Vol.LXIV No.9 March - 2022 Pages-40 Price: Rs.6

Indian Coconut Journal

The Magic of Coconut Oil

An Aid to Beauty

Higher Productivity and Income
from Coconut Based Farming System

Coconut Leaf Mulching:
a boon for ginger farming

INDIAN
COCONUT
JOURNAL

Vol. LXIV No.9
March - 2022
Kochi - 11

Publisher
COCONUT DEVELOPMENT BOARD
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Department of Agriculture and Co-operation,
Government of India
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SUBSCRIPTION

Annual	Rs. 60.00
Single Copy	Rs. 6.00
Institutes / Libraries	
Annual	Rs. 200.00
Single Copy	Rs. 20.00

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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Message from the Chairman's desk

Dear Readers,

"Agriculture is our wisest pursuit, because it will in the end contribute most to real wealth, good morals and happiness" – Thomas Jefferson wrote this in 1787, but the words still hold true. Agriculture brings us closer to nature, provides nourishment for both body and soul; improves our health; and also provides for the millions of organisms in nature. It also teaches us the patience and the rhythm of nature since one can't hurry in making a crop. On a commercial angle, it is the only sector which will never be affected by recession or pandemic or any other disaster.

Food is very much essential for sustenance and with each passing day, relevance of food is increasing, not only in terms of its quality but also in terms of the sustainable means by which it is produced, taking into account both sustainability of the farmers and the environment. But today, the perils of climate change is on the face of the farmer, crippling him at every step with floods, cyclones, typhoons and droughts, new entrants like El Nino and La Nina hindering the journey towards quality agricultural production. It is time to rethink and revisit agriculture and support the farmers with policies and programmes that lead to quality production, since the effects of climate change largely impacts the poor and marginal farmers who make their livelihoods from agriculture. Technology and smart practices can help mitigate risks caused by climate change, among other measures. India is constantly making efforts to formulate and implement policies to make agriculture more sustainable.

Coconut is a crop highly suited to climate smart agriculture; a team leader in cohabiting crops, livestock, poultry, fish and other organisms; selfless in paying back with interest to the soil through the biodegradable biomass; and creating a healthy haven in the soil for a variety of organisms and microbes. Integrating technology and smart practices to an already smart crop will revolutionise the existing trends and make it a smart agriculture industry.

Concerted efforts by Coconut Development Board since inception have enabled to achieve significant growth in production and productivity making us the global leader in coconut production. Policies for development of the entire ecosystem in the coconut sector has resulted in entry of entrepreneurs and establishment of processing units which have created an additional capacity to process over 15% of the production. The aggressively developing **"start up"** environment in the country and the application of new age technologies like artificial intelligence and block chain is bound to provide solutions to increased mechanization, efficient logistics, improved supply chain and increased market access.

Let us work together to develop a vibrant coconut sector which offers livelihood security and social security to its stakeholders; to the farmers and the industry.

Rajbir Singh IFS

Chairman

Coconut Cultivation and Coconut Based Enterprises in Lakshadweep -

Changing Scenario and Need for Revitalizing Coconut Sector

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Coconut farming is intrinsically woven into the socio-cultural life of the Lakshadweep islands. Copra and coir making were the major economic activities and livelihood options for the islanders during the olden days. Though coconut production and copra making continue to be the major options for livelihood, the local people experience various constraints which adversely affect coconut production. In general, farmers perceive that the productivity of coconut palms has been declining in the islands since the last few years. However, the official statistics indicate a consistently high level of coconut productivity.

Recently, in February 2022, a team of scientists from ICAR-CPCRI, Kasaragod and Krishi Vigyan Kendra, Lakshadweep conducted interface programmes in different islands with coconut farmers, entrepreneurs, palm climbers, and tappers. During the interaction sessions, the farmers and climbers opined that there is a decline in coconut productivity. The diagnostic field visits by the team to selected coconut gardens revealed various field problems that is adversely affecting coconut yield. Deficiency of nutrients, especially deficiency of potassium, nitrogen and boron, incidence of stem bleeding disease and infestation by white fly and eriophyid mite were the major field problems observed. Crop loss due to rodents continues to be another important field problem experienced by coconut growers in the islands. Overcrowding of coconut palms prevalent in the islands is quite congenial for intensified rodent attack and subsequent crop loss. Taking into cognizance the island agro-ecology and socio-economic situations, appropriate interventions are needed to overcome the field problems experienced by coconut growers

in Lakshadweep islands. Nature and functioning of coconut based enterprises in Lakshadweep islands are also undergoing changes owing to various socio-economic factors.

