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

Coconut Development Board

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

Functions

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

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

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

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Shri. Rajbir Singh IFS assumes charge as Chairman, Coconut Development Board

Shri. Rajbir Singh IFS took additional charge of Chairman, Coconut Development Board on 14th January 2021. He is a 1991 batch IFS officer of Gujarat Cadre and is presently serving as Joint Secretary (MIDH), Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India

Smt. G Jayalakshmi IAS relinquished charge of Chairman, Coconut Development Board

Smt. G Jayalakshmi IAS relinquished the charge of Chairman, Coconut Development Board. She is a 1995 batch IAS Officer of Andhra Pradesh Cadre. She is repatriated to her parent Cadre of Government of Andhra Pradesh.

Message from the Editor

Coconut Development Board has been working towards integrated development of coconut cultivation and industry. The prospects for the coconut sector looks brighter with the increased awareness among the consumers on the health and nutritional attributes of various coconut products. The market prospects are also good with better price realization for coconut products. To enable the coconut farmers realize the true potential of the prospects of coconut, it is essential to give thrust on increasing area, production and productivity of coconut. The Board has been implementing various schemes like area expansion and replanting and rejuvenation of coconut gardens on a priority basis towards achieving the same.

Quality planting material is a very crucial component while planning for establishment of commercial coconut gardens. Coconut being a perennial crop, quality of planting material becomes more crucial since the plantation is a long term investment. Assurance of quality of planting materials is usually done through certification of seedlings by accredited agencies. The recent development in ensuring quality of coconut seedlings is through tagging of seedlings with QR code which not only assures quality but also provides accountability to the farmer regarding the performance of the seedling.

Introduction of technological innovations in coconut cultivation is inevitable to keep up with the advances in this modern era of agriculture. It is important for the development agencies, extension workers and the coconut farmers to work together towards sustained development of the sector.

Editor

Intercropping of fruit crops in Coconut garden – Vignettes from 'Chowtara thota' Meeyapadavu

Thamban C, Rajesh M.K, Shameena Beegum, Prathibha P. S. and Daliyamol
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'Chowtara thota' ('Chowta's Farm' in Kannada language) is a field school for the farmers of Meenja village in Kasaragod district in Kerala state and nearby areas to visit and get exposure on modern farming practices. The farm is headed by Dr. D. Chandrasekhar Chowta who was once teaching in a university.

Dr. Chowta has no regrets in his decision to leave the promising academic job and switching over to farming as his profession. He is now 77 years old and he entered farming in 1978 at the age of 35 years. Prior to that he was engaged in teaching post graduate students and doing research in Cytogenetics and Radiation Biology in University of Bombay in the beginning and subsequently at University of Mysore (presently Mangalore University) for about ten years.

In 1978 he came back to Meenja, a remote village in Kasaragod district, his native place and got involved in the farming activities of Chowta family. His father, late Sri. Narayana Chowta was the Patel (village head having revenue authority of the village during the British regime) of the village and it was a joint family. The Chowta family was following traditional farming practices in their farm land revolving around paddy as the main crop. Chowtas still pursues the joint family system and Dr. Chowta lives with his two brothers and one sister. His older brother late Dr. D.K. Chowta was the head of the family who supported Dr. Chowta in the expansion and development of the farm. All the members of the Chowta family are

actively involved in the management of farm.

After taking over the farming activities, he introduced lot of changes in the crops, enterprises and agro-techniques in the farm. His approach to farming is very systematic and effective utilisation of scientific and improved farming techniques has been the key in the decision making related to development of their farm; be it the choice of crops, cropping/farming systems adopted, crop management practices followed, natural resource management and resource recycling or marketing strategies. And the result is there to see in the 'Chowtara thota'.

Chowta's farm is a rich showpiece of agro-biodiversity spread in about 50 acres. Apart from coconut, Chowta's farm comprises other crops like paddy, arecanut, cocoa, rubber, nutmeg, pepper, jack, and various fruits and vegetables. Paddy is cultivated in two acres near the banks of a small river flowing near his farm. It is not cultivated on a commercial scale but mainly aimed to meet the domestic requirement. Banana and pepper are grown mostly as intercrops in coconut garden. Of late, various exotic fruit crops like rambutan, mangosteen and avocado have been introduced in Chowta's farm as intercrops along with coconut and arecanut palms and also as pure crops.

Cocoa is raised as mixed crop in his five acre arecanut garden. His arecanut garden has all the important varieties released by ICAR-CPCRI; Mangala, Sumangala, Sreemangala and Mohitnagar apart from the south Canara Local or Kasaragod Local. The arecanut based cropping system in Chowta's farm was selected as a demonstration plot by the CPCRI Regional Station Vittal. Vanilla was also raised during the period from 2005 to 2010 as a mixed crop in the arecanut garden in two acres which was subsequently removed after the boom period due to the price crash.

Many farmers and extension personnel from Kasaragod district and other parts of Kerala and Karnataka state regularly visit Chowta's farm to get exposure to the innovative farming practices. Dr. Chowta and his family happily receive the visitors and are very keen to interact with them on the farm activities.

Coconut in 'Chowtara thota'

Chowta's farm has about 2200 coconut palms comprising of different varieties. About 1200 trees are of West Coast Tall variety. 500 trees are of dwarf varieties like Chowghat Orange Dwarf, Gangabondam, Malayan Yellow Dwarf and Malayan Orange Dwarf. The farm also has 400 trees of hybrid coconut mainly Chandrasankara and Kerasankara. Dr. Chowta gratefully acknowledges the support he received from Dr. K. U. K. Nampoothiri, former Director of CPCRI for introducing different coconut varieties in his farm. He also had fruitful association with Coconut Development Board for expanding coconut farming in Chowta's farm. CDB supported him under the Nucleus Seed Garden scheme.

WCT palms are about 55 years old while hybrids and dwarfs are about 25 years old. Besides, eight years back in 2013 Dr. Chowta has also planted 400 coconut seedlings of different hybrid and dwarf varieties which are mixed cropped with Rambutan fruit plants. Since Dr. Chowta adopts scientific crop management practices especially integrated nutrient management, irrigation and water management, coconut palms in his farm has high productivity. On an average the WCT trees yield 100 nuts, dwarfs about 100-125 nuts and hybrids about 125 to 150 nuts per palm per year.

Tender coconut marketing

A very unique feature of coconut farming in Chowta's farm is that about 80 per cent of coconut yield is harvested for marketing as tender coconuts. For the last 20 years Chowta's farm is selling tender coconuts mostly at Meeyapadavu, the nearby small town in his village. When the coconut price was low they were able to get higher price for tender nuts sold. Presently they are able to sell tender coconuts for Rs 30 per nut and tender nuts of COD, MYD and MOD varieties are sold for Rs. 32 per nut. Of late, though there has been a favourable price trend in the market for mature coconuts the highest rate for mature coconuts he received in the recent times was

only Rs 41.5 per kg which is not attractive compared to the price received for tender coconuts. According to Dr. Chowta the market rate for tender coconut is always attractive compared to mature nuts. He feels that there is an increasing trend in tender coconut consumption even in rural areas and coconut growers are to be made aware about the need to utilize the marketing opportunities in tender coconut sector which would essentially fetch them more income. Lack of availability of skilled palm climbers for harvesting tender coconuts would be a major constraint experienced by the growers which needs to be addressed by effectively utilising the service of rural youths trained under the Friends of Coconut Tree programme implemented by CDB.

Introduction of fruit crops

For many seasons banana was cultivated on a commercial scale in Chowta's farm. Banana varieties like Cavendish were raised as intercrops along with coconut and arecanut palms. Of late, intensity of banana intercropping has come down in his farm mainly due to the shifting focus to new fruit crops.

Later Dr. Chowta took interest in growing papaya and initiated a commercial papaya cultivation unit in the year 2005 with 125 plants of Taiwan Red Lady variety. There was no problem in marketing of papaya and it was a very remunerative enterprise and he was able to sell about half a tonne papaya every week. Papaya cultivation was continued for about 10 years.

Inspired by Mr. Sree Padre, well known farm journalist popularly referred to as 'Water Man' due to his efforts for popularising water conservation, Dr. Chowta turned his attention to jack fruit. He made efforts to have a diverse collection of local and exotic jack varieties in his farm. Apart from local varieties, the collection includes Taiwan Red, Early Vietnam, J-33 (Malaysian variety), Siddu and Shankara (Farmers' varieties of Jackfruit identified and promoted by ICAR-IIHR, Bengaluru). Traditional soft carpel jack varieties are also part of the collection. Dr. Chowta organised various programmes in his village to popularise production and marketing of value added products of jack fruit. Jack festivals were conducted many times at Meeyapadavu. Dr. Chowta invited chefs of the Taj group of Luxury Hotels to participate in the jack festival organised by Chowtara thota in collaboration with the Sarosa Institute of Hotel Management of NITTE University for the deliberations on jackfruit delicacies. Subsequently Dr. Chowta shifted his focus to introduction of different exotic fruit crops.

Experience of raising exotic fruits as mixed crops in coconut garden

▶ *Rambutan*

The first exotic crop thus introduced in Chowta's Farm was rambutan. He was motivated to take up rambutan cultivation by Mr. Jacob Francis who is having fruit plantations in different localities in Kerala and Karnataka. Dr. Chowta started rambutan cultivation in the year 2013 by planting 400 plants along with coconut in five acres. In the same year 100 rambutan plants were also introduced in the existing coconut gardens with grown up palms. In 2016-17 another batch of 500 rambutan plants were raised by removing the rubber trees. Altogether there are about 1000 rambutan plants in Chowta's Farm spread in nine acres of land partly as mixed

crop with coconut and remaining as pure crop.

Since it was his pioneering efforts to introduce rambutan as a mixed crop in coconut orchard there were none among the coconut growers in the locality to discuss or consult about the crop management practices to be followed. Thus he mainly consulted Mr Jacob Francis, the planter.

Varieties: N-18 and Ron Grein are the two varieties of rambutan in Chowta's Farm. The planting materials (grafts) of these varieties were procured from a private nursery (Homegrown Bio-tech, Kanjirappally).

Manuring: Dr. Chowta follows integrated nutrient management practices for rambutan. Every year an adult rambutan plant is given 4-5 kg poultry manure or FYM, 1 kg bone meal, 2 kg neem cake and 2 kg Geogreen (a commercially available branded organic manure). Chemical fertilizers are given in three splits; at the beginning of south west monsoon during May-June, post-monsoon during August September and the third split during the fruit setting time. 150 g Urea, 200 g Rajphos and 350 g Muriate of Potash are applied per plant. According to Dr. Chowta lime need not be applied since the rambutan plant prefers a pH range of 5-7. However, to avoid calcium deficiency calcium nitrate is applied in the soil or sprayed on the foliage. Similarly, magnesium sulphate is applied for ensuring the required amount of magnesium to the plants. Need based application of borax and zinc sulphate is done to correct deficiency of micronutrients; boron and zinc respectively.

