil (CNO) was observed in 2020. The price averaged at US$1,015/MT which was up from US$731/MT a year ago or an increase by 39%. The price was ranging from US$834/MT to US$1,463/MT with a price volatility of 35%.

Like CNO, the price of Palm Kernel Oil (PKO) in 2020 also significantly increased by 25% to reach an average of US$ 827/MT as against US$662/MT in 2019. The price had an increasing trend at 3% per month and price volatility of 46%. The price ranged between US$678 and US$ 1,193/MT, CIF Rotterdam from January to December 2020.

CNO had a premium price of 20% over the price of PKO in 2020. This makes CNO considerably more expensive than PKO causing a shift in demand at the expense of CNO.

The demand for CNO in the US declined as the price premium of CNO over PKO widened. Shipment of CNO to the US in 2020 was 454,401 tons which were lower by 3.5% as opposed to the volume a year earlier. On the other hand, demand for PKO increased from 343,052 tons in 2019 to 381,105 tons in 2020 or leveled up by 11%. In total, the import demand for lauric oils by US buyers increased by more than 3%.

The higher price of CNO has also caused lauric oil buyers in EU countries to purchase more PKO at the expense of CNO. In 2020, European countries bought 0.8 million tons of CNO, a reduction of 10% against 2019's volume. Meanwhile, imports of PKO went up by10% from 0.75 million tons in 2019 to 0.82 million tons in 2020.

Despite the price discrepancy between CNO and PKO in the world market, demand for lauric oils

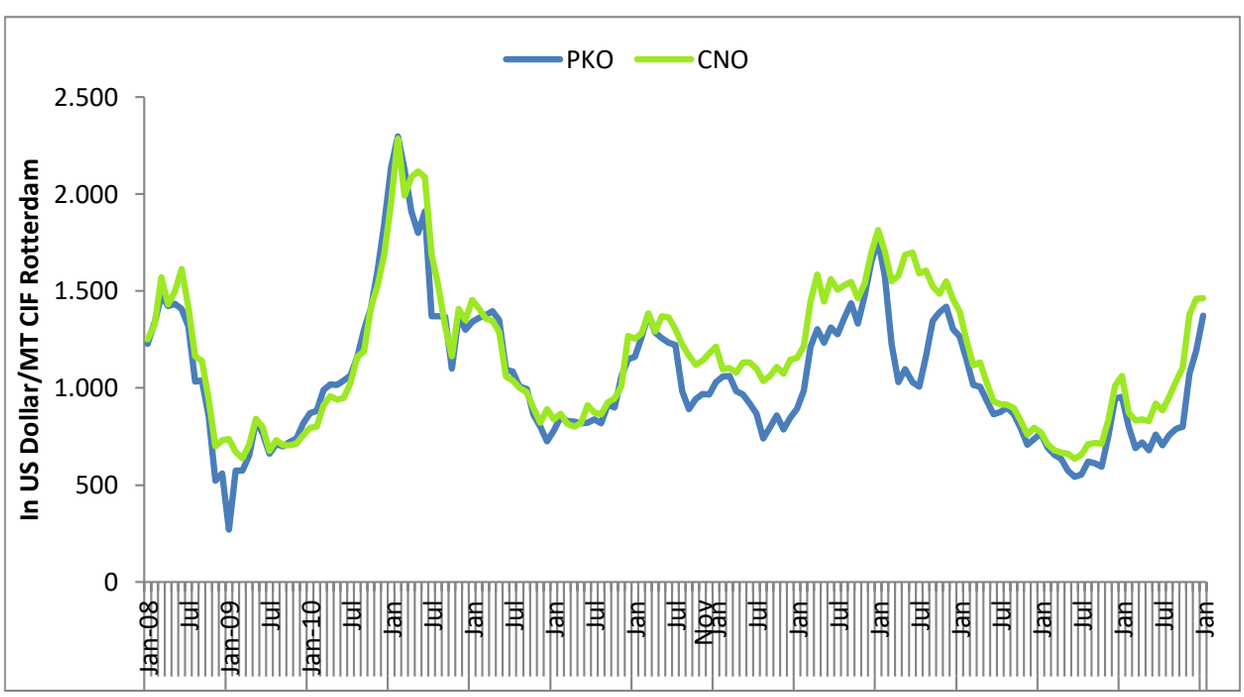


Figure 1. Price Trend of Lauric Oils, January 2008-January 2021 (USD/MT)

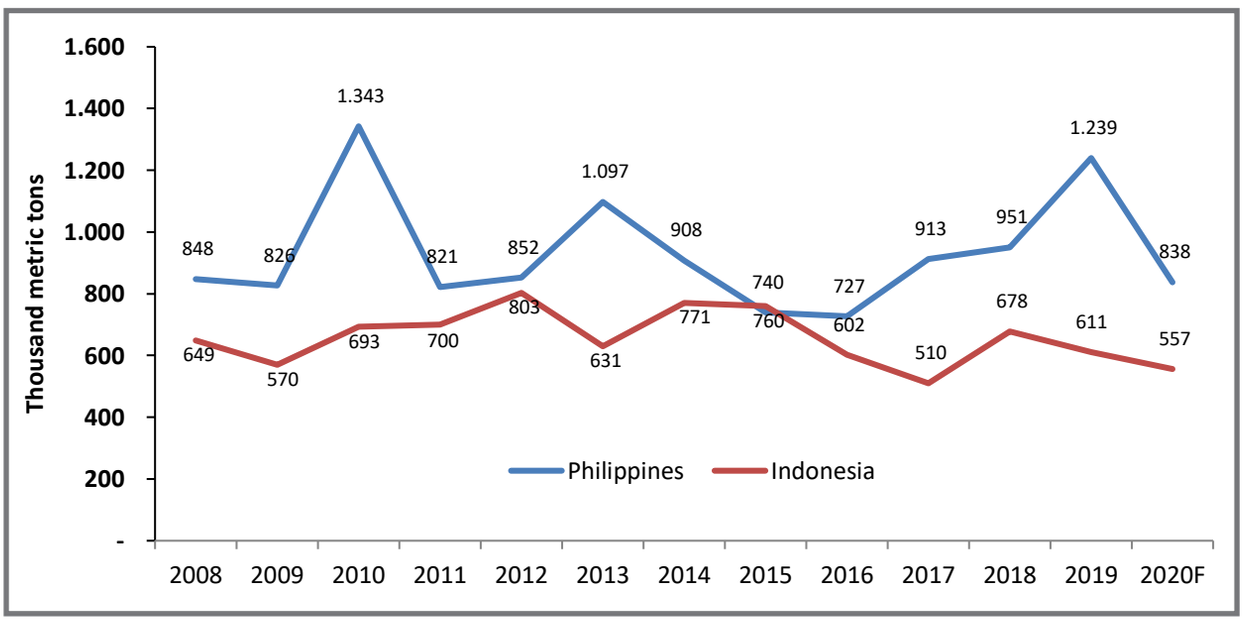


Figure 2. Exports of Coconut Oil from the Philippines and Indonesia, 2008-2020

by Chinese buyers was significantly low. Lauric oils shipments to China dropped mainly due to the global Covid-19 outbreak which led to travel restrictions as well as shipping delays. Imports of CNO by Chinese buyers was 162,186 tons which lowered by 6% compared to the previous year's volume. Shipments of PKO to China were even worse in 2020. China received only 742,424 tons of PKO or a reduction of more than 20% as opposed to 2019's volume. Combined imports of lauric oils by China in 2020 suffered a setback by almost 0.2 million tons from 1.1 million tons to only 0.9 million tons or shrank by 18%, reflecting a reduction of stocks and consumption. However, China was still the biggest importing country of lauric oils in the world.