I. Management of coconut palms

As per the official statistics for the year 2018-19, the total area under coconut cultivation in Lakshadweep is 2674.87 ha with an annual production of 876.09 lakh nuts and a productivity of 32,753 nuts/ ha (Table 1). Though the data on the production and productivity of coconut in the islands indicate higher productivity compared to the national average, the average productivity of coconut palms realized in farmers' field at present is about 70-100 nuts per palm per year only, according to many farmers who were present during the interface programmes.

Table 1 Coconut cultivation in Lakshadweep islands

Name of island	Area(in ha)	Production (no. of nuts)	Productivity (nuts per ha)
Kavaratti	392.40	13964339	35587
Agatti	338.12	12131746	35 880
Amini	243.50	8675905	35630
Kadmat	306.10	10300265	33650
Kiltan	149.60	5068448	33880
Chetlat	100.1	3379376	33760
Bitra	7.70	51359	6670
Androth	452.75	16593288	36650
Kalpeni	258.50	8931175	34550
Minicoy	426.10	8513478	19980
Total	2674.87	87609378	32753

(Source: Coconut Development Board)

During discussion, a 71-year old farmer Mr. Hamza Haji from Agatti Island and a 75-year old coconut grower Mr. Aboo Salam Koya from Agatti Island gave a detailed account of the yield of coconut in their orchards which is in line with the general perception of farmers about the coconut productivity in Lakshadweep islands. All farmers perceived that over the years, the care and management given to coconut orchards has gradually declined, which in turn has resulted in reduced palm health and yield. During earlier times there were many indigenous technical knowledge (ITKs) and practices related to the care and management of coconut palms from planting to harvesting to ensure high yield. Some of them are furnished in Table 2.

Table 2. Traditional practices of coconut cultivation

Mother palm selection and seed nut collection	High yielding palms over 35 years old
Sowing	Slanting position with the eye upward
Nursery management and selection of seedlings	Early germination
	Early splitting of leaves
	Maximum girth
	Transplanting in 'fathiyakett' which is a raised nursery
	Regular irrigation during the initial two years.
Field planting and aftercare	1-2 year old seedlings selected from the 'fathiya-kett' nursery are planted.
	2-3 years old seedling are planted in low lying 'thottam' areas
	Regular irrigation provided to palms using water from the open wells.
	Application of ash in palm basins
	Mulching of palm basins using dried leaves
	Community action for 'Elinayatt' (rat hunting) for rodent management in coconut gardens
Harvesting	Traditional climbing method using rope
	Harvesting in an interval of 45 days
	Crown cleaning twice in a year

Selection of mother palms for seednut collection, nursery management and selection of good seedlings were systematically followed by the farmers. During the interface meeting at Kavaratti, Mr. Aboobacker Koya of Kavaratti island narrated the genetic diversity of coconut nurtured by farmers in different islands. The predominant local ecotypes of coconut prevalent in islands in olden days were chenga (green nuts), karinga (orange nuts), cherukka (smaller nuts), thodom (bigger nuts), chentheng (orange dwarf) and pathinettampatta (green dwarf). Nuts of both the chenga and karinga are medium sized. Chenga types are steady yielders. The most common coconut varieties in the islands are Laccadive ordinary tall and Laccadive micro tall, which have been used in the coconut breeding programmes by institutes such as ICAR-CPCRI and Kerala Agricultural University. Seed nuts are selected from high-yielding palms that are more than 35 years old. Nuts are sown in slanting position with the eye facing upwards. When the seedlings attain three leaves stage, seedlings with good girth are taken for nursery planting for almost two years. Traditional nursery set up was known as "fathiyekket", where the sprouted seedlings are sown in a raised bed in which the hard pan is broken to get water, which is in turn used for irrigating the seedlings.

Mr. Ahamed Musliar of Kadmat Island mentioned that the young seedlings were provided with stakes of Thespesia plant and also fencing was provided to the nursery with dried and plated coconut leaves to protect them from sun scorching and also from animals.

For planting, pits of around 2 feet height, 2 feet width and 2 feet depth were taken and the dried leaves and farmyard manures were added along with the top soil, and then the seedling was planted at the centre as stated by Mr. Aboo Salam Koya. Basin opening regularly done once in an year. Crown cleaning was an important activity which can regularly carried out twice a year, mainly in the monsoon season as a prophylactic measure to prevent rodents and other pests. Mulching of coconut basins with dried leaves was also done. Gap filling with new seedlings was ensured by planting four seedlings in place of cutting two palms. Palms were planted closely in places where it is comparatively hotter. Nonetheless, presently, these indigenous technical knowledge has almost vanished from the islands as the younger generation lacks interest in farming.