Since it was his pioneering efforts to introduce rambutan as a mixed crop in coconut orchard there were none among the coconut growers in the locality to discuss or consult about the crop management practices to be followed.

Pruning: Rambutan will grow as a big tree if its growth is unrestricted. Pruning is done to restrict the height of the plant to 10 feet to facilitate easy harvesting and cultural operations. Light pruning is done regularly after the harvest in every season by lopping the fruit bearing branches.

Plant protection: No serious incidence of pests and diseases is observed for the rambutan plants. However, if there is rain or dew fall during flowering season the flowers are to be protected by spraying wettable sulphur @ 2.5g/litre water.

Yield: Rambutan starts flowering about two years after planting and commercial yield can be obtained three years after planting; sometimes even two years after planting. From five years onwards stabilised high yield level can be expected. Normally the flowering season of rambutan is from December to April and fruits become ready for harvest during the period from April to September. Harvesting is either done as whole bunch or as individual loose fruits as per the market demand. It is better to harvest before 8 am to improve keeping quality of fruits. If delayed colour of fruits will fade. In Chowta's Farm yield obtained from rambutan, on an average, is 50 kg fruits per tree.

Marketing : Dr. Chowta has not experienced any difficulty so far in marketing of rambutan. Wholesale traders come to Chowta's Farm and purchase the fruits. Rambutan fruits from Chowta's farm is sold in the markets in Kerala, Karnataka and Tamil Nadu.

During the last season they could sell rambutan fruits at Rs 200 per kg.

Other exotic fruits

Based on the successful experience of raising rambutan, other exotic fruits like mangosteen, avocado and dragon fruits were also subsequently introduced in Chowta's Farm.

▶ *Mangosteen (Garcinia mangostana)*

Mangosteen is a tropical evergreen tree with edible fruit native to island nations of Southeast Asia and Thailand. Dr. Chowta has planted about 200 mangosteen in his farm; 100 nos planted in 2014 and the remaining 100 panted in 2016. Out of these, 75 mangosteen are planted as mixed crop along with coconut palms, 45 as mixed crop along with areca palms and remaining 80 as mono crop.

▶ *Avocado (Persea americana)*

Avocado is a fruit tree native to Mexico and Central America. This exotic fruit crop has been integrated in Chowta's Farm on a commercial scale. In 2017 about 100 plants of avocado were introduced in the existing coconut garden (40 nos along with 18 years old coconut palms and 60 nos along with 3 years old coconut palms). Again two years ago another batch of 500 avocado saplings were planted as monocrop in the laterite quarry in the farm after putting sufficient quantity of soil and applying lot of organics. Though few avocado trees were there earlier in the Chowta's farm they were raised only for house consumption. In earlier times, avocado cultivation in India was mostly confined to the tea and coffee estates. Since there was not much information about the potential of growing avocado in the agro-climatic situation prevailing in his village which represents the northern laterite tract. Dr. Chowta took lot of efforts to gather information about the cultivation of avocado and its suitable varieties. There was nobody to guide him on cultivation of avocado. There were mistakes made especially in choosing varieties and procuring planting material. His visit to Hawai island gave him exposure to the avocado cultivation.

Dr. Chowta is highly optimistic about the avocado crop in the farm which he hopes would add substantial income to Chowta's Farm.

▶ *Dragon Fruit (Selenicereus undatus)*

The latest addition to the exotic fruit crops in Chowta's Farm is dragon fruit. It is a species of Cactaceae and is the most cultivated species in the genus. It is used both as an ornamental vine and as a fruit crop. In 2019 about 20 units of dragon fruit plants were planted with granite stones as support. Dr. Chowta feels that dragon fruit, which is a hardy crop, would be quite suitable for planting as mixed crop in coconut gardens located in the laterite tract with low water availability.

Research and extension support needed

According to Dr. Chowta, coconut growers need support from research institutions like CPCRI for taking up cultivation of exotic fruit plants as mixed crops in coconut orchards. Technological recommendations pertaining to suitable varieties and crop management practices for raising these crops in the major coconut growing tracts in the country are to be evolved at the earliest and disseminated among the farmers. He has already presented this requirement before the scientists during one of the recently held interaction sessions at ICAR-CPCRI, Kasaragod. Dr. Chowta also feels that coconut development agencies should formulate and implement appropriate development/extension interventions to popularise intercropping of fruit crops in coconut gardens. This would strengthen the food and nutritional security and enhance income of coconut growers.

Recognitions/awards

Dr. Chowta has received many awards and recognitions for his outstanding achievements in farming. He got the 'Innovative Farmer Award' from ICAR-Indian Agricultural Research Institute (IARI), New Delhi in the year 2010. He was one of the 100 coconut farmers selected from various states in India who were honoured during the centenary celebration of CPCRI in 2016. Dr. Chowta was selected by Department of Agriculture as one of the governing body members of ATMA Kasaragod. He also received the 'Alva's Nudisiri Prashasthi' award instituted by Alva's Sikshana Prathistana, Moodabidri in the year 2016 for his achievements in the field of agriculture. He was also included as a farmer representative in various committees constituted by different government departments and development organisations.

Reaching out to fellow farmers

Dr. Chowta and members of Chowta family have been very keen in sharing their farming experience with other farmers and providing guidance for scientific cultivation. Dr. Chowta was actively involved in organising FPOs of coconut growers in his village. 'Chowtara chavadi' was built by Chowta family at Meeyapadavu as a meeting place for farmers. It has building and infrastructure facilities for conducting training, seminars and meetings besides dormitory accommodation facility for the visiting farmers' groups. Various extension programmes including Krishimelas, exhibitions, training programmes and seminars are being regularly organised in 'Chowtara chavadi' in collaboration with different agencies to benefit farming community.

For more information about the farming activities of 'Chowtara thota' Dr. Chowta can be contacted in the following address.

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Integrated Nutrient Management in Dwarf Coconut Garden – a Rejuvenation Therapy

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Coconut is one of the predominant horticultural crops of the state of Tamil Nadu spreading across 4.26 lakh hectares with a productivity of 12291 nuts per hectare. Dwarf coconut varieties viz., Chowghat Orange Dwarf, Malayan Green Dwarf, Malayan Yellow Dwarf, Malayan Orange Dwarf and Chowghat Green Dwarf are cultivated by the growers in account of the attractive prices of tender nut and occupies over 20% of the total coconut area of the state. Past history reveals that coconut is a succumb victim to an array of pests and diseases since 2000, with Eriophid mite, Red palm weevil, Rhinoceros beetle, Slug caterpillar, Leaf blight, Root(wilt) and Rugose Spiraling Whitefly ruling over the reent years. There had been a set back in the spathe emergence owing to the incidence of Rugose Spiraling Whitefly and more was the intensity of damage in case of dwarf varieties, and hybrids evolved with dwarf as the female parent. Climate change has turned out to be an unavoidable factor in cropping and dwarf coconut is a sensitive victim to receive the catastrophes of the drought events.

One such case was witnessed in a farmer's garden at Avalchinnampalayam village of Pollachi (North) block of Coimbatore district, Tamil Nadu. The farmer Mr.Venugopal had been cultivating Chowghat Orange Dwarf variety of coconut over an area of four acres. The palms were planted by the farmer during 2009 and the yield stability was attained at the fourth year of planting. It is the field in which the crop production research project of the ICAR – AICRP (Palms) "Integrated Nutrient Management Technologies to Enhance the Productivity and Quality of Tender nut in Dwarf Coconut" was initiated during 2014-15. Soil analytical data of the experimental site revealed that the soil was neutral in pH, non saline in nature, low in KMnO4-N, medium in Olsen –P and low in 1N NH_4OAcK. Organic carbon content was low (<0.5 %) in the soil. Micro irrigation system is being followed in the garden utilizing water from the open well of the farm. The farmer was enjoying a bumper yield of 200 - 250 tender nuts per palm per year from 2014 until his garden was worst hit by the drought of 2016. Rainfall received during 2016 was 40 % less than the mean annual rainfall of 800 mm of the region. This caused a severe setback in the spathe emergence in the dwarf coconut cultivar during 2017. The farmer who had been harvesting lorry loads of tender coconut was frustrated by the very few heaps of nuts he witnessed during 2017 and planned to abandon the garden because of its poor performance and to replace with tall variety of coconut.

Coconut Palm during 2017

Weather variables recorded in the Agro Meteorological Observatory of CRS, Aliyarnagar					
Year	Max. Temp (oC)	Min. Temp (oC)	Rainfall (mm)	RH (%)	Evapo-ration (mm)
2014	36.7	25.0	1054.9 (83)	90.8	5.9
2015	35.3	22.3	1073.7 (76)	92.4	6.5
2016	38.0	23.9	480.4 (31)	90.0	8.0
2017	36.8	24.2	748.1 (50)	93.4	5.6
2018	36.8	23.1	1085.5 (73)	96.8	4.8
2019	38.0	27.5	896.01 (67)	97.2	9.0
2020	37.5	21.5	644.9 (61)	94.2	4.8

(Figures in parantheses indicate the number of rainy days).

But the farmer was encouraged to continue basin management so as to keep rhizosphere alive and it was demonstrated in the research plots maintained over there. He was advocated to apply more of organic manures viz., farmyard manure @ 50 kg per palm, coconut frond mulching removing the basal portions, green leaf manuring with the available biomass around his fields, application of biofertilizers viz.,Azospirillum and Phosphobacteria @ 100 g each per palm per year. On receipt of sufficient rains during 2017, application of NPK @ 560 – 320 – 1200 g was resorted to in two split doses during December and June, together with MgSO4 @ 500 g per palm per year. A month after the application of macronutrients, ZnSO4 was applied @ 200 g per palm per year in two equal splits. The same package was continued during 2018 with neem cake @ 3 kgs per palm per year to evade whitefly. During 2018, coconut palms were better than the previous years and during 2019, Integrated Nutrient Management registered its special imprint by giving out inflorescence stringed with buttons analogous to grape bunches. The yield graph started shooting up steeply which reverted smile in the face of the farmer. Regardless of Rugose Spiraling Whitefly visiting and leaving the dwarf palms, Integrated Nutrient Management technology started contributing for the betterment of the garden which showed great transition in the mindset of the farmer and others in the vicinity. The farmer who had been thinking of replacing the dwarf coconut palms with tall variety

because of drought and pest is enjoying lorry loads of harvested bunches in his field. He reaped 200 tender nuts per palm per year during 2020 with a net return of Rs.3,00,000 accrued per annum.