Exports of coconut oil from Indonesia and the Philippines in 2020 declined following a price premium of CNO over PKO as well as a result of poor yields from previous dryness aggravated by typhoon damage, especially in the Philippines. The preliminary figure of coconut oil exports from the Philippines during January-December 2020 was 837,720 tons which dropped by 32% from 1.2 million tons for the same period a year earlier. Lower export performance was also perceived in Indonesia, the second-largest exporting country. In 2020, Indonesia shipped 557,059 tons of CNO to the global market. The export was lower than 2019's volume at 610,812 tons or declined by 9%.

The environment of the CNO market for the first half of 2021 is still expected to face some challenges due to the pandemic in supply, though it is most likely to experience a moderate recovery in the second half of the year. The Philippine coconut industry is playing catch-up amid delays and breaks in production, as companies struggle to get staff regularly and with enhanced Covid protection measures. Shipping will still be going to be the biggest challenge for most importers.

Despite the challenges, the Philippines' coconut oil is anticipated to recover by 14% to 1.1 million tons (Oil World). Likewise, coconut production in Indonesia is projected to modestly improve following expected better precipitation. Higher yield in 2021 is also projected in India. The Coconut Development Board of India estimated that coconut production will reach 21,487 million nuts or 2.46 million copra equivalent. Coconut Research Institute Sri Lanka forecasted that annual coconut production will increase by 19%. As a result, the export of coconut oil for 2021 is projected to go up by 4% to 1.92 million MT in copra terms from an estimated year-ago total at 1.86 million MT.

	2019	2020	2021[p]
Philippines	1.32	1.26	1.66
Indonesia	1.46	1.46	1.34
Other countries	1.58	1.58	1.68
World	4.76	4.30	4.68

Source: Oil World p: projected figures

Table 1. Copra Production, 2019-2021 (million tons)

However, a modest increase in supply is projected to happen in the second half of 2021.

If the demand of CNO in 2021 is assumed to be stronger than last year's volume, then there will be a shortage of export supply of CNO in the world market leading to drain off the CNO stock available in the market and supply from PKO as substitution oil.

Prices of CNO are expected to increase as a result the import demand exceeds the export supply. It is noted that the price of CNO in Rotterdam for January 2021 increased at a significant rate of 38% over last year's price at US$1,086 per ton. The price of CNO will keep rallying for the coming months. One of the main factors that could reduce the accelerating price of CNO this year is a higher export supply of PKO both from Malaysia and Indonesia as main producing countries.

The Oil World forecast that world PKO production to increase by 4% in Oct/Sept 2020/21. World exports are estimated to reach 3.6 million tons or level up by 0.2 million tons, mainly on account of larger volume from Indonesia.

In conclusion, a bullish CNO market will be prevailed in the first half of 2021 due to an expected tight supply both in the Philippines and Indonesia. PKO as substitute oil for CNO, its additional production and export supply in 2021 is not enough to fulfill the demand-supply gap of CNO in the world market. Consequently, the price of CNO in 2021 will going to stay strong at least until the first half of 2021.

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

PCA KICKS OFF NATIONAL COCONUT MONTH

The Philippine Coconut Authority (PCA), in accordance with Proclamation No 142 series of 1987, launched this year's month-long celebration of the 34th National Coconut Week on 5th August in a simple ceremonies at the PCA Auditorium in its Main office in Elliptical Road, Quezon City. PCA Administrator Benjamin Madrigal Jr said this year's celebration with the theme "Masaganang Niyugan Tungo sa Kaginhawaan" aims to "heighten people's awareness and appreciation for our industry's promising contribution to our country's economy and our people's wellbeing".

The month long celebrations will highlight the coconut farmers and industry which took a toll on the impact of the COVID 19 pandemic. The PCA is collaborating with relevant government agencies and other stakeholders for a country wide promotion of coconut as a "Healthy Food" for the Filipinos. Promotion of different uses of coconut products beneficial to health is important particularly in this time that people are conscious of their health.

The kick off ceremony recognized different farmers in various contests. Cocolaki for the biggest coconut; Cocodami for the most coconut in a single-bunch tree; Cocokapal for the thickest coconut; and Cocobigat for the heaviest coconut.

Various activities will highlight this year's celebrations. CocoMersyo introduces online shopping of coconut products such as VCO, coconut flour, coco sugar, cooking oil, and many more. Cocosina is a series of online cooking sessions and demonstrations using various coconut food ingredients. Cocoskwela features online learning through a School on air program. Launched in Lucena City, Region IV, the online education will benefit farmers in the area.

The celebrations will be capped by a Webinar series to delve on various issues affecting the coconut industry and the farmers. The 5-day webinar series is in partnership with the Coalition for Agriculture Modernization in the Philippines, Inc. (CAMP), a SEC-registered non-stock and non-profit NGO whose volunteer members are from agriculture, agribusiness, industry, academe, government, professional groups and international organizations.

PCA Administrator Madrigal also said that PCA will launch its Transformation initiative to "start our journey to becoming the leading agency in the agriculture sector, steering a market-driven coconut industry with greater global reach and significance." The PCA Multi-Sector Advisory Board (MSAB) will take oath on the celebrations' closing ceremony on August 28 to signal PCA's enrolment to the Institute of Solidarity in Asia. "Let's work together to achieve our common goal for the coconut industry to improve and benefit our coconut farmers and industry stakeholders", Administrator Madrigal said.

WORLD COCONUT DAY CELEBRATION

The World Coconut Day on 2nd September 2020 was celebrated with the theme "Invest in coconut to save the world". The outbreak of COVID-19 Pandemic forced all to celebrate this day remotely which connected the coconut family around the globe with a different experience.

World coconut day has its significance in the international community as it is the Foundation Day for ICC. The main objective of celebrating this day is to create worldwide awareness about coconut usage, positive attributes of coconut products, show people how important this palm to million people, and attract support from stakeholders.