Coconut climbing is a tedious operation in coconut farming. There is a traditional way of harvesting and undertaking post-harvest operations among the people of Lakshadweep. Palm climbing is done in the traditional manner with rope by skilled workers belonging to certain sections of the population. In addition, the services of skilled workers from the main land are also utilized by the farmers. The present wage rate is attractive; however, a shortage of skilled climbers is faced in all the islands as climbing coconut trees is considered an inferior job by the upper elite sections of the population.

Drudgery involved in palm climbing is another factor which deters younger generation from taking it up as an occupation. Recently, a few climbers have started using palm climbing machines. However many traditional climbers perceive that climbing with machine takes more time compared to the traditional climbing method. An experienced climber can climb 15–30 palms in 3-5 hours of climbing in a day, whereas it takes more time while using the climbing machine. On an average the wage rate for climbing palm is Rs. 50 per palm. Similar to their attitude towards coconut farming, younger generation is not much interested to take up palm climbing.

In earlier days, harvesting was done once in 45 days, which now has been reduced to once in 3-4 months. Other alternate jobs for the climbers are fishing and assisting in construction work. Many climbers have noticed alternate bearings in coconut palms. There is a phenomenon called 'Kulachaatam' where the bunches tend to bend in the direction of the wind, as stated by Mr. Aboobacker Koya. It is a common practice to store harvested nuts in heaps under shade for a few days before they are further processed. Farmers believe that this has many advantages, such as easier husking and shelling and superior quality of copra produced. In some places, harvested nuts are heaped in open areas till dehusking is done, which may affect the seasoning of the stored nut and further lead to deterioration of quality. Traditionally, husking is done manually by skilled workers with the help of an iron spike driven into the ground. A skilled worker can dehusk around 2000-2500 nuts per day.

Current scenario of coconut farming in Lakshadweep island is that it no longer attracts the younger generation and, at the same time, elderly farmers are unable to manage the cultivation of coconut in a systematic way. Because of the low level of management, there are many field problems which results in low yield. In some localities farmers experience problems due to shortage of water for irrigation in coconut gardens. Palms in the coconut orchards of islands look unhealthy with symptoms of nutritional deficiency including that of boron, potassium, nitrogen, etc.

Soil test results of the sample collected from the farm under Department Agriculture in Kadmat island pointed out the status of potassium, magnesium, and boron were very low, which clearly indicated the need for interventions to improve the soil health so that sustainable coconut production can be ensured. Many families have taken up cattle rearing and goat rearing as an income generating activity. However, non availability of fodder led to poor health of animals.

Incidence of pests and diseases such as white fly, eriophyid mite and stem bleeding are observed in some localities.

Farmers perceived that the recently observed widespread infestation of whitefly has made life miserable as the interspaces of coconut palms used for parking vehicles, drying clothes, were spoiled with honey dew secretions. Overcrowding of palms in coconut gardens which enhances rodent infestation and the substantial loss of nuts is another major problem in coconut farming in Lakshadweep islands. Rat hunting, locally known as 'Eli nayattu' organized as a community action for the control of rat menace in the coconut gardens is not followed at present in the islands.

Technological options for sustainable coconut cultivation in Lakshadweep

Taking into account the field problems observed in coconut gardens and the policy on organic farming prevalent in Lakshadweep islands various suggestions on technological options for sustainable coconut cultivation are made as summarized below.

i. Planting

Planting of coconut seedlings are to be taken up in a scientific manner rather than the current practice of planting in a very unsystematic way. The following measures are suggested.

- Opening of pits @ 75 cm x 75 x 60 cm
- Husk incorporation in the planting pits
- Regular watering of seedlings upto 2 years

ii. Organic recycling

About 15 to 21 tonnes of biomass as leaves, bunch waste and husk is available in one hectare of coconut garden which can be effectively used for *in-situ* organic recycling to improve soil health.

iii. Green manuring

Raising green manure crops such as cow pea, sun hemp, daincha and mimosa in the basin and interspace of coconut palms and incorporating into palm basins can be adopted for improving the soil health.

iv. Green leaf manure

The potential for raising green leaf manure crops such as glyricidia, thespesia, calotropis etc. can be utilized to generate substantial quantity of green leaf manure for application to coconut palms.