Basin management, an essential phenomena helped to retrieve the lost glory of the dwarf coconut palms. Soil is a living entity and a dynamic mix of minerals, organic matter, air and water which changes in response to crop management practices. Soil management is an inevitable part of land management. In the recent past, physical, chemical and biological quality of the soil has deteriorated due to imbalanced use of chemical fertilizers, poor recycling of farm wastes and depletion of soil organic carbon pool which restrain the capability of the crops to resist adversities. Scrupulous application of organic manures creates a favourable rhizosphere environment for microbial processes which include exudation, water uptake, nutrient mobilization, decomposition of soil organic matter and respiration. The role of soil microorganisms in nutrient transformation reactions is far beyond measurement. Microorganisms are often cited as the 'eye of the needle' through which organic matter passes more than once. Microbial generation can be triggered only through application of organic matter. The hidden half of coconut is always engaged in anchorage and acquisition of vital nutrients and water. Rhizospheric processes have control over the biogeochemical cycles and mechanisms that signal resistance to biotic and abiotic stress mechanisms. Basin management affects the hydrothermal regime of the soil which facilitates the palms to perform better by regulating the thermal cycles in the rhizosphere. Under moisture stress condition, mulching helps in curtailing the evaporation losses and holding moisture for an extended period of time in soil. It paves way for soil resilience, the ability of the soil to resist adverse changes under a given set of ecological and land use conditions. This is what happened in the farmer's garden too.

Today, still there is Rugose Spiraling Whitefly and sooty mould on the dorsal surface but, the palms are yielding well. Thanks to rejuvenation therapy of Integrated Nutrient Management. Thus in coconut, basin management holds great promise in imparting tolerance to biotic and abiotic stress. Combined application of farmyard manure @ 50 kgs, green leaf manuring with daincha or sunhemp @ 35 kgs per hectare, recycling of coconut wastes, coconut frond mulching, application of biofertilizers Azospirillum and Phosphobacteria @ 100 g each together with soil test based application of macronutrients and critical micronutrients per palm per year can promote the root growth, keep the rhizosphere active and help the dwarf palms to tolerate the biotic and abiotic stresses as evinced from the research plot of the farmer's garden. ■

Quick Response (QR) code labeling

as a quality assurance mechanism for coconut seedlings

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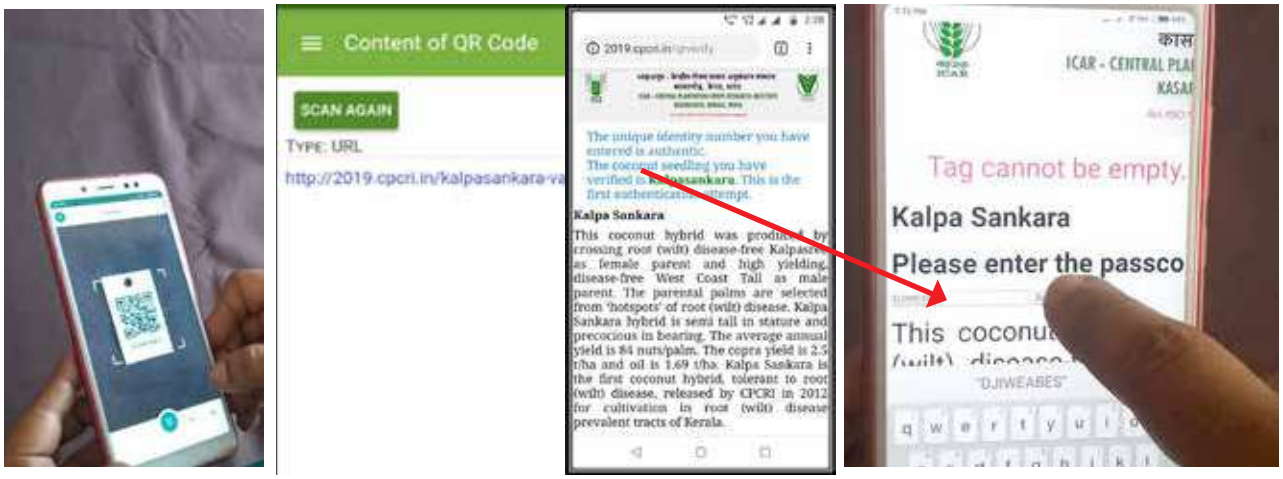
Coconut seedlings with QR code labeling

Coconut is a perennial crop with a lifespan of 80-100 years and an economic life of 60 years or more depending upon the variety, local conditions and management practices. Coconut palm takes about 7-10 years to commence flowering and another five years or more to come to the stage of full bearing. Thus, only after 15 or 20 years the grower is in a position to reap the reward for his investments. If the original planting material used happens to be poor in quality, it will result in the establishment of a plantation giving poor yields and results in loss to the grower as long as the plantation lasts. This indicates the importance of selection of quality planting material for successful coconut farming.

The prevalence of old and senile palms, poor genetic base of majority of palms under cultivation, over populated stands of both coconut and other trees in the homesteads, poor management adopted and severe incidence of pest and diseases are the major reasons for low productivity of coconut plantations in the state of Kerala. Therefore, large scale production and supply of quality planting materials is one of the solutions for enhancing productivity of coconut palms in the state.

Non-availability of genuine planting material of improved varieties is considered as a major bottleneck in enhancing the productivity of any crop. Standard operating procedures for raising coconut



Step 1. Open the QR code scanner app from your phoneStep 2. Hold your phone steady for 2-3 seconds towards the QR Code you want to scan, Step 3. Once the code is scanned, you will be directed to open a link which will reach to a website (2019.cpcri.in). In the website you will be prompted to enter passcode and Step 4: Enter the passcode

seedlings are not practiced by many private coconut nurseries and there is no check on the quality even at the time of distribution of seedlings. Many unauthorized nurseries sell coconut seedlings under the pretext that the seed nuts were collected from ICAR-CPCRI, Agricultural Universities or CDB Farms. There are some other who pretend as agents of research institutes and collect advance from farmers and cheat them by issuing bogus bills. So ICAR-CPCRI, Regional Station, Kayamkulam was forced to come out with a mechanism to ensure the genuineness of the coconut seedlings distributed to farmers.

With a view to ensure availability of genuine and quality planting material, ICAR-CPCRI has come up with Quick Response (QR) code tagged coconut seedlings.

What is QR code: QR code system was invented by Masahiro Hara in 1994. Initially it was used to track vehicle parts during the manufacturing process. Now, QR Codes are a popular marketing tool, allowing users to quickly access websites and other media. A QR Code can contain such things as text, a URL, an SMS or a phone number. QR codes are one of the easiest ways of providing information to customers and other individuals, allowing them to extract valuable data with just scanning the code with the help of an optical reader. They offer endless possibilities, as their functionality is versatile.

Development of QR code labels for coconut seedlings: Initially coconut seedlings issued from ICAR-CPCRI were labeled using labels made out of tin/aluminum sheets, which were tagged onto leaf petioles and only the variety name was marked on the label. During 2016, ICAR-CPCRI developed labels with ICAR-CPCRI emblem and variety name on one side and QR code on other side and the label was laminated. On scanning the QR code with the QR code scanner, user will get information regarding particular variety and its management practices. The defect of this QR code label was that on continued exposure to sunlight and rain, the label gets damaged after 8-12 months. In the subsequent year (2017), a modified version of QR code was developed where the material used for printing the label was made from plastic laminated sheet and each label had a password (alphanumeric) which was printed just below the QR code (so as to restrict the access of information to users who purchased CPCRI seedlings). This password can also be treated as Unique Identification Number (UID) which is specific to each coconut seedling. A plastic tie of 15 cm length is available in the label having auto locking facility and is tamper proof. The QR code was developed in collaboration with M/s Resnova Technologies Pvt. Limited, a Kochi based startup. Mr. Ajith Asok (Director, M/s Resnova Technologies) was associated with development of the QR code labels for coconut seedlings.

How to use QR code?

Step 1. Open the QR code scanner app from your phone

Step 2. Hold your phone steady for 2-3 seconds towards the QR Code you want to scan

Step 3. Once the code is scanned, you will be directed to open a link which will reach to a website

140th meeting of Coconut Development Board

The 140th meeting of Coconut Development Board was held on 22nd December 2020 under the Chairmanship of Smt.G. Jayalakshmi IAS, Chairman, Coconut Development Board through video conferencing. Members of the Board; Shri G.S. Basavaraj, Member of Parliament (Lok Sabha), Dr. Anitha Karun, Director, CPCRI, Shri K.R. Uday Bhaskar, Principal Commissioner, Central Excise, Customs & Service Tax, Kochi, Shri Naba Kishore Tad, Deputy Director of Horticulture, Government of Odisha, Shri Kuldeep Singh Gangar, Secretary(Agriculture), Department of Agriculture, Government of Goa, Dr. B.Ramakichenin @ Balagandh, Director, Directorate of Agriculture & Farmers Welfare, Govt. of Puducherry, Shri P. Reghunath, Kerala, Shri K. Narayanan Master Kerala, Shri S.V. Muthuramalingam, Tamilnadu, Shri Guruswamy D, Karnataka and Shri H L Aswathnarayana, Karnataka, Shri. Rajeev Saraswat, Under Secretary, MOA& FW, Government of India (representing Shri. B Pradhan IAS, AS&FA, MOA& FW, Government of India) Smt. K Premalatha,

Deputy Director, Coir Board, representing Chairman, Coir Board and Shri. B N Prasad, Joint Director, Horticulture (representing Director of Horticulture, Government of Karnataka) attended the meeting. Shri. Saradindu Das, Chief Coconut Development Officer and Shri. R. Madhu, Secretary, Coconut Development Board also attended the meeting.

(2019.cpcri.in). In the website you will be prompted to enter passcode

Step 4: Enter the passcode

As you enter the passcode (the unique alpha numerical code imprinted on the reverse side of the label), the uniqueness and genuineness of the seedling will be displayed as 'The unique identity number you have entered is authentic. The coconut seedling you have verified is ..... (respective name of the variety). This is the first authentication attempt.

Along with this, the details of the variety and cultivation practices to be adopted are also displayed.

If the label is scanned for the next time, the information on first authentication attempt will not be displayed indicating that the particular label has been already scanned previously.

The unit cost for QR code affixed labels will be Rs. 4-5. Considering the hefty cost of planting material which ranges anywhere between Rs. 200-500, this cost incurred to ensure quality will serve to cleanse the system wherein distribution of spurious seedling is quite rampant.

Future prospects: Attempts have been initiated to include traceability upto mother palm level (to track the source of seed nut/mother palm from which each seedling is produced). Towards this direction, a GPS enabled digital database of all mother palms has already been created. Digitally marking each seed nut

right from harvesting stage and later during sowing in nursery beds will have to be adopted. Finally the selected seedling fulfilling all selection criteria alone will be labeled so that farmer scanning the QR code can track details like variety, mother palm source, nursery location, seed nut harvest date, age of the seedling after sowing. To realize the above objective, convergence of information and communication technologies (ICT), cloud computing and data science is the need of the hour. Genuineness of the coconut seedlings and its quality can be assured through such certification/labeling mechanism. ■

Development of High Yielding Variety to Support Coconut Replanting in Indonesia

Dr. Hengky Novarianto
Senior Scientist of IPCRI-AARD Manado, Indonesia

Introduction

The coconut plantations can be found in almost all the 34 provinces of Indonesia. The three largest area which constitute 75% of total coco- nut area are Sumatera (32.0%) followed by Java (27.0%) and Sulawesi (21.0%). The main coconut products exported are coconut oil, desiccated coconut, and copra meal. In the last 10 years there is increase in demand of other coconut products which includes food and non-food coconut products, such as: VCO, Nata de coco, coconut water, tender coconut, coconut milk, coco fiber, cocopeat, briquette, etc.