International Coconut Community, Jakarta, Indonesia

To mark the occasion of World Coconut Day International Coconut Community, Jakarta, Indonesia, organized the webinar with the theme ***"Invest in Coconut to Save the World"***. More than 200 participated remotely across the globe, including the representatives from ICC and Cogent Member Countries, research institutes, private sectors, and international partner organizations of ICC.

In his opening remarks the Honorable Lopaoó Natanielu Muá, Minister of Agriculture & Fisheries, Samoa, ICC Chairman, encouraged the country government to support this crop and design more

programs in their countries. He focused on the sustainable development of the coconut sector and maintaining the coconut plantations with proper management practices, develop advanced technologies to increase productivity and to compete with the growing demand for planting materials.

Dr. Jelfina C. Alouw, Executive Director, ICC, wishes everybody a happy World Coconut Day 2020 and informed that this year's theme very well goes with the present scenario of Covid-19, which affected the sector. She acknowledged the support of the member countries and other international partner organizations for the smooth functioning of the Community and she assured that in the future we unite for the sustainable development of the sector.

The technical presentation started with Dr. Mary Newport, a Neonatologist from Florida, USA on the ***Health Benefits of Coconut Oil*** and how coconut oil helps manage Alzheimer's and other diseases. Dr. Fabian Dayrit, Professor, Department of Chemistry, Ateneo de Manila University & Chairman ICC Scientific Advisory Committee on Health (SACH) presented the concept of the World coconut day i.e., ***we need the coconut to save the world***. He presented the beneficial effects of Virgin Oil and its characteristics. Dr. Toby explained the scientific reasons to rebut against the negative impacts and the use of VCO against the COVID-19 and potential attributes of coconut oil. Dr. Pons, Chair, ICC Technical Working Group, briefly presented the ***ICC strategic plan and programs***. The vision of ICC was explained. He focused on the potential projects to be taken for the sustainable development of coconut. The last speaker was Mr. Asep, Chief Executive Officer, Tom Coco, Indonesia, spoke on ***Save the World by Coconut Charcoal***. Charcoal is the healthiest source of bioenergy, having numerous uses and we can save the environment by not cutting the forest by using coconut shell.

There was an in-depth discussion of the topics presented. The webinar was moderated by Mr. Vincent Johnson, Interim COGENT coordinator, ICC. The webinar concluded with a closing summary by Ms. Mridula Kottekate, Assistant Director, ICC.

World Coconut Day in Sri Lanka

The Coconut Research Institute, Coconut Cultivation Board and Coconut Development Authority of Sri Lanka jointly observed the World Coconut Day on 2nd September 2020. Along with other program the Sri Lankan coconut authorities awarded Nestle on World Coconut Day, in recognition of its high foreign exchange contribution as one of the world's largest exporters of coconut milk powder, and the strategic planning support extended to the government to help promote the Sri Lankan coconut industry.

Nestle supports more than 9,000 local coconut farming families through its business. The award was jointly conferred to the company by the chief guest of the event Hon. Dr. Ramesh Pathirana, the Minister of Plantations, in the presence of Hon. Mr. Arundhika Fernando, the State Minister of the Ministry of Plantations, and Mr. Jayantha Wickremasinghe, Chairman of the all three authorities i.e., Coconut Development Authority, Coconut Cultivation Board, and Coconut Research Institute.

The other highlight of the program included opening a business incubation facilitation unit for coconut research; release of new coconut hybrid variety; repellent against coconut red weevil; awarded appreciation plaques to the coconut value-added performer; smartphone app and seedling planting program at Bandirippuwa estate.

EXECUTIVE DIRECTOR, ICC HAD A VIRTUAL MEETING WITH MINISTRY OF AGRICULTURE FIJI THROUGH CHARGE D' AFFAIRES, THE EMBASSY OF THE REPUBLIC OF FIJI, INDONESIA

Mr. Isaac Grace, Charge d' Affaires, the Embassy of the Republic of Fiji, Indonesia arranged a virtual meeting with the Ministry of Agriculture, Fiji and ICC Secretariat on 17 November 2020. Ms. Sera Bose, the Chief Economist represented from the Ministry of Agriculture, Fiji and Dr. Jelfina C. Alouw, Executive Director lead the ICC Secretariat team. The meeting aimed to enable deeper cooperation and collaboration in the coconut sector management of Fiji.

In the meeting, Mr. Issac proposed the sectorial needs and priorities for bilateral engagement, in which he presented the Ministries Strategic Priorities. The four priorities were: commercial agriculture development, food and nutrition security, sustainable agriculture livelihoods and poverty alleviation, climate risk, resilience and sustainable land management. In each area Fiji expressed their interest and seek opportunities to collaborate with ICC and member countries.

Ms. Sera Bose, the Chief Economist of the Ministry of Agriculture presented the Agriculture scenario of Fiji including the functional divisions of the Ministry of Agriculture, key strategic priorities which had a direct link to NDP and SDG, food security and agriculture growth strategy, budget and target, the farming population in Fiji, agriculture GDP, agriculture production, agriculture and major commodities export. Fiji also faces challenges of the Covid-19 pandemic, lack of technical expertise, farm technology, ICT and infrastructure. Amidst the challenges, the opportunities are still open wide for the export market, huge potential for value-added production, farmer population growth, and agro-tourism.

Dr. Jelfina C. Alouw, Executive Director, presented the ICC vision and mission, projects and programs such as symposiums, trainings, seminars, technical assistance, and capacity buildings of ICC in which Fiji as a member country could participate and gain benefits. In implementing the projects and programs, ICC also collaborates with some international organizations and donor agencies. Dr. Jelfina also mentioned the CORD Journal website that has been indexed in Garuda, DOAJ, Google Scholar as a medium for information and technology dissemination. *(ICC News)*

COURTESY VISIT OF INDONESIAN AND INDIAN INVESTORS TO ICC SECRETARIAT

Mr. Rajmohan, of India and CEO of Commodity Trade Company in Indonesia, Mr. Joseph Adam, Director of PT. Nui Hia Prima, and Dr. Ir. Alfred Inkiriwang, Senior Advisor of PT. Nui Hia Prima, visited ICC Secretariat to discuss potential collaboration to set up an integrated Coconut Processing Unit at North Maluku, Indonesia.

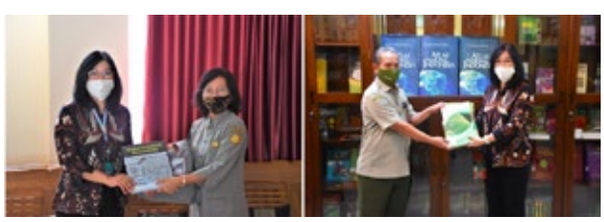
Dr. Jelfina C. Alouw, Executive Director, ICC, welcomed the visitors. The Assistant Director and Market and Statistics Officer, ICC also participated in the discussion. Mr. Joseph Adam explained his plan of setting up an integrated coconut processing unit in North Maluku. He mentioned that plenty of raw materials are available, and no integrated coconut industries have been established, except one small VCO processing unit. It would be advisable to go for an integrated unit, processing the CNO, VCO, activated carbon and coir-based products to meet domestic and global markets.