Coir pith mulching

Coconut leaf mulching

Husk mulching

v. Use of biofertilizers

Carrier based inoculants containing high population of plant-beneficial microorganisms capable of enhancing the availability of nutrients to plants can be used for coconut palms. These micro organisms help in fixation of atmospheric nitrogen (eg. Azospirillum) and solubilisation of phosphorus (eg. Phosphobacterium), produce plant growth promoting substances, enhance root growth and induce systemic resistance in plants to pests and diseases.

vi. Coconut based cropping system

Instead of the current practice of under planting of coconut, growing of intercrops is the good option. Vegetable crops like cowpea, cucurbits, moringa etc. can be intercropped in the coconut gardens.

vii. Inclusion of fodder trees in the coconut based integrated farming system

Fodder trees like glyricidia or subabool can be included in the coconut based integrated farming system to enhance the availability of fodder to the animals.

viii. Plant protection

Use of neem cake enriched with trichoderma need to be popularised for the control of stem bleeding disease. Similarly, eco-friendly pest management methods against rhinoceros beetle, eriophyid mite and white fly infestations are to be promoted as part of plant protection measures. Leaf axil filling with powdered neem cake/marotti cake/ pongamia cake @ 250 g/palm + fine sand (250 g) per palm during pre and post monsoon months as a prophylactic measure against rhinoceros beetle can be undertaken.

Use of Oryctes rhinoceros nudivirus (OrNV) for biological control of rhinoceros beetle and release of virus inoculated beetles brings down the pest population. Spraying against eriophyid mites requires an oil garlic soap mixture at a 2 percent mite concentration (neem oil 200 ml, soap 50 g, and garlic 200 g mixed in 10 litres of water). Severely infested palms, especially dwarfs with white flies, can be given a 0.5% neem oil spray. In addition, encourage build up of the aphelinid parasitoid (*Encarsia guadeloupae*) and re-introduce parasitized pupae to emerging zones of whitefly outbreak. Install yellow sticky traps on the palm trunk to trap adult whiteflies. Krishi Vigyan Kendra Lakshadweep in collaboration with ICAR-CPCRI can implement suitable interventions to conduct front line demonstrations and capacity development programmes to create awareness among coconut growers on these practices.

viii. Harvesting

Regular harvesting of coconut is a must. Harvesting should be done at 45-60 days interval. Harvesting can be done either manually or using mechanical climbing devices with proper safety measures.

Research and On Farm Testing

Research and on farm testing are required to be initiated to:

- Isolate nitrogen fixers and phosphorus solubilizers from the soil of Lakshadweep islands and develop location specific microbial consortia for nitrogen fixation and solubilisation of phosphorus.
- Develop location specific microbial consortia and plant decomposers for enhancing the decomposition of recyclable biomass.
- Sea weed manure utilisation for potassium management
- Effective utilisation of fish waste as organic manure
- Screening of fodder varieties suitable for rainfed conditions and high pH conditions
- Efforts should be made for the comprehensive assessment of soil health status and formulation of package of practices recommendations for soil health and crop health management taking into cognizance the local availability of inputs and policy on organic farming in the islands.

II. Coconut based enterprises

In the olden days, coir twisting was an important activity carried out by the women of certain classes which the nuts would be harvested by the men. Husk was then steeped for six or eight months in pits built with coral rock between the high and low water-mark in sheltered situations on either the lagoon beach or the sea beach. When sufficiently rotten, the husks are taken out and beaten by the women with a wooden beater on a fiat stone. The resulting coir is then washed out, dried, and finally twisted by the women by hand into yarn. Feet as well as hands are cleverly used. The quality depends upon the fineness of the twist and the colour.

Copra making was another economic activity. Although copra processing is still continued as the major economic activity, certain problems exist in copra making and marketing. Copra is prepared by sun drying in the traditional way. The season