The main problem in coconut development is low productivity, because of old and senile palms. The implementation of coconut replanting and development program are lower than the target, because of the limited budget and non-availability of quality seedlings. The average copra production at the farmers level is only 1.2 ton/ha/year. The coconut breeding in Indonesia had succeeded to produce several kinds of tall, dwarf and hybrid varieties with high productivity of copra and nuts. The potential productivity of coconut tall varieties can reach 3.0-3.5 ton copra/ha/ year and 4.0-5.0 ton copra/ ha/ year for hybrid varieties. The production of fruit is 12,000-15,000 nuts/ha/year for Tall type, and more than 20,000 nuts/palm/year for hybrid and dwarf varieties. But the resources of these varieties of Tall, Hybrid and Dwarf are limited, because these coco- nut seed gardens are not maintained properly. For more than 40 years, the Indonesian government is focusing on development of oil palm cultivation. In 2020 the total area under oil palm is reported around 14 million ha, larger than coconut area that is only 3.6 million ha.

The Indonesian Palma Crops Research Institute, ICERD-IAARD is implementing a short and medium strategy for production of the good and quality coconut planting material, through the technology of mass selection, local tall and dwarf variety having high production quality has been selected from each block and recommended for mass multiplication to produce high yielding tall and dwarf in each region or province.

Coconut breeding development in Indonesia

In early 1970 there was decline in the productivity of coconut, while the demand for cooking oil increased. To overcome this problem, the government has implemented various programs to increase area under coconut and production of copra through coconut replanting program. In order to fulfil the needs of hybrid coconut seeds in quick and large quantities, the government had introduced PB121(Malayan Yellow Dwarf x West African Tall) hybrid from Cote d'Ivoire. In addition, hybrid coconut seed gardens were established in 11 provinces with an area of 1,856 hectares. Type of coconut hybrid generated is NIWA hybrid (Nias Yellow Dwarf x West Africa Tall). Besides importing hybrid variety, the Indonesian government through the Agency for Agricultural Research and Development has collected a local hybrid coconut, namely KHINA hybrid.

The breeding program in Indonesia launched in the past (1970-1990) with the objective to produce large scale superior quality planting material with the characteristics of high yield of copra and early bearing of fruits (Liyanage,1974). To achieve this objective crossed breeding method has been selected with hybridization to assemble various types of hybrid coconut of dwarf x tall.

1. Hybridization of Dwarf x Tall Coconut Crossing of dwarf x tall has been started since1975. The local

Figure 1. KHINA-1 hybrid coconut

hybrid coconut can produce 4-5 tons copra/ha/year. The three types of hybrid coconut are KHINA1(Nias Yellow Dwarf x Tenga Tall), KHINA2 (Nias Yellow Dwarf x Bali Tall) and KHINA 3(Nias Yellow Dwarf x Palu Tall) and was released by the Ministry of Agriculture in 1984. The KHINA hybrid started its first flowering at the age of 3-4 years. The average copra production is 4 tons/ha/year, with the highest production up to 5 tons/ha/year. Copra oil content is 64%-65%. Average weight of copra is around 300g/nut so require 3-4 nuts to get one (1) kg of copra.

The coconut farmers are generally not using fertilizers in coconut plantations. As a result, the fruit size of hybrid coconut became small, and getting low production. Coconut farmers were very disappointed, because the imported hybrid coconut, namely PB121 is susceptible to bud rot disease caused by Phytophthora palmivora, and less tolerant to drought in addition to low production.KHINA hybrid (Figure 1) shown better performance compared to the PB121 hybrid, in production as well as resistance to disease. But the coconut farm- ers were not interested to take hybrid coconut under the program. Survey of coconut plantation in the North Sulawesi showed that 98% of coconut farmers choose tall type under replanting program of coconut. Rethinam, et.al, (2002) reported that 94.44% of coconut farmers in Indonesia prefer to take high yielding local tall and local hybrid for use in development program. 93% of the total coconut area in Indonesia is covered with tall coconut vari- ety. After that the IPCRI continued to release the KHINA-4 (Raja Brown Dwarf x Mapanget tall) and KHINA-5 (Bali Yellow Dwarf x Mapanget tall). The purpose of releasing these two coconut hybrids was that it required less inputs i.e. 50% compared to KHINA-1, 2 and 3 around 3 kg (Urea+SP36+KCl) per palm/year. The potential production with medium input get around 3.0-3.5 ton copra/ha/year.

Farmers generally prefer tall variety of coconut with the fol- lowing reasons: (1) Tall coconut does not require intensive maintenance, (2) More tolerant to drought and bud rot disease, (3) The seednuts/ seedlings are cheaper, (4) Farmers have not had a good experience with hybrid coconut. In recent year experienced more demands for hybrid coconut seednuts, especially from private plantation owners. Research started during 2012 for the new hybrid variety and successfully completed and released in

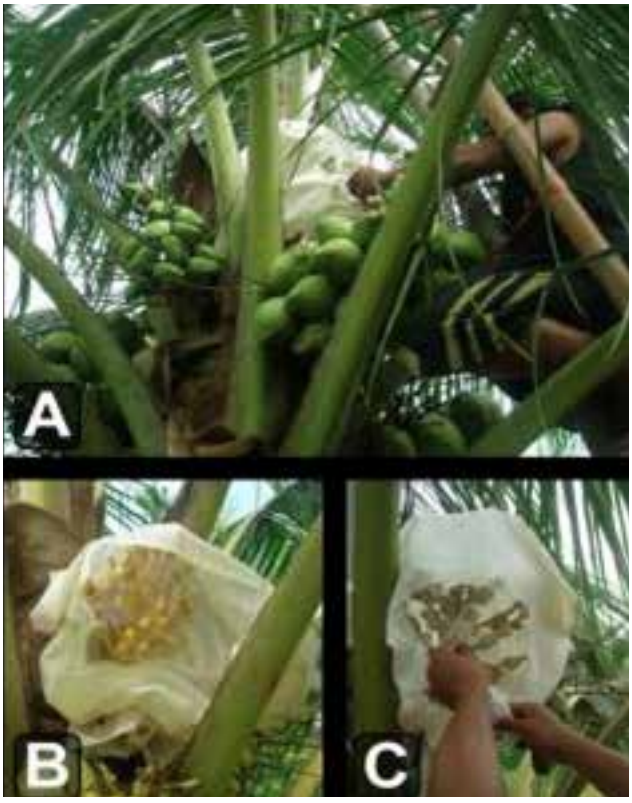


Figure 2. Hand pollination to produce coconut hybrid

Figure 3. Local tall coconut

2019 with the name HENGNIU. The variety starts bearing fruit at the age of 3 year and the copra production potentially reach 4 tons/ha/year.

2. Development and Replanting Program Using High Yielding Local Tall

Based on the experience and the acceptance by the coconut farmers, during 1990-2000 under the coco- nut breeding program the government has decided to produce tall coconut varieties having high con- tent of copra. Increasing the productivity of tall coconut can be done through mass selection. Mass selection based on the weight of nut to improve the yield of next generation. Selection of 5%, the best mother palm will provide the 14.4% increase followed by selection of 10% and 15% provided 10.1% and 7.9% respectively. Selection of Mapanget tall, which produced 45-50 kg copra/palm/year, is better than other tall varieties such as: Tenga tall, Bali tall and Palu tall.

The total coconut area is distributed in 34 Provinces of Indonesia. In 2016, the total coconut area was3.6 Mha with production of about 3.2 MMT copra equivalent. The main coconut Provinces, covering more than 200,000 ha are Riau Province (628,582 ha), followed by East Java Province (288,120 ha), North Sulawesi Province (268,973 ha), Central Java Province (234,651 ha) and North Maluku Province (210,107 ha). Out of the total area about 580,000 ha area is occupied with old and senile palms which is 15% of the total area. To increase the coconut productivity for sustainable coconut industry, replanting the old and senile coconut palms for which good planting materials is needed.

One of the sources for coconut seedling program is to identify High Yielding Block (HYB) and Coconut Mother Palm (CMP) in each Province and Regents. For identification of HYB and selec- tion of CMP the Standardization finalized in the Coconut National Meeting held during July 2005 at Denpasar, Bali was considered. Some of the HYB criteria identified are location easy to reach, palms of 15-60 years age, mostly uniform morphology, average production > 70nuts/palm/year, free from pests and diseases. The CMP is selected individually from the HYB population, and maximum selected is 15%. Some of the CMP criteria identified are shape of crown is to be Spherical or Semi-spherical, number of green- leaf > 29 leaf, petiole short, width and vigour, production > 7 nuts/ bunch are considered during the selection of the seednut, and seedling before planting in the field.

The total of HYB have been identified until 2009 in an increase of 2,212 ha. The good of SMP have been selected from each HYB, and maximum selection is 15%. From these total HYB can produce 1,647,250 seednuts and can be used for replanting 8,236 ha every year. This capacity of HYB is lower than the requirement and it needs to be replanted 100,000 ha per year as macro programme of government.