Mr. Rajmohan, basically from India and staying in Indonesia for the last 28 years, expressed that since Maluku is a place where plenty of raw materials are available, it is easy and advisable to set up the unit as a collaborative project. He added that his company is doing a feasibility study to set up the units and the result will be ready by the end of November. Based on the study they can proceed further to set up the unit.

Dr. Alfred mentioned the importance of coconut milk and said it can easily replace other dairy products. He added that it is necessary to convince the government with more scientific evidence of the importance of coconut and its value-added products in human diets and to resolve stunting.

Dr. Jelfina in her address added the global importance of the various coconut products and assured the full support and guidance from ICC to proceed to set up the collaborative project. There were in-depth discussion on various issues related to the importance of coconut; scientific evidence to prove the nutrient level of coconut products and market opportunity. *(ICC News)*

ICC TEAM VISITED SOIL & AGRICULTURE MUSEUM AND LIBRARY OF THE INDONESIAN CENTER FOR AGRICULTURAL LIBRARY & TECHNOLOGY



Dr. Jelfina C. Alouw, Executive Director, ICC, and Ms. Mridula Kotekatte, Assistant Director, ICC, accompanied by Marketing & Statistics Officer, Information & Publication Officer, and the Secretariat team visited the Soil and Agriculture Museum, Jl. Ir. H. Juanda No. 98, Bogor, Indonesia as part of seeking the potential collaboration for dissemination of coconut technology and strengthening networks between the two institutions.

The ICC officers were welcomed by Ms. Rima Setiani, S.P, M.M., Head of the Soil and Agriculture Museum, and the Museum's team. In her address, Dr. Jelfina expressed that this was the beginning of the relationship between ICC, the Soil and Agriculture Museum, and the Ministry of Agriculture library. ICC was looking forward to strengthening the relationship. Executive Director shared the activities of ICC and its collaboration with other member countries and research institutes. Dr. Jelfina appreciated the incredible information obtained from the Soil and Agricultural Museum and the Indonesian Center for Agricultural Library and Technology. It was comprehensive information from the past to the future, and from conventional to modern agricultural technology. She also appreciated the knowledge acquired about library management, from old book conservation, digitalization, also collections handling. Overall it was very informative. Dr. Jelfina also provided input for coconut display improvements for the Agriculture Museum, including bilingual written information to accommodate global visitors. Also, ICC would be grateful to provide coconut product information and any information support related to coconut.

The Soil and Agriculture Museum has been established since September 29, 1988. This Museum occupies the Voor Agrogeologie en Grond Onderzoek Laboratory building or the Agrogeology and Soil Research Laboratory, which was founded during the Dutch administration around 1900. The Museum was closed for several years until the Ministry of Agriculture decided to renovate it. On December 5, 2017, to coincide with World Soil Day, the Minister of Agriculture, Dr. Ir. H. Andi Amran Sulaiman, M.P. (2014-2019 period), inaugurated the reopening of the Soil Museum.In further developments, Prof. Dr. Sjarifudin Baharsjah, M.Sc. (Minister of Agriculture 1993-1998) and several other agricultural figures declared the Agricultural Museum's establishment on April 17, 2018. The wishes of these Indonesian agricultural leaders received support from the next Minister of Agriculture, Dr. Ir. Andi Amran Sulaiman, M.P., which then gave the mandate to the Secretary-General of the Ministry of Agriculture through the Indonesia Center for Agricultural Library and Technology, carried out the construction of the Agricultural Museum in the same place, to be inaugurated for its opening on April 22, 2019.

After visiting the Soil and Agriculture Museum, the ICC team visited the Indonesian Center for Agricultural Library and Technology or Pusat Perpustakaan dan Penyebaran Teknologi Pertanian (PUSTAKA), Jl. Ir. H. Juanda, No. 20, Bogor, Indonesia. The visit's purpose was to look into the library management system, coconut-related collection in the Museum, potential

collaboration, and increase Cord Journal citation by strengthening networks to the library. The ICC team was welcomed by Ir. Endang Sulistyorini, M.Si., Sub-Head of Publication, and Mr. Akhmad Syaikhu, S.Sos., M.T., Head of General Affairs.

PUSTAKA is the oldest agricultural and biological library in Indonesia, founded in May 1842. In the beginning, PUSTAKA was part of the Bogor Botanical Garden, which had the function of providing botanical literature for guest researchers conducting regional botanical investigations. Currently, PUSTAKA actively disseminates information on agricultural science and technology through various information media, such as television, radio, brochures, CDs, internet sites, and electronic databases, cooperating with various domestic and foreign institutions in disseminating agricultural research results, technology and commodities information.

The visit was planned as part of the capacity building for the team of ICC Secretariat. *(ICC News)*

COCONUT WATER, HONEY AND LEMON, WEST ACEH REGENT'S HOME REMEDY TO FIGHT AGAINST COVID-19

West Aceh Regent Ramli MS, who has recovered from COVID-19, has shared the recipe for a home remedy he consumed while self-isolating. "During my isolation period, I never skipped consuming a cocktail of coconut water with a pinch of salt, natural honey and lemon," Ramli said.

Ramli, who tested positive for COVID-19 on September 18th, added that he consumed the homemade cocktail twice a day after breakfast and dinner.

He believed the drink had helped him recover from the disease as it helps improve immunity.

He said he got the recipe from West Aceh Attorney Office head M. Said Rukhsal Assegaff.

"One of the benefits I feel is my throat feels better and the smell and taste loss are gradually improving," said Ramli.

According to a study of data collected via a symptom tracker app developed by British scientists released in April, almost 60 percent of patients who were subsequently confirmed as positive for COVID-19 had reported losing their sense of smell and taste, Reuters reported.

Ramli added that even though he had been declared free of the virus, he continues consuming the natural remedy, maintaining his healthy lifestyle and doing regular exercise.

Based on his personal experience, he called on the public to increase their vigilance against COVID-19 because the disease is real and very dangerous.

Therefore, he urged the public to adhere to health protocols as suggested by the government such as wearing a mask, washing hands with soap, maintaining physical distance, avoiding crowds and maintaining cleanliness.

Many Indonesians have a tendency to resort to home remedies to recover from various diseases including COVID-19, which to date has yet to have a clinically proven vaccine or medication.

At the beginning of the COVID-19 outbreak in March, many people in the country hoarded herbs and medicinal plants that are believed effective at preventing viral infections. Some also believe in the power of *jamu*, Indonesia's traditional herbal drink.