Table 3. Comparison between traditional 'Meera tapping' and CPCRI method of neera (Kalparasa) tapping		
Particulars	**Traditional 'Meera tapping'**	**Kalparasa® tapping technology**
Selection of palm	Good yielding palms and with strong trunks	After attaining a stable yield.
Selection of inflorescence	Inflorescence seen next to an unopened spadix	Any unopened spadix
Length of cutting spathe	10-15 cm	15cm
Process of neera tapping	Unopened spathe is cut around 10 cm from the tip followed by gentle beating for a day using knife (rear end of knife).	The development of female flowers inside the spathe causes a swelling at the base, which is an indication of appropriate stage for tapping
	In addition, the sap flow will be ensured by rubbing the cut opened area with green coconut leaves.	The inflorescence selected for tapping is first tied around with a strong coir or plastic rope to prevent it from bursting
	If the sap flow is lesser, then around 2 cm is cut further. The sap flow will start within 2 days of cutting.	A gentle uniform beating is given using a mallet and massaged using palm all over the spadix, twice a day
	• After a day or two, small froth starts to form which indicates the opening of spathe, and at this time, the spathe is removed.	After 4-5 days of stroking 7-10 cm tip is cut off
	Meera comes out within 2-3 days is discarded for better flow and good quality, there after the sap is collected.	In a week's time sap starts oozing out from the cut end
Neera collecting tool	In olden days, coconut shell was used for collecting meera, and nowadays either PVC or boya or plastic pots or even bottles are used for tapping	Coco sap chiller
Length of tapping	One spadix is tapped for 2-2.5 months (60-75 days)	45 days
Sap collection	Two times a day (morning and evening)	Two times a day (morning and evening)
Yield	0.5-4 litres meera per spadix per day	1.5 to 3.0 liter of sap per spadix per day
Neera quality		
Colour	Oyster white	Light orange & honey color
pH	6-6.8	7-7.5
Insects, pollen, dust	Present	Absent as there is filter inside the chiller box
Processing	Meera thus collected are mainly sold in household for preparing vinegar which is an essential raw material in fish based cuisines.	Consumed as zero alcoholic health drink. Products like natural coconut sugar, jaggery, honey and confectionery can be prepared without the addition of lime and other chemicals
	A smaller portion is sold as fresh drink.	
	Occasionally, the collected meera is concentrated and converted into semi solid form as 'katti' or neera jaggery.	
	While concentrating, limestone is added to increase the pH	
	Katti and coconut gratings are used for making Lakshadweep halwa, which is a traditional sweet and has a good market potential.	

for copra making is from December to May. By December-January farmers and entrepreneurs prepare temporary drying yards in the open space near the sea shore. Each square shaped drying unit is demarcated using thatched coconut leaves. Dehusked nuts are transported to these drying yards, cut and spread for drying, the shelling done and packed in gunny bags after proper drying for sending to markets. Drying time usually takes seven days. Fully dried copra is assessed by breaking the dried copra cup and listening to the sound while breaking by hand. Due to the inadequacies of the traditional method of sun drying, farmers often find it difficult to produce copra that meets the minimum standards specified by the procuring agencies, thus realizing less income. In earlier days, copra was traded to the mainland (Mangalore and Kozhikode) through local boats called 'odom'. Later on, motor sailing vessels ('macnhu/ uru') were used as a mode of transport, which reduced the time of travel. In return, the household groceries and other items for the next season were purchased and brought to the islands.

Of late, many oil expelling units have been installed in all the islands, in addition to one or two units under the government which were closed recently. A few copra dryers have been installed along with oil expelling units in various islands. Home scale processing of Virgin Coconut Oil (called bentha neii) by hot processing has been a traditional practice in the households of the Lakshadweep islands, in which



women folk were engaged. The process involves grating the kernel of mature coconuts, extraction of milk from the gratings, keeping the milk thus extracted for cooling overnight, boiling the milk the next day for about two and a half hours, and separating the VCO, which was mainly used for new born babes and as hair oil for the elderly, which had no commercial value. Presently, a few women's self help groups are involved in the processing and marketing of VCO, which needs to be mechanized to reduce drudgery and to enhance efficiency. In the 1990s, a few desiccated coconut units were established by the Lakshadweep Development Corporation Limited, under the Lakshadweep Administration, which were closed recently due to operational issues. Inadequacy of entrepreneurship among the islanders for exploring the potential for income generation through coconut based value-added enterprises is quite evident.

Traditional neera tapping and value addition in Lakshadweep

The traditional method of neera tapping (called meera) using earthen pots is practiced in the islands since time immemorial. In fact, the practice of meera tapping and its value addition to vinegar and jaggery was mentioned in the publication of 1920 (Ellis, 1924). However, there are slight differences in the method of tapping compared to Kerala. Tapping starts with palm selection. The palms that are good at yielding and with strong trunks are selected for tapping. It is believed that healthy trees that bear more nuts also yield more sap. An interesting observation made by a progressive tapper, Mr. Jamaluddeen from Agatti island, who started neera tapping at the age of 12, is that the best palms will be those whose bunches bend naturally, and also, when non bearing palms are tapped for neera, they start bearing in successive years.

IACR- CPCRI has developed a technology for neera tapping using 'coco sap chiller' in which the neera collected is with zero alcoholic content. The differences observed between the traditional meera

tapping and Kalparasa tapping which is patented technology of CPCRI of neera tapping are summarized in