The largest of HYB is in East Java Province with total area of 1,100 ha. The maximum number of SMP and coconut farmers belongs to East Java Province. It shows the location of HYB, for example in Sumenep Regent, Gapura District (Andulang Village), Panggul District (Wonocolo Village) and Tugu District (Prambon Village). The total number of SMP is 264 palms, and all these palms are belonging to 32 coconut farmers. The total SMP in East Java have been

Table 1. High Yielding Tall Coconut Variety

No.	Varieties	Origin	Characteristic of yield and fruit component						Released year
			Number of bunch/ palm/ years	Fruit weight (g)	Number of nuts/ bunches	Number of nuts/ palm/ years	Copra/ nut(g)	Oil content of copra (%)	
1.	Mapanget tall	North Minahasa region, North Sulawesi Province	13		90		250	63	2004
2.	Tenga tall	South Minahasa region, North Sulawesi Province	13	2,500	6	75	250	69	2004
3.	Bali tall	Bali Province	13		6	75	290	66	2004
4.	Palu tall	Donggala region, Central Sulawesi	13		6	75	250	69	2004
5.	Sawarna tall	Lebak region, West Java Province	14		8	75	275	66	2006
6.	Sikka tall	Sikka, Flores, East Nusa Tenggara Province	13		7	90	250	64	2007
7.	Jepara tall	Jepara region, Central Java	14		8	80	233	62	2008
8.	Kima Atas tall	Manado city, North Sulawesi	16		10	100	220	62	2008
9.	Lubuk Pakam tall	Lubuk Pakam region,	14		9	75	248	60	2008
10.	Banyuwangi tall	North Sumatera	14		8	80	270	63	2008
11.	Bojong Bulat tall	Banyuwangi region, East Java province	12		8	98	220	68	2008
12.	Molowahu tall	Kulonprogo region, Jogyakarta	14		9	110	225	67	2009
13.	Lubuk Kramat tall	Gorontalo region, Gorontalo Province	13		8	100	220	65	2009
14.	Adonara tall	Boalemo region, Gorontalo Province	14	2,000	9	95	250	66	2012
15.	BuolST-1tall	East Flores region, East Nusa Tenggara Province	13	1,518	10	139	240	61	2013
16.	Mastutin tall	Buol region, Central Sulawesi	13	2,170	9	133	240	62	2015
17.	Sri Gemilang tall	Labuhan Mapin, South Sulawesi Province	13	1,800	9	116	244	64	2017
18.	Lampanah tall	Indra Giri region, Riau Province	13	1,525	9	138	224	67	2017
19.	Bido tall	Aceh Besar region, Aceh Province	14	2,500	9	133	320	58	2017
20.	Babasal tall	Morotai Island region, North Maluku	13	1,795	10	128	210	61	2018
21.	Selayar tall	Banggai region, Central Sulawesi Province	13	2,135	9	119	272	60	2018
22.	NuiSua tall	Selayar Island Region, South Sulawesi Province	14	1,450	9	126	211	61	2019
23.	Zabal tall	Sula Island region, North Maluku	13	2,026	9	123	252	64	2019
24.	Gambut tall	Tanjung Jabung Timur region, Jambi Province	14	1,981	8	128	235	60	2019

Source: IPCRI Manado

Figure 4 Bali tall palm in Bali Island and Bali tall fruit

identified and selected 4,495 palms, since 2005 to 2009. These HYB and SMP will be used as source of seednuts for supporting the replanting programme in East Java. The other advantage of using the local tall are usually more adaptive to environment, and tolerant to pests and diseases compared to introducing the coconut seedlings from other location.

3. Release of High Yielding Tall Coconut Variety During the year 2000-2008, IPCRI have released 10 high yielding tall varieties. The results showed that some varieties of tall coconut have a high yield potential and these varieties are proposed to release. The coconut varieties that are recom- mended as the high yielding varieties are Mapanget tall, Tenga tall, Bali tall, Palu tall, and Sawarna tall (Table 1). The copra production of these five varieties are between 2.2-3.5 ton/ha/year, higher than the average national production, i.e. 1.0-1.5 ton/ha/year. Coconut Mapanget tall, Tenga tall, Bali successfully released 24 high yielding tall coconut varieties until 2020. The potential yield of these tall varieties is more than 3.0-ton copra/ha/year. The high yielding varieties can be very well utilized for replanting old and senile coconut palm to increase the production and productivity, and to improve coconut farmers' income. Tall and Palu tall have been released in 2004, coconut Sawarna tall released in 2006 by the Ministry of Agriculture. While five other coconut varieties have been released in the year 2008. Out of this superior coconut varieties have been recommended to use as source of good planting materials under replant- ing program of coconut.

Until 2020, the IPCRI has released 24 high yielding tall coconut varieties from some Regions and Provinces of Indonesia, which is producing copra

more than 3.0 ton/ha/year (Table 1). Some of the high yielding tall varieties are Bojong Bulat tall from Yogyakarta; Molowahu tall from Gorontalo; Adonara from Flores, East Nusa Tenggara; Sawarna tall from West Java ; Lubuk Pakam tall from North Sumatera; Mastutin tall from South Sulawesi; Buol tall from Central Sulawesi; Lampanah tall from Aceh; Bido tall from North Maluku; and Zabak tall from Jambi, etc.

Conclusion

Coconut productivity can be improved optimally by using improved seed, improved cultural practices, and breeding activities. The breeding program includes: selection, evaluation, and utilization of coconut germplasm. The selected good accession, can be released as high yielding variety. Several coconut varieties of tall type and dwarf type have been released as commercial seed nuts by Indonesian Palma Crops Research Institute (IPCRI) for more than 40 years. The IPCRI–IAARD

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Coconut for

Health, Wealth and Prosperity

Plant a coconut .. Promote Farming

Get assistance from CDB for increasing the future production potential of coconut.

CDB provides subsidy to small and marginal farmers thereby increase the future production potential.

	Subsidy of CDB for Expansion of Area under coconut (Rs. @ha.)	
Variety	**Normal area**	**Hilly area**
Tall	**6500**	**13750**
Hybrid	**6750**	**13750**
Dwarf	**7500**	**15000**

For further details contact offices of the Board or visit Board's website: www.coconutboard.gov.in

नारियल विकास बोर्ड
(कृषि एवं किसान कल्याण मंत्रालय, भारत सरकार)
कोची, केरल, फोन: 0484-2377266, 67

Coconut Development Board
[MINISTRY OF AGRICULTURE & FARMERS WELFARE, GOVERNMENT OF INDIA] KOCHI, KERALA. PH : 0484-2377266, 67

Awareness Programmes on Coconut Cultivation

CDB, SC, Odisha

Coconut Development Board, State Centre, Odisha organized three webinars on scientific coconut cultivation, technology. A one day Webinar was organized on 5th January 2021 with 50 farmers from Tangi , Banapur, Chilika, Begunia & Bolagarh and Khurda Blocks who were connected through video conferencing mode from their respective locations.

Considering the pandemic of COVID-19 situation, farmers were connected to the meeting on virtual mode from their respective locations maintaining

proper social distancing and obeying the rules of COVID-19.

Another webinar was conducted on 6th January 2021. 50 member farmers from Jagannath CPS, Kendrapara, Khetrapal CPS, Kendrapara, Jay Jagannath CPS, Balipatna, Puri, Bajramahakali CPS, Cuttack and Maa Lenkudisuni CPS, Krushnaprasad connected through video conferencing mode from five different locations maintaining proper social distancing and obeying the rules of COVID-19.

Dr.Rajat Kumar Pal, Deputy Director, CDB welcomed the Chief Guest, Dr. Gobind Ch. Acharya, Head, ICAR-CHES who was present in the programme as resource person and was connected through video conferencing mode.

Dr. Gobind Chandra Acharya, Head, ICAR-CHES, Bhubaneswar spoke on "Insect Pest & Physiological Diseases in Coconut" with a presentation. Dr. Rajat Kumar Pal, Deputy Director, CDB briefed on "Care of young seedlings and Management of Rugose

Spiraling Whitefly" and discussed with the farmers on various schemes of CDB and answered their queries.

Another webinar on scientific coconut cultivation, technology on Coconut was organised on 21st January 2021 with 50 farmers of Jagatsinghpur districts from Krushnadaspur GP office, Jagatsinghpur, Federation Office, Balikuda, Jagatsinghpur, Sangrampur GPFL office, Jagatsinghpur, Debahat community hall, Jagatsinghpur and Balikuda block conference hall, Jagatsinghpur were connected through video conferencing mode.

Dr.Rajat Kumar Pal, Deputy Director, CDB welcomed the Chief Guest , Dr. Sarat Chandra Sahoo, Prof. OUAT, Bhubaneswar who was present in the programme as resource persons at Seminar Hall of CDB, State Centre, Odisha. Dr. Sarat Chandra Sahoo, Prof. OUAT, Bhubaneswar, spoke on a lecture on "Coconut Cultivation Technology & Suitable varieties of Coconut in Odisha condition and pests disease control in coconut garden and Shri Mihir Samantaray, ADH, Jagatsinghpur spoke on Replanting & Rejuvenation scheme of CDB, and described the procedures to be followed for applying for the R& R scheme to the FANI affected farmers of Jagatsinghpur districts.

Dr. Rajat Kumar Pal, Deputy Director, CDB briefed on "Care of young seedlings and Management of Rugose Spiraling Whitefly and discussed with the farmers on various schemes of CDB and answered their queries. The regional level webinar programmes helped the farmers in gaining knowledge and farmers raised their queries during the interactive session.

CDB, RO, Patna

CDB, RO, Patna organised a block level awareness programme on coconut cultivation at KVK, Parsauni, Paharpur Block, East Champaran, Bihar. The programme was inaugurated jointly by Shri Rajiv Bhushan Prasad, Director, CDB and Dr, Abhishek Pratap Singh, Sr. Scientist and Head, KVK by lighting the lamp. Shri Prem Kumar Gupta, former Block Head, Paharpur Block, Dr.Shailendra Kumar Rajak, Jr. Animal Scientist, KVK, Parsauni and progressive farmers were also present during the occasion.

Shri Pankaj Kumar, Divisional Technical Manager, Bhaktyarpur spoke on the objectives of organising the programme and the benefits of coconut farming. He also explained various schemes of CDB and said that interested farmers can get seedlings from the CDB farm.

Dr. Ashish Rai, Jr. Soil Scientist , KVK spoke on suitable soils and the nutrients needed for cultivation of coconut. Dr. Shailendra Kumar Rajak, Jr. Animal Scientist, KVK, Parsauni spoke in detail about maintaining animals along with coconut cultivation and also adopting intercropping. Shri Rajiv Bhushan Prasad, Director, CDB gave an introduction about coconut and shared information on the importance of coconut, scientific coconut cultivation, planting methods of coconut, irrigation methods, selection of mother palms, selection of quality seedlings, fertilizer application methods, selection of tender coconut and mature coconut, identifying pest and diseases of coconut, preventive measures etc. He also spoke on various schemes of CDB.

Dr.Abhishek Pratap Singh, Sr.Scientist and Head, KVK spoke about cultivating other fruit crops along with coconut. Income of farmers could be doubled by adopting this method. Programme was concluded with vote of thanks by Dr.Shailendra Kumar Rajak, Jr. Animal Scientist.

Regional level webinar in Kerala

A regional webinar on Scientific Cultivation Technologies & Value Addition in Coconut sponsored by Coconut Development Board was organized by Krishi Vigyan Kendra, Thrissur on 8th January 2021 for the coconut growers of Thrissur district, Kerala. In order to maintain the Covid19 protocols and to reach the maximum number of farmers in the district, the webinar was conducted both online and offline at four venues; Krishi Bhavans of Kodakara, Thrikkur, Block Panchayath Office, Anthikkad, and the Seminar Hall of Krishi Vigyan Kendra Thrissur, by observing all covid protocol. Around fifty farmers and FPO members took part physically in the webinar at the arranged venues and 100 participants joined the google meet in the online mode.