However, the Health Ministry reaffirmed in August that herbal medicines and jamu could not be used to cure COVID-19.

Akhmad Saikhu, the head of the ministry's herbal and traditional medicine research and development division, said herbal medicine or drinks only worked to relieve comorbidity symptoms in a patient, rather than curing the coronavirus disease.

A comorbidity is a medical condition that co-occurs with another, according to the Oxford English Dictionary.

"*Jamu* can only be used to relieve symptoms of comorbid diseases," said Akhmad. He added the misconception had been passed among the public that jamu could be used to cure the coronavirus disease.

COVID-19 antiviral drugs and vaccines are still being tested. *(The Jakarta Post)*

FILIPINO SCIENTISTS CLAIM COCONUT OIL CAN DESTROY CORONAVIRUS

Scientists carrying out research on the impact of virgin coconut oil on people with COVID-19 say the oil appears to be a viable treatment for the lung disease caused by the coronavirus.

After six months of experiments, scientists in the Philippines found that a diet rich in virgin coconut oil decreased the coronavirus count by 60% to 90% for mild to moderate cases, Fortunato dela Pena of the government's science department said in a radio interview.

The study is being funded by the department's Philippine Council for Health Research and Development (DOST-PCHRD) and led by the Ateneo De Manila University.

"The results are very promising, as not only does it show that the VCO, by itself, can destroy the virus, but it also has a key mechanism in upregulating the immune response against COVID-19," PCHRD chief Dr. Jaime Montoya said.

In recent years, coconut oil has seen increasing attention for its apparent broader health benefits, despite its high percentage of saturated fat, and is frequently recommended as part of health trends, such as ketogenic and paleo diets. From ashy knees and elbows to dry and brittle hair, coconut oil is also widely used as personal care.

In the Philippines, meanwhile, virgin coconut oil is readily available and consumed in this coconut-exporting country.

In the study, the scientists also found the oil to improve cell survival, adding to its previous skincare benefits of helping reduce dryness. However, dermatologists warn that as coconut oil is an occlusive moisturizer, meaning it traps moisture beneath the skin, it can lead to breakouts or aggravate existing acne, hence they do not advise using on the face.

The results of clinical trials on virgin coconut oil will determine whether it can be used as an adjunct therapy for COVID-19 patients. Dela Pena said an analysis of the oil as a potential antiviral agent may be out by the second week of November. *(Daily Sabah)*

WHITE COPRA PICKS UP IN EAST NEW BRITAIN

White copra training that started last month in the province is the first in the country to carry out the new coconut product, which is progressing well.

The province is on a quest with the possibility to have its first export of white copra by the end of this year.

White copra is high grade copra produced using an indirect heating system, the oven.

Fresh coconut is dried into clean white copra using oven to reduce the meat moisture content to five per cent, as opposed to the usual sun dried variant.

The four districts Kokopo, Pomio, Rabaul and Gazelle have shown much interest and farmers have been continuously attending training at the Tobera Plantation Eden Sanctuary Farm in the Kokopo district.

Former Executive Director International Coconut Community (ICC) and strategic business advisor – Kokonas Indastri Koporesen (KIK) Uron Salum, who was in the province to guide the training, said more volume and good quality is needed in order for buyers to purchase the first container.

Speaking during the opening program of the training Mr. Salum said one way to attract buyer attention is to produce more and quality volume as there are buyers who are ready to receive the first container of white copra from East New Britain.

"Let us produce good quality copra. If we change the quality there is always a buyer. If there is no quality copra they cannot buy," he said.

Mr. Salum challenged the KIK team and the leaders in the province to continue the enthusiasm to flourish the economy.

"One task is too difficult for one to carry, but needs all of us. If you have this unity in your district and province there is no limit on what you can do. I am happy with the progress in what ENB is doing".

Mr. Salum said the copra sent must not have mold in them when they reach their destination with at least five per cent moisture content and have the right quality.

He said white copra is called the edible copra where people in other countries regard it as food and consume it. Oil that comes from white copra is also food and is called food grade oil.

He said as a business man and from his work experience there is no fluctuation of coconut product price over the last 20 years and urged farmers to tap into producing coconut products as there are over 300 of them. *(Post-Courier)*

MORE PHILIPPINE-MADE COCONUT PRODUCTS NOW SOLD IN RUSSIA - DTI

The Department of Trade and Industry (DTI) said that more coconut products made in the Philippines are now available in Russian stores. Organic coconut-based items such as coconut milk, coconut cream, balsamic sauce, aminos sauces, coconut syrup, coconut oil and coconut jam are now available in Russian retail stores Ozon and Wildberries.

In addition, 10 new coconut products of Philippine manufacturer Quezon's Best are now also available in major Russian online retail stores, it said. Aside from Coco Daily organic coconut milk, which was made available earlier this year, a wider range of products have also become available including refined coconut oil, organic refined coconut oil, organic coconut sauce aminos, organic coconut sauce balsamic, organic coconut syrup, organic coconut vinegar, organic coconut sugar, organic coconut sauce with vinegar, organic coconut jam, coconut jam with cacao, the agency said.

"Finally, a wider range of Philippine-branded organic coconut food products are now being sold and made available to mainstream consumers in Russia through their online stores. With this development, Russians can have a taste of our quality world-class food products," Trade Secretary Ramon Lopez said. "Having our products available in Russia is a testament that despite the pandemic, Philippine exporters can and have the capability not only to continue trade exports in the global market, but forge new partnerships with buyers and importers in new markets," Lopez added.

DTI said Philippine coconut products were gaining popularity in Russia due to its "pure taste and absence of the unhealthy additives." Russian importer PanAsia Impex Ltd committed to continue working with the exporters in sourcing organic products due to "high potential and high sales" in Russia. *(UCAP Bulletin)*

COCONUT WASTE PUSHED AS A VIABLE INCOME SOURCE

Turning coconut waste into a viable source of livelihood and income for many communities is a "win-win for people and the environment," Senator Cynthia Villar said.

"There are two-fold benefits in turning waste coconut husks into something useful, we got rid of garbage that used to litter our streets and clog our rivers and waterways. Secondly, we helped residents by providing them with livelihood and additional source of income," said Villar, head of both the Senate Committees on agriculture and the environment.

Villar SIPAG's coconet-weaving enterprises convert waste coconut husks into coconets, which are used as riprap materials in construction projects to prevent soil erosion. Vista Land buys the coconets for its housing subdivisions.

Villar also said the coco peat or dusts extracted from the coconut husk fiber were mixed with household waste to make organic fertilizers. All the fertilizers produced are distributed all

over the country and given free to farmers and urban gardeners.

Villar says these have become in demand during the pandemic when the popularity of growing one's food and vegetable gardening dramatically increased.

She says people who are involved in making coconets and organic fertilizers have made it a viable source of income.