The seminar was inaugurated by Dr. Jiju. P. Alex., Director of Extension, Kerala Agricultural University. He pointed out that though Kerala has the maximum area under coconut cultivation in our country, we are far behind the other producer states in terms

of production and productivity. He highlighted the necessity of scientific management of the crop to increase the yield and to promote the value addition prospects to improve the income of coconut farmers of Kerala. Smt. Shameena. S, Assistant Professor, KVK, Thrissur welcomed the gathering. Smt. Mini K.,Principal Agricultural Officer, Thrissur, Department of Agriculture Development and Farmers' Welfare, Government of Kerala and Smt. Mini Mathew Publicity Officer, Coconut Development Board, Kochi offered felicitation on the occasion. Smt. Arathy Balakrishnan, Assistant Professor, KVK, Thrissur proposed vote of thanks

Technical session was handled by Dr. P. Muralidharan, Head, KVK, Alappuzha on comprehensive management of the Keravriksha and Dr. Sudheer K.P., Head, ABI Thrissur on possible avenues in value addition of coconut. Farmer interaction was also held as part of the programme.

Farmers Field Day Programmes

CDB, SC, Odisha

A Farmers Field Day programme was organised by Coconut Development Board, State Centre, Odisha at CDB, DSP Farm, Pitapalli on 7th January 2021. Twenty farmers of Khurda district participated in the programme. Dr.Rajat Kumar Pal, Deputy Director CDB, SC, Pitapalli and Dr. Sarat Chandra Sahoo, OIC-AICRP on Palms, OUAT, Bhubaneswar were the resource persons of the programme. Smt. Sasmita Pallei, CDB welcomed the farmers. Interaction about coconut cultivation was taken place between Dr.Rajat Kumar Pal, Deputy Director CDB, SC, Pitapalli and the farmers.

During the theory session, Dr.Sarat Chandra Sahoo briefed on proper method of fertilizer application, method of irrigation and installation of drip irrigation system, method of mulching, management measures for Rugose Spiraling Whitefly & Black Headed Caterpillar.

Farmers visited the coconut farm for practical training. In the practical training, Integrated Crop Management including field preparation, Integrated Pest Management, Integrated Disease Management and Integrated Nutrient management were demonstrated to the farmers. A whitefly affected coconut plot was chosen for demonstrating on erecting yellow sticky traps to control over Rugose Spiralling Whitefly. Farmers raised their queries and the resource persons in the training programme cleared the doubts of farmers. The programme ended with vote of thanks by Kum. Minati Majhia, Technical Officer, CDB.

Another Farmers Field Day programme was jointly organised by Coconut Development Board, State Centre, Odisha in association with Baranga

Block of Cuttack district on 15th January 2021. 40 farmers from Branga block participated in the programme. Dr. Rajat Kumar Pal, Deputy Director CDB, SC, Pitapalli, Dr. Sarat Chandra Sahoo, OIC-AICRP on Palms, OUAT, Bhubaneswar, Dr.Arun Kumar Das, Retd. Prof. OUAT, BBSR and Dr.Prasanta Kumar Biswal, Block Veterinary Officer, Baranga were the resource persons of the programme.

Another Farmers Field Day programme was jointly organised by Coconut Development Board, State Centre, Odisha and KVK-CIFA, Bhubaneswar at KVK-CIFA on 8th January 2021. Forty farmers of Balipatna and Balianta of Khurda district participated in the programme. Dr.Rajat Kumar Pal, Deputy Director CDB, SC, Pitapalli, Dr.Sarat Chandra Sahoo, OIC-AICRP on Palms, OUAT, Bhubaneswar, Dr.Siba Sankar Giri, Head, KVK-CIFA& and Shri Ajay Kumar Dash were the resource persons of the programme. Farmers raised their various queries on coconut cultivation which was cleared by the resource persons.

CDB, RO, Patna

CDB, RO, Patna organised a field day programme at Manihari, Katihar district on 28th December 2020.

Shri. Manohar Prasad Singh, honourable MLA, Manihari, Katihar, Shri. Rajiv Bhushan Prasad, Director, CDB, RO, Patna, Dr. Umakant Singh, Scientist cum Asst.Professor, Dept. of Horticulture, Regional Research Institute and Mandan Bharati Agriculture College, Agawanpur, Saharsa and Shri Gopal Prasad, Mukhiya, Gram Panchayat, Mirzapur and other distinguished guests attended the programme.

Shri. Ravindra Kumar, Development officer, CDB, RO, Patna demonstrated planting method in the field and spoke on good cultivation practices.

Dr. Umakant Singh, Jr. Scientist cum Asst.Professor, Dept. of Horticulture, Regional Research Institute and Mandan Bharati Agriculture College, Agawanpur, Saharsa requested to follow scientific coconut cultivation practices. He gave detailed information on planting methods, diseases, irrigation, manures and harvesting of nuts etc. He also gave emphasis on intercropping with other horticulture crops such as papaya, guava, lemon, sapota, black pepper, litchi etc.

Shri. Rajiv Bhushan Prasad, Director, CDB, RO, Patna spoke on schemes implemented in Bihar by the Board and coconut cultivation and adopting integrated farming for earning better income. He said that intercropping along with coconut cultivation will increase farmers income. In the interaction session he attended the queries of farmers regarding planting of coconut, plant protection etc.

Shri. Manohar Prasad Singh, honourable MLA, Manihari, Katihar inaugurated the programme. In his speech he opined that farmers should plant at least 10 to 20 seedling in their field bunds. He said that coconut has significant importance in our life and it has many uses in cultural activities especially during Chhath festival in Bihar. Tender coconut, mature coconut and coconut oil is useful in treating various diseases like intestinal diseases, heart diseases

etc. He admired the efforts taken by CDB for the development of coconut cultivation in the state and also requested that these kinds of programmes may be organised in future also.

About 40 farmers participated in the programme. Programme was concluded with vote of thanks by Shri. Gopal Prasad, Mukhiya, Mirzapur Gram Panchayath.

CDB, RO, Patna organised another field day programme at Amdabad, Katihar district on 29th December 2020.

Shri. Manohar Prasad Singh, Honourable MLA, Manihari, Katihar, Shri. Rajiv Bhushan Prasad, Director, CDB, RO, Patna, Dr.Umakant Singh, Jr.Scientist cum Asst.Professor, Dept. of Horticulture, Regional Research Institute and Mandan Bharati Agriculture College, Agawanpur, Saharsa and Shri Zaffar Aalam, Former Mukhiya, Lahasa village and other distinguished guests attended the programme.

Shri. Manohar Prasad Singh, honourable MLA, Manihari, Katihar inaugurated the programme. In his speech he mentioned about the various uses of coconut and encouraged farmers for adopting coconut farming because the soil and climate of the region are congenial for coconut cultivation. While talking about the various uses of coconut he mentioned that it can be used as a remedy for various diseases. He also stressed on value addition of coconut for the development of coconut industry.

Dr.Umakant Singh, Jr.Scientist cum Asst.Professor, Dept. of Horticulture, Regional Research Institute and Mandan Bharati Agriculture College, Agawanpur, Saharsa called upon the need for following scientific coconut cultivation practices. He gave detailed information on planting methods, diseases, irrigation, manures, harvesting of nuts etc. He also spoke on intercropping with other horticulture crops such as papaya, guava, lemon, sapota, black pepper, litchi etc.

Shri. Ravindra Kumar, Development officer, CDB, RO, Patna demonstrated the planting method of coconut in the field and spoke about good cultivation practices. He mentioned about the uses of organic and chemical fertiliser for increasing coconut production.

Shri. Rajiv Bhushan Prasad, Director, CDB, RO, Patna spoke on the methods for identifying various pest and diseases and its management practices. He requested the farmers to adopt more and more coconut farming for ensuring better income. He said that tall varieties are suitable for cultivation in Bihar. He also mentioned about the economic value of this crop and created awareness among farmers about coconut farming. He also explained about different irrigation methods.

About 30 farmers participated in the programme. The programme was concluded with vote of thanks by Shri. Ravindra Kumar, Development Officer, CDB.

Foundation day of ICAR-CPCRI celebrated

Various programmes were conducted as part of 105th Foundation Day Celebration of ICAR-Central Plantation Crops Research Institute, Kasaragod.

i. Online programme

Dr. A. K. Singh, Deputy Director General (Hort. Science), ICAR, New Delhi, delivered the Foundation Day Lecture online through videoconferencing. In his address, Dr. A. K. Singh appreciated the efforts of CPCRI in evolving and disseminating appropriate technologies which would enhance income and improve the livelihood of farming community.

In the online programme Dr. N. M. Nayar, former Director, ICAR-CPCRI, delivered Dr. K. V. Ahamed Bavappa Memorial Lecture on the topic "Introspection, reflections and observations". In his lecture Dr Nayar highlighted the commitment and able leadership of Dr. Bavappa, founder Director of CPCRI who was instrumental in laying a strong foundation for research programmes at CPCRI.

Dr. S.P. Ghosh, Former DDG (Hort.) offered felicitations and suggested to initiate coconut seed gardens in Krishi Vigyan Kendra campuses in the coconut growing areas.

Dr. Jelfina C. Alouw, Executive Director, International Coconut Community, Jakarta appreciated the research achievements of CPCRI in the coconut sector and revealed the proposals of ICC to start in - vitro gene bank facility at CPCRI.

Dr. Anitha Karun, Director, ICAR-CPCRI, welcomed the participants and dignitaries in the online gathering and presented the recent research achievements of the institute.

Other dignitaries including Dr. Venkatesh N. Hubballi, Director, Directorate of Cashewnut and Cocoa Development, Kochi, Dr. Homey Cheriyan, Director, Directorate of Arecanut and Spices Development, Kozhikode, Dr. B. K. Pandey, Assistant Director General (Hort. Science), ICAR, New Delhi and Shri Saradindu Das, Chief Coconut Development Officer, Coconut Development Board, Kochi offered felicitations online through videoconferencing during the occasion.

ICAR-CPCRI Awards 2019 was distributed to the outstanding staff of CPCRI during the occasion. The team of scientists including Dr. A.C. Mathew, Dr. M.R. Manikantan, Dr. R. Pandiselvam, Dr. Shameena Beegum, Dr. S.V. Ramesh, Dr. Arivazhagan, Dr. K.B. Hebbar, Dr. Murali Gopal and Dr. Paulraj won the Best Scientific Team award.

The Best Technical Staff Award was shared among Shri K Krishnan Nair, Technical Officer, CPCRI, Kasaragod and Shri Santhosh Kumar P., Senior Technical Assistant, CPCRI, RS, Vittal

The Best Skilled Support Staff award was also shared among Shri T.J. Ninan, CPCRI, Kasaragod and Shri Sudhakara, SSS, CPCRI, RS, Vittal.

Dr. K. Muralidharan, HoD, Social Sciences proposed vote of thanks.

ii. Public function at CPCRI, Kasaragod

The public function in connection with the Foundation Day celebration was held in the Platinum Jubilee Hall of CPCRI Kasaragod which was inaugurated by Sri Rajmohan Unnithan, Hon'ble Member of Parliament (Lok Sabha), Kasaragod. In his inaugural address Sri. Unnithan appreciated the research achievements of CPCRI and highlighted the need to effectively disseminate the technologies developed at the institute to farmers and entrepreneurs.

Dr. Anitha Karun, Director, ICAR-CPCRI, welcomed the gathering. Sri. N.A. Nellikunnu, Hon'ble MLA, Kasaragod who presided over the inaugural function lauded the efforts of CPCRI in streamlining research

programmes to solve field problems faced by farmers and in organising farmer centred technology transfer programmes. He opined that coconut processing technologies developed by CPCRI such as coconut neera collection methods and devices are quite useful in enhancing income of coconut growers.

Smt. Baby Balakrishnan, President, District Panchayat, Kasaragod, was the Guest of Honour in the function. In her address, Smt. Baby Balakrishnan highlighted the potential for effectively integrating coconut based technologies developed by CPCRI in the implementation of interventions by Local Self Governments under their decentralised planning programme. Shri Prashanth P.V., Programme Executive, All India Radio Kannur offered felicitations in the function.

Critical technology inputs such as bio-agents for the integrated management of bud rot disease of coconut, Ganoderma Wilt disease of coconut and leaf eating caterpillar of coconut were distributed to selected farmers from the Mere Gaon Mere Gaurav villages during the public function by the guests. Besides, coconut climbing devices were distributed to five selected SC youths under the SCSP programme of the institute. The newly developed 'Coconut sap chiller' device was handed over to Mr. Joji P Daniel, Coconut FPO representative by the chief guest Sri Rajmohan Unnithan.

Audio compilation of topics covered in the 'Thengum Thanalum', the ongoing radio series on coconut farming being broadcasted through All India Radio Kannur in collaboration with CPCRI Kasaragod, was released in the function by Sri. Rajmohan Unnithan by handing over the audio CD to Dr. D.C. Chowta.

Extension publications including Cocoa Notebook (English & Kannada), Training manual on Coconut Planting Material Production (English & Kannada), Scientific cultivation of arecanut (Assamese) and Scientific cultivation of coconut (Assamese) were released in the function.

Dr. C. Thamban, Principal Scientist, ICAR-CPCRI proposed vote of thanks.

iii. Scientist-Farmer Interface Programme on Coconut Farming

A Scientist-Farmer Interface Programme on Coconut Farming was held in DJ Hall at ICAR-CPCRI Kasaragod on 5th January 2021 in connection with the 105th Foundation Day celebration of CPCRI. Fifty selected coconut growers from various localities of Kasaragod district participated in the interface programme. Dr. D. Chandrasekhar Chowta, an award winning farmer from Meeyapadavu inaugurated the interface programme. In his inaugural address Dr. Chowta emphasised the need to adopt scientific crop management practices to enhance productivity of coconut and to reduce cost of cultivation so that coconut farming becomes remunerative. It is essential to popularise coconut based multiple cropping and integrated farming rather than coconut monocropping in order to overcome the difficulties due to price crash/price fluctuations of coconut in the market.

Farmers shared their experiences in coconut

farming and a team of scientists including Dr. C. Thamban, Dr. K. Samsudeen, Dr. P. S. Prathibha, Dr. Shameena Beegum and Dr. Daliyamol, interacted with them in the interface programme.

(Report prepared by : Thamban C., H. Muralikrishna and Mr. K. Shyamaprasad, ICAR-CPCRI, Kasaragod)

Tendercoconutsmoothie

Refreshing, healthy and nourishing smoothie

Ingredients:

Tender young coconuts-2

Banana -1

Honey or sugar-2 tsp

Ice cubes-4

Preparation:

Mix 2 cups of tender coconut water with Ice cubes or chilled water as needed. Blendall the ingredients well to smooth. To thin down the smoothie, add coconutwater or plain water. Serve chilled or at room temperature.

Pineapple Coconut Summer Smoothie

Ingredients

Tender Coconut Water& Flesh -1 Cup
Banana for a thicker consistency (for better result use chilled banana)- I
Pineapple Roughly Chopped (for better result use chilled)- 1 1/2 Cups
Dash of Ground Ginger

Preparation

Add all ingredients into the blender and make puree until smooth and creamy. Pour into glasses or bowls and serve immediately. Garnish with slice of pineapple.

Recipe prepared by Sageer Ahamed
Pastry Chef, Flora Airport Hotel, Kochi

Cultivation Practices for Coconut -February

Collection and storage of seed nuts

From the identified mother palms seed nuts should be carefully harvested and properly stored to prevent drying of nut water. Wherever the ground surface is hard, harvested bunch should be lowered to the ground using a rope.

Nursery management

Irrigation has to be continued. Weeding has to be done wherever necessary. If termite infestation is noted in the nursery drenching with chlorpyriphos (2ml chlorpyriphos in one litre of water) should be done. Spraying of water on the lower surface of leaves of seedlings can be done against spiralling white fly attack.

Shading

Shade has to be provided for the newly planted seedlings, if not already provided.

Irrigation

Irrigation has to be continued in coconut gardens. If basin irrigation method is adopted, provide irrigation once in four days @ 200 litres per palm. Drip irrigation is the ideal method of irrigation for coconut. The number of dripping points should be six for sandy soils and four for other soil types.

Depending on the evaporation rate, quantity of water to be provided through drip irrigation system can be decided in different coconut growing tracts. In Kerala 30-35 litres and in Tamil Nadu and Karnataka 35-45 litres of water is sufficient per palm per day through drip irrigation system during January.

Moisture conservation

Mulching and other soil and moisture conservation practices should be adopted if not done earlier.

Plant protection

With the temperature shooting up high even in January, it is all likely that the month of February is going to be very dry. Nights remain still cooler, humidity percentage slowly comes down and the evaporation level increases. The areas adjoining river and brackish water as well as midland regions favours emergence of sucking pests like rugose spiralling whitefly and other whiteflies during this period. Several coconut gardens in Kerala, Tamil Nadu, Andhra Pradesh, Karnataka and Lakshadweep Islands (Kavaratti and Minicoy) are heavily infested with rugose spiralling whitefly or nesting whiteflies or occurring in synergy. There will be a shift in the parasitism level favouring the pest population to flare up especially on juvenile palms and coconut nursery. The sooty mould scavenger beetle population recedes after the withdrawal of rainfall. Strict domestic quarantine in the transport

Leaf and inflorescence damage

Shielding by fish net

Metarhizium infected grub

of coconut seedlings or ornamental palms should be ensured. The sustenance of key pests like black headed caterpillar and slug caterpillars in endemic zones are to be understood keenly and management strategies evolved accordingly. The dry pathogens like leaf rot disease and basal stem rot disease could increase in the endemic regions as well.

▶ *Rhinoceros beetle (Oryctes rhinoceros)*

Being a ubiquitous pest, the incidence of rhinoceros beetle is quite common during all periods however its damage is well pronounced during monsoon phase when seedlings are also planted. In seedlings just planted, the spear leaf gets damaged and distorted by beetle damage. Juvenile palms are also prone to pest attack and sometimes appearing as elephant tusk-like symptoms. Damaged juvenile palms are stunted and get delayed in flowering. Of late incidence of nut boring symptoms are also noticed. Moreover, the attack by rhinoceros beetle would invariable incite egg laying by red palm weevil as well as entry of bud rot pathogen in this period.

Management

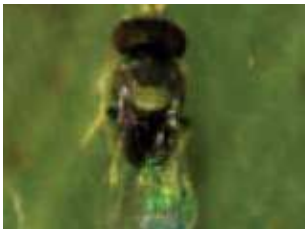
- Prophylactic treatment of top most three leaf axils with either botanical cake [Neem cake /marotti cake / pongam cake (250 g)] admixed with equal volume of sand or placement of 12 g naphthalene balls covered with sand.
- Routine palm scrutiny during morning hours and hooking out the beetle from the infested site reduces the floating pest population. This strategy could reduce the pest population significantly.
- Shielding the spear leaf area of juvenile palms with fish net could effectively entangle alighting rhinoceros beetles and placement of perforated sachets containing 3 g chlorantraniliprole /fipronil on top most three leaf axils evade pest incursion.
- Dairy farmers could treat the manure pits with green muscardine fungus, Metarhizium anisopliae @ 5 x 1011 /m3 to induce epizootics on the developing grubs of rhinoceros beetle. Area-wide farmer-participatory approach in technology adoption could reduce the pest incidence very effectively and forms an eco-friendly approach in pest suppression.
- Incorporation of the weed plant, Clerodendron infortunatum in to the breeding pits caused hormonal irregularities resulting in morphogenetic transformational aberration in the immature stages of the pest.
- Crop diversity induced by intercropping and ecological engineering principles would disorient pests and provide continuous income and employment as well.

▶ *Rugose Spiralling Whitefly (Aleurodicus rugioperculatus)*

This period could also witness the establishment of the invasive rugose spiralling whitefly (Aleurodicus rugioperculatus) in new areas as well as re-emergence in already reported areas. The pest population is increasing very high due to favourable weather factors of high day temperature and fall in relative humidity. Presence of whitefly colonies on the under surface of palm leaflets and appearance of black coloured sooty mould deposits on the upper surface of palm leaflets are characteristic visual symptoms of pest attack. In severe cases, advancement in senescence and drying of old leaflets was observed. Leaflets, petioles and nuts were also attacked by the whitefly pest and a wide array of host plants including banana, bird of paradise, Heliconia sp. were also reported. Continuous feeding by whiteflies cause health deterioration in palms for which agronomic care is very critical.

Rugose spiraliing whitefly

Parasitized pupa



Encarsia guadeloupae

Sooty mould scavenger beetle

Management

● In juvenile palms, spraying of water with jet speed could dislodge the whitefly and reduce the feeding as well as breeding potential of the pest.

● Ensure good nutrition based on soil-test recommendations and adequate watering to improve the health of juvenile and adult palms. Agronomic health management of palms is very crucial including planting of intercrops wherever possible to diversify volatile cues and improve microclimate disfavouring flare up of whitefly.

● No insecticide should be used as this causes resurgence of the pest and complete kill of the natural aphelinid parasitoid, *Encarsia guadeloupae*. A pesticide holiday approach is advocated for the build up of the parasitoid.

● Installation of yellow sticky traps and conservatory biological control using *E. guadeloupae* could reduce the pest incidence by 70% and enhance parasitism by 80%.

● Habitat preservation of the sooty mould scavenger beetle, Leiochrinus nilgirianus could eat away all the sooty moulds deposited on palm leaflets and cleanse them reviving the photosynthetic efficiency of palms.

● A close scrutiny should be made for the presence of other whiteflies including the nesting whiteflies on coconut system.

▶ *Nesting whiteflies (Paraleyrodes bondari and Paraleyrodesminei)*

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

Management

● In juvenile palms, spraying of water with jet speed could dislodge the whitefly and reduce the feeding as well as breeding potential of the pest.

● Ensure good nutrition and adequate watering to improve the health of juvenile and adult palms

● Effective nitidulid predators belonging to Cybocephalus sp. were observed on the palm system and pesticide holiday is advised for conservation of biological control.