"She continue as a social entrepreneur have to put an income component in the projects for them to be successful or sustainable. Otherwise, people will be hesitant or half-hearted to participate,". She says their coco waste project also demonstrates how technological innovation can improve people's lives.

The coconet enterprise is also supporting farmers all over the country because they don't have to buy fertilizer.

It also boosts organic agriculture in the country. Incidentally, November is "Organic Agriculture Month" by virtue of Proclamation 1030, which cites organic farming as an effective tool for development, environmental conservation and protection of the health of farmers, consumers, and the general public.

Villar is an active proponent of organic agriculture. The Villar-authored Organic Agriculture Bill was passed in the Senate on June 1. Senate Bill 1318 will introduce the Participatory Guarantee System, a more affordable and accessible certification system for organic products. It amends Republic Act 10068 as the Organic Agriculture Act of 2010 will provide the much-needed impetus to support the growth of organic agriculture in the country.

As an environmentalist and social entrepreneur, Villar is continuously searching for ways to provide livelihoods to Filipinos that also help protect the environment. *(Manila Standard)*

COCONUT, COPRA WILL FETCH GOOD PRICES, SAY EXPERTS

Domestic and export market intelligence cell (Demic) functioning at the Tamil Nadu Agricultural University (TNAU) has forecast that copra will fetch prices above the minimum support price (MSP) this season in the market. Coconut will also fetch a decent price.

The cell analysed coconut and copra prices over the last 18 years that prevailed in the Avalpoonthurai regulated market in Erode and Perundurai Cooperative Marketing Society "Price of good quality coconut during October-December will be Rs 15-Rs 17 per nut. Good quality copra price will rule around Rs 100-Rs 110 per kilogram and subsequent price fluctuation will be subjected to the arrivals from Karnataka and Kerala," a Demic representative said.

The prevailing price of copra is around Rs 100-Rs 105 per kilogram, which is higher than the minimum support price of Rs 99.6. "The price is subject to the northeast monsoon. If the monsoon is good, there would be arrivals from the neighbouring states, especially Karnataka, and the price may fall accordingly. It is subjected to weather risk, not market risk," said a Demic official. "Any which way, the price of copra will be above the MSP."

Meanwhile, farmers in the district said that after a dull for the past four months, the price of coconut has seen a boost over the past one week. "In the previous months, coconut sold for Rs 20-Rs 22 per kilogram. It has gone up to Rs 38-Rs 40, which translates to Rs 17-Rs 20 per nut," said R Periasamy, district vice-president of Tamil Nadu Farmers Association. "Copra price is showing indicators of increasing. First quality copra sells for around Rs 114-Rs 116 in the market. Small farmers sell coconuts for retailers for rate per nut, while farmers with more produce sell it in bulk."

The release from Demic quoted trade sources, that from January to August 2020, coconut production in major districts in Tamil Nadu were low compared to the previous season. "Demand is firm and arrivals of copra to the Perundurai market is mainly from Mysuru and parts of Tamil Nadu. Arrivals will start from Kerala and Tamil Nadu from January to February," it said.

Farmers cited lack of rains and the rugose whitefly pest infestation as reasons for low coconut production. *(Times of India)*

INDIAN ROBOT CLIMBS TREES TO HARVEST COCONUTS

As the population increasingly moves towards tech jobs, there's now a shortage of coconut harvesters in India. That's why scientists there have built a tree-climbing coconut-harvesting robot, that could perhaps someday take up the slack.

The prototype device was created by a team at Amrita Vishwa Vidyapeetham University, led by Asst. Prof. Rajesh Kannan Megalingam. Known as Amaran, it's currently in its sixth incarnation, and has been in development for three years.

In a 15-minute process, users start by manually assembling the robot's ring-shaped body around the base of a coconut tree. Utilizing its eight inward-facing omnidirectional rubber wheels, Amaran then makes its way up to the top.

A user wirelessly controls it from the ground, utilizing either a joystick unit or a smartphone app to move it up and down, and to rotate it around the trunk.

Once the robot has reached the coconuts, its arm is extended and positioned at the base of a bunch of ripe coconuts. Utilizing a circular saw blade on the end of the arm, Amaran then cuts through that base, allowing the coconuts to fall to the ground.

In field tests conducted at a coconut farm, the robot successfully climbed trees up to 15.2 m (49.9 ft) in height, with trunk inclinations of up to 30 degrees. Additionally, while human coconut harvesters were found to work faster, Amaran could work for longer, potentially making up the difference. *(New Atlas)*

ON WORLD COCONUT DAY, KERALA LOOKS TO CENTRE TO IMPROVE YIELD

World Coconut Day is celebrated across the world on September 2. In India, it is Kerala -- which is known as the 'land of coconuts' and derives its name from 'Kera' meaning coconut tree -- which is now looking towards the Centre for more support to take the state to greater heights in coconut production.

Agriculture Minister V.S. Sunil Kumar, who also has a keen interest in agriculture especially coconuts, told IANS that things will speed up in this sector if the Centre extends its help with more coconut centric schemes.

"We got Rs 20 crore for the Kerala Agriculture University from the Centre to step up research on coconuts. The government had planned to plant at least 2 crore seedlings by 2029 and of this 30 lakh are targeted to be produced by the end of the next calendar year," said Kumar.

The coconut has been in existence for over 3,000 years and today it is an important horticultural crop cultivated in 17 states and three Union Territories across the country, making India the largest producer of the fruit, accounting for 31 per cent of the world production.

In the country, the total area under coconut cultivation is 20.96 lakh hectares of which Kerala alone accounts for 7.60 lakh hectares.

Kerala stands first in the production of coconuts (5,230 million nuts in the state as against 23,798 million in the rest of the country) but in terms of productivity it is at the fifth position.

"The need of the hour is to see how quickly we can get to the target of 2 crore new seedlings, because the area under coconut cultivation in Kerala is coming down due to low productivity. If we are able to cut down low yielding trees and in their place, plant new ones, then things can be better for the crop, farmers and the state," said Kumar.

On its part, Kumar said that the government has set the ball rolling to set up a Rs 100 crore Coconut Park at two centres in Kozhikode.

"With the corona pandemic striking hard, the work at these centres has taken a beating. To take coconut to new heights, we have decided to set up a trading centre and also a facilitation centre. Had it not been for Covid, it would have been ready to open. We are positive that we will be able to open it before the end of the term of the present government," added Kumar.

Kumar pointed out that his department has been able to set up around 350 Kera Gramam (Coconut Villages) and their target is to see that each and every one of the close to 1,000 local bodies in the state becomes a coconut village.

"The target is that each village should have a coconut plantation in 250 hectares and it's a joint effort of the farmers. They engage in coconut farming using the most modern scientific principles. Setting up of value addition units of coconut should also take place," added Kumar.

Kumar's dream of value addition can become a reality as today every part of the coconut tree is used for one thing or the other. This includes coir from the husk of the coconut, the wood of the tree is used as timber, there is coconut oil and now activated carbon is being produced from coconut shells besides newer varieties of food items such as coconut milk, flavoured milk, butter, biscuits and the cool refreshing neera.

Researchers have also found that coconut flour is a rich source of dietary fibre, protein and low in digestible carbohydrates and is good for preventing cancer, heart ailments and diabetes. Another feature is that it is gluten free.

Kumar said the Centre, through its two Central units working for the improvement of the coconut -- the Central Plantation Crop Research Institute which does research on coconut and the Coconut Development Board -- can help in the overall development of the coconut.

The future of coconut appears bright as over the years it has played a significant role in poverty alleviation and employment generation besides providing a livelihood to 12 million families. Coconut products including coir bring in foreign exchange to the tune of around Rs 3,000 crore. *(The Times of India)*

SRI LANKAN MINISTER CLIMBS TREE TO INFORM PEOPLE ABOUT SHORTAGE OF COCONUTS

In an unusual move, a minister in Sri Lanka climbed a coconut tree to talk to members of the media about a pressing concern – the shortage of coconuts in the island country.

For the press conference, the minister, identified as Arundika Fernando, climbed a coconut tree in his estate in Dankotuwa even as he held onto the tree with one hand and a coconut with his other hand.

Fernando, who is the State Minister of Coconut, Kithul, Palmyrah, and Rubber Cultivation Promotion and Related Industrial Product Manufacturing & Export Diversification was seen climbing a coconut tree using a new kind of gear introduced by a local inventor from Warakapola.

"We hope to utilise every available plot of land for the cultivation of coconuts and boost the industry to one which would generate foreign exchange to the country,".

Speaking to reporters from the top of a tree, he said the price of coconuts has increased due to the demand for coconut-related products world over. The minister further said that those employed to pick coconuts must be paid LKR 100 per tree. Although there is a sharp decline in employees for the production of toddy and to pick coconuts, the minister vowed not to import the fruit despite an increase in price. *(The Indian Express)*

PURI SERVITOR PROMOTES FACE MASK MADE FROM COCONUT SHELL

With World Health Organization (WHO) stating that COVID-19 vaccine might not be available by mid-2021, wearing of face masks amongst other means to fight the virus have become an integral part of our lives.

While several people have gone overboard with making face masks out of gold and silver with diamonds embellished, a senior servitor of Puri Hajuri, Bhimsen Khuntia was seen flaunting a mask made out of coconut shell.

In a bid to support local artisans and handicrafts, Khuntia happily spoke of the coconut shell mask. "In most masks, people complain of breathing issues, which is not the case with this mask. Special outlets have been made for the same. It also has been adequately covered with cloth and hence extremely comfortable," said Khuntia. *(Ommcom News)*

FIJI MAKES 2021 YEAR OF COCONUT IN EFFORTS TO ENSURE POST-PANDEMIC FOOD SECURITY

A Fijian government official said that Fiji is making 2021 Year of Coconut in efforts to revive the industry which is significant to food security and people's livelihoods in the South Pacific island country.

While addressing the virtual 56th International Coconut Community session and ministerial meeting 2020, Fiji's Agriculture Ministry Permanent Secretary Ritesh Dass said that the move would help revitalize Fiji's coconut industry.

Dass said the COVID-19 pandemic has put Fiji's food systems under strain, increasingly challenging its capacity to guarantee food security and provide a profitable source of livelihoods for the people.

Reviving Fiji's coconut industry would help promote the use of coconut "for nutrition, health and wealth" for the Fijian people, he said, adding that a Fijian agriculture ministry initiative being carried out in response to COVID-19 and with a focus on long-term food security involved the distribution of coconut seedlings to households nationwide.

"This initiative will support ongoing activities by the Ministry of Agriculture such as planting and replanting of 1,000 hectares of coconuts, development of lucrative farming systems such as intercropping and mixed farming systems, promotion of innovative land use and farming techniques," and downstream processing of coconut by-products, among others, he said.

In the Pacific region, coconut is an important economic and subsistence crop. Pacific islanders make use of almost every part of the coconut tree as it is a major source of food, oil, fiber, and wood. *(XinhuaNet)*

LUMAJANG RESIDENTS GAIN PROFIT FROM WASTED COCONUT SHELL

Starting from seeing a lot of wasted coconut shell, a resident of Indonesian Ranuyoso Village, Lumajang, East Java named Jauhar processed that waste into handicrafts.

Armed with a saw, drill and sandpaper machine, Jauhar transformed coconut shells into handicrafts of flower pots of various types, loudspeakers, and ashtrays. Jauhar was assisted by a number of employees, makes various handicrafts from wasted coconut shells .

The idea of making coconut shell crafts originated from Jauhar's concern regarding the abundance of coconut shell waste. Moreover, Ranuyoso District is a coconut producing center. With creativity, Jauhar innovated to make handicrafts made from coconut shells .

"We try to make a different one, the first that we produce is from 3/4 of the shell, because we are making use of unused shells, or coconuts eaten by squirrels, the condition is still intact. The second is the variant of the pot itself that we try to make all kinds of things, " said Jauhar.

From trial and error, Jauhar can produce dozens of various handicrafts in a day. Prices for coconut shell handicrafts are vary, starting from IDR 8,000 to IDR 10,000 depending on size.

Not only to Lumajang Regency, this craft is also sent to Jakarta, Bogor, Banjarmasin, as well as a number of cities in Central Java and East Java.

Jauhar wants to develop his handicraft business. In the future, Jauhar hopes that his business can continue to grow. Not only to helping his family economy, this creative effort can also absorb the workforce of residents in his village. *(Liputan 6)*

Table 1. WORLD Exports of Coconut Oil, 2014– 2020 (In MT)

COUNTRY	2015	2016	2017	2018	2019	2020[R]
A. APCC Countries	**1,728,076**	**1,548,733**	**1,605,772**	**1,823,859**	**1,837,714**	**1,819,672**
F.S. Micronesia	0	0	87	57	0	0
Fiji	1,794	1,779	1,955	3,261	2,700	2,700
India	7,725	29,215	11,726	6,985	7,632	7,500
Indonesia	760,072	602,318	510,352	675,270	650,000	552,000
Jamaica	3	7	6	2	2	2
Kenya	161	252	55	36	30	30
Kiribati	2,461	2,220	1,359	1,851	1,500	1,500
Malaysia	152,091	115,969	102,735	121,914	135,000	175,000
Marshall Islands	0	1,239	809	2,229	2,000	2,000
Papua New Guinea	18,467	23,866	26,565	22,341	25,000	20,000
Philippines	740,279	726,827	912,632	954,107	980,000	917,000
Samoa	1,020	546	1,098	32	50	50
Solomon Islands	1,163	1,487	5,515	5,670	3,300	3,350
Sri Lanka	22,032	22,679	20,126	19,039	20,000	17,000
Tonga	1,020	900	900	0	0	0
Thailand	15	1,236	1,331	1,266	1,300	1,300
Vanuatu	9,000	654	2,543	1,226	700	740
Vietnam	10,773	17,539	5,978	8,573	8,500	8,500
B. Other Countries	**342,894**	**327,780**	**167,349**	**124,151**	**112,600**	**118,000**
TOTAL	**2,070,970**	**1,876,513**	**1,773,121**	**1,948,010**	**1,950,314**	**1,826,672**

R: Revised figures

Table 2. Prices of Coconut Products and Selected Vegetable Oils, 2020 (US$/MT)

	2020											
Products	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Copra	607	543	519	536	540	585	592	600	632	665	848	920
Coconut Oil	1,062	875	834	840	831	920	886	954	1,034	1,105	1,380	1,459
Copra Meal[2]	257	224	193	231	252	261	231	205	206	209	259	281
Desicc. Coconut[2]	2,153	2,149	2,081	2,150	2,153	2,190	2,190	2,195	2,208	2,222	2,315	2,469
Mattress Fiber[1]	157	154	149	n.q.	136	107	110	111	111	111	109	107
Shell Charcoal[2]	316	327	324	361	371	369	376	381	390	396	418	447
Palm Kernel Oil	955	802	689	721	678	761	704	756	788	801	1,073	1,193
Palm Oil	835	729	635	609	574	652	659	703	741	758	918	979
Soybean Oil [r]	874	800	748	680	684	752	821	867	906	915	974	1,023

1: Sri Lanka (FOB); 2: Philippines (FOB); r: revised

Table 3. World Oil Balance 2018-2020 (1,000 Tons)

Oil/Year	Jan/Dec 2018	Jan/Dec 2019	Jan/Dec 2020
Palm Oil			
Opening Stocks	13.11	15.26	13.61
Production	74.68	76.67	74.02
Imports	51.43	55.39	50.16
Exports	52.21	54.80	50.41
Disappear	71.75	78.91	75.19
Ending Stocks	15.26	13.61	12.19
Soybean Oil			
Opening Stocks	5.75	6.00	5.87
Production	56.91	56.89	58.47
Imports	10.93	11.81	12.77
Exports	11.15	12.03	12.90
Disappear	56.44	56.80	57.55
Ending Stocks	6.00	5.87	6.66
Groundnut Oil			
Opening Stocks	0.34	0.35	0.27
Production	4.17	3.72	3.90
Imports	0.27	0.33	0.35
Exports	0.27	0.33	0.35
Disappear	4.17	3.78	3.88
Ending Stocks	0.35	0.27	0.29
Sunflower Oil			
Opening Stocks	2.01	2.88	3.38
Production	20.04	20.77	21.35
Imports	10.11	11.89	13.16
Exports	10.16	12.09	13.22
Disappear	19.12	20.06	21.28
Ending Stocks	2.88	3.38	3.39
Rapeseed Oil			
Opening Stocks	3.57	3.27	2.99
Production	25.51	24.94	25.14
Imports	4.98	5.34	5.82
Exports	5.01	5.28	5.79
Disappear	25.78	25.29	24.92
Ending Stocks	3.27	2.99	3.24
Cotton Oil			
Opening Stocks	0.43	0.42	0.36
Production	4.68	4.58	4.56
Imports	0.14	0.17	0.15
Exports	0.14	0.16	0.15
Disappear	4.69	4.65	4.56
Ending Stocks	0.42	0.36	0.36

Oil/Year	Jan/Dec 2018	Jan/Dec 2019	Jan/Dec 2020
Palm Kernel Oil			
Opening Stocks	1.01	1.31	1.36
Production	7.81	8.11	7.90
Imports	3.35	3.57	3.42
Exports	3.30	3.63	3.43
Disappear	7.56	8.00	7.92
Ending Stocks	1.31	1.36	1.34
Coconut Oil			
Opening Stocks	0.33	0.52	0.51
Production	2.91	2.91	2.62
Imports	1.92	2.05	1.85
Exports	1.90	2.12	1.81
Disappear	2.73	2.84	2.76
Ending Stocks	0.52	0.51	0.41

Source: ICC and Oil World

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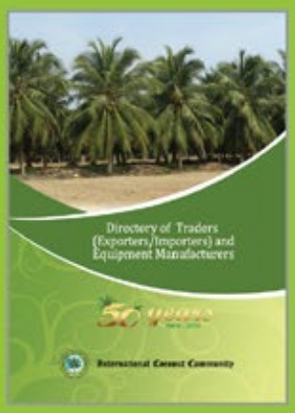

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for Desiccated Coconut Granules, Chips,
Toasted D/C & Parings.
Output Capacity : 300 to 1000 Kgs/hr.

VIBRATORY FLUID BED DRYER

for Desiccated Coconut Granules & Parings.
Output Capacity : 300 to 1000 Kgs/hr.

GRINDER

Output Capacity:
1000Kgs/hr.

BLANCHER

Output Capacity :
1000 to 4000 Kgs/hr.

NOVATEX SCREENER/GRADER

Output Capacity :
1000 to 1500 Kgs/hr.

DESHELLING MAHINE
Output Capacity :
250 to 300 nuts/hr.

DEHUSKING MACHINE
Output Capacity :
1200 nuts/hr.

OIL EXPELLER

RADIATOR
Extruded Fins or
Plate Fins Type

STAINLESS STEEL PERFORATED APRON TRAYS
Width: 2640mm & 3250mm

STAINLESS STEEL CHAIN

GEM

GEMTECH PROJECTS LLP.

10/C, Middleton Row, 3rd Floor, Kolkata - 700 071, India
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E-mail: info@coconutprojects.com | sg@gemforgings.com | www.coconutprojects.com

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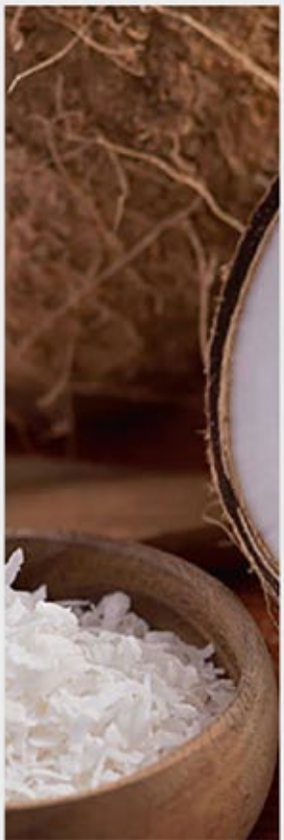

vco expeller

Think Coconut. Think TIGL.