▶ *Black headed caterpillar, Opisina arenosella*

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

Pest-infested field

Black headed caterpillar

Goniozus nephantidis

biological control suppressed by natural enemies.

Management

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

Leaf rot disease (*Colletotrichum gloeosporioides, Exserohilum rostratum*)

It is commonly observed on palms affected by root (wilt) disease wherein foliar necrosis of terminal spear leaf and adjacent leaves are registered. The disease prominently noticed in the post-monsoon phase during the month of December. Affected leaves turn necrotic and are not detachable from the palm and remain intact. This disease could be initially observed as minute lesions which later enlarge, coalesce and cause extensive rotting affecting the photosynthetic efficiency of palms. The disease is endemic to root (wilt) affected regions of Southern Kerala

Leaf rot disease affected palm

Leaflets

Management

- Need based pruning and destruction of affected spear leaf and other adjacent leaves in the terminal region
- Spot application of hexaconazole 2 ml in 300 ml water on the affected spear leaf region
- Soil test based nutrition for improving the health of the palm and ensure adequate irrigation

Basal stem rot disease *(Ganoderma spp.)*

It is a destructive disease observed in all coconut growing regions and found very severe in soils with higher pH and moisture stress condition. The pathogen invades the root system during early stages of infection that are not visibly noticed. Very severe in areas of Thanjavur, Tamil Nadu parts of East Godavari, Andhra Pradesh and Arsikara, Karanataka. The outer whorl of leaves turn yellowish, then gradually become brown and droop from their point of attachment and hang vertically downwards to form a skirt around the trunk apex. In course of time, the apex of the trunk shows tapering with the advancement of the disease, and bleeding symptoms may appear on the bole region. At the base of the stem a characteristic reddish brown discoloration develops, accompanied by the exudation of a brown viscous gummy substance. These brownish patches may extend up to one metre from ground level and at times bark pealing was also observed. Sometimes fruiting bodies (basidiocarp) of the pathogen develop

Coconut Development Board Approved 32 Projects worth Rs. 3838.41 lakh

Coconut Development Board (CDB) in its 57th meeting of the Project Approval Committee (PAC) on Technology Mission on Coconut (TMOC) held at Kochi through videoconferencing on 8th, 9th, 13th, 14th & 16th October 2020 under the Chairmanship of Smt. G. Jayalakshmi IAS Chairperson, Coconut Development Board and Chairman PAC approved 32 projects with an outlay of Rs. 3838.41 lakh and an eligible subsidy of Rs.869.59 lakh. Out of the 32 projects approved by 57th PAC, 17 projects are from entrepreneurs for setting up of coconut based industries and 15 projects from various research institutes all over India.

Dr.Sanjay Kumar Dy. Commissioner(Hort.), DAC&FW, Krishi Bhawan, New Delhi; Shri. K. Dhanaraj, Joint Director of Horticulture, Karnataka; Dr. Anitha Karun, Director, ICAR- Central Plantation Crops Research Institute (CPCRI), Kasargod, Kerala; Dr. C. Anandaramakrishnan, Director, IIFPT, Thanjavur, Tamil Nadu; Shri. Prasanth Chakravarthy Asst. Agrl Mkg Adviser, Kakkanad, Kochi, Kerala & Shri Venu Gopal Reddy R., Marketing Officer, DMI, R.O, Kochi, Kerala; Dr. G. Suresh Kumar, Scientist, Dept. of Biochemistry, CSIR- Central Food Technological Research Institute, Mysuru, Karnataka & Dr. Sukumar Debnath, Senior Principal Scientist, Dept. of Food Engineering, CSIR- Central Food Technological Research Institute, Mysuru, Karnataka; Smt. Dini S. Panikar, Deputy General Manager, NABARD, Trivandrum, Kerala; Shri Philip Y. Chief Regional Manager, Indian Overseas, Kochi; Shri Saradindu Das, Chief Coconut Development Officer, CDB, Kochi; Mrs. Minnie Mathew IAS (retd), Secunderabad, Co- opted expert attended the meeting.

Basal stem rot disease Bracket fungus

from the affected trunk.

Management

- Avoid burning of trash and palm residues near the trunk to avoid trunk/root injury
- Removal of dead palms and palms in advanced stage of the disease as well as destruction of the boles and root bits of the diseased palms to remove disease inoculums.
- Isolation of neighboring healthy palms, by digging isolation trenches (60 cm deep and 30 cm wide) around the affected palm (1.2 m away from the base of the trunk).
- Application of neem cake (5 kg) fortified with Trichoderma harzianum(CPTD 28)talc formulation (50 g)per palm per year at six monthly intervals reduced the disease intensity.
- Root feeding of hexaconazole @ 2% (100 ml solution per palm) and soil drenching with 0.2 % hexaconazole or with 40 l of 1% Bordeaux mixture in the coconut basin are recommended

Correct and timely diagnosis of insect and mite pests as well as disease causing pathogens would be the key factors for the implementation of effective management solutions. Delayed detection would take a longer time for recovery from pest invasion. Hence, a close scrutiny of palms through effective scouting and timely diagnosis would form the basis in doubling income through increased production. Palm health management is very important to tackle pests and diseases in coconut. ■

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

Market Review – December 2020

Domestic Price

Coconut Oil

During the month of December 2020 the price of coconut oil opened at Rs. 19700 per quintal at Kochi and Alappuzha markets and Rs. 21400 per quintal at Kozhikode market. The price of coconut oil at Kochi,Alappuzha and Kozhikode markets expressed an overall upward trend.

The price of coconut oil closed at Rs. 20100 per quintal at Kochi and Rs. 19950 per quintal at Alappuzha market and Rs. 22000 per quintal at Kozhikode market with a net gain of Rs.400 at Kochi and Rs.250 at Alappuzha and Rs.600 per quintal at Kozhikode market.

The prices of coconut oil at Kangayam market in Tamilnadu, which opened at Rs. 18667 per quintal and its expressed a mixed trend during the month.

Weekly price of coconut oil at major markets Rs/Quintal)				
	Kochi	Alappuzha	Kozhikode	Kangayam
01.12.2020	19700	19700	21400	18667
05.12.2020	19900	19900	21500	18667
12.12.2020	20100	20100	21600	18333
19.12.2020	NR	20100	21600	18467
26.12.2020	19650	19750	21600	18133
31.12.2020	20100	19950	22000	18333

Milling copra

During the month, the price of milling copra opened at Rs.13200 per quintal at Kochi and Rs.13050 per quintal at Alappuzha market and Rs. 13900 per quintal at Kozhikode market.

The prices of milling copra at Kochi market and Alappuzha markets opened and closed at the same price. At Kozhikode market, the prices closed at Rs. 13850 per quintal with a net loss of Rs. 50 per quintal.

At Kangayam market in Tamilnadu, the prices opened at Rs. 12200 per quintal and closed at Rs. 12000 per quintal with a net loss of Rs. 200 per quintal.

**NR-Not reported *NQ-Not quoted*

Weekly price of Milling Copra at major markets (Rs/Quintal)				
	Kochi	Alappuzha (Rasi Copra)	Kozhikode	Kan-gayam
01.12.2020	13200	13050	13900	12200
05.12.2020	13400	13300	13800	12500
12.12.2020	13500	13350	13700	12200
19.12.2020	NR	13350	13800	12200
26.12.2020	12900	12900	13750	11700
31.12.2020	13200	13050	13850	12000

Edible copra

The price of Rajpur copra at Kozhikode market opened at Rs. 17100 per quintal expressed a mixed trend during the month and closed at Rs.16500 per quintal with a net loss of Rs.600 per quintal.

Weekly price of edible copra at Kozhikode market (Rs/Quintal)	
01.12.2020	17100
05.12.2020	16500
12.12.2020	17000
19.12.2020	16500
26.12.2020	16500
31.12.2020	16500

Ball copra

The price of ball copra at Tiptur market opened at Rs. 15400 per quintal. No report was received from Tiptur market during the last week of the month.

Weekly price of Ball copra at major markets in Karnataka (Rs/Quintal)	
01.12.2020	15400
05.12.2020	14500
12.12.2020	15000
19.12.2020	14366
26.12.2020	14900
31.12.2020	NR

Dry coconut

At Kozhikode market, the price of dry coconut opened at Rs.13200 per quintal and expressed a downward trend during the month. The prices closed at Rs.12250 per quintal with a net loss of Rs.950 per quintal during the month.

Weekly price of Dry Coconut at Kozhikode market (Rs/Quintal)	
01.12.2020	13200
05.12.2020	12450
12.12.2020	12450
19.12.2020	12450
26.12.2020	12250
31.12.2020	12250

Coconut

At Nedumangad market in Kerala, the price of coconut opened at Rs.21000 per thousand nuts and closed at Rs. 20000 during the month with a net loss of Rs. 1000 per thousand nuts.

No regular report was received from Pollachi market Bangalore and Mangalore markets during the month.

Weekly price of coconut at major markets (Rs /1000 coconuts)				
	Nedumangad	Pollachi	Man-glore	Ban-glore
01.12.2020	21000	NR	NR	22500
05.12.2020	21000	18000	NR	22500
12.12.2020	21000	NR	NR	NR
19.12.2020	21000	18000	29000	22500
26.12.2020	21000	18000	NR	NR
31.12.2020	20000	NR	29000	NR

International price

Coconut

The price of coconut quoted at different domestic markets in Philippines, Indonesia, Srilanka and India are given below.

Weekly price of dehusked coconut with water				
Date	Domestic Price (US$/MT)			
	Philippines	Indonesia	Srilanka	India*
05.12.2020	185	247	NR	561
12.12.2020	195	248	NR	NR
19.12.2020	NR	219	NR	561
26.12.2020	NR	220	NR	547
*Pollachi market				

Coconut Oil

International price of coconut oil expressed an upward trend during the month. However domestic price of Indonesia and Sri Lanka expressed a downward trend during the month.

The price of coconut oil quoted at different international/ domestic markets are given below.

Weekly price of coconut oil in major coconut oil producing countries					
	International Price(US$/MT)	Domestic Price(US$/MT)			
	Philippines/Indonesia (CIF Europe)	Philip-pines	Indo-nesia	Sri lanka	India*
05.12.2020	1455	1405	1397	2642	2552
12.12.2020	1463	1420	1389	2648	2507
19.12.2020	1500	NR	1394	2701	2525
26.12.2020	1505	NR	1393	2550	2479
* Kangayam					

Copra

The domestic price of copra in Indonesia, Srilanka and India expressed a downward trend.The price of copra quoted at different domestic markets are given below.

Weekly International price of copra in major copra producing countries				
Date	Domestic Price (US$/MT)			
	Philippines	Indonesia	Srilanka	India* * Kangayam
05.12.2020	914	828	1510	1709
12.12.2020	925	864	1505	1668
19.12.2020	NR	864	1490	1668
26.12.2020	NR	859	1498	1600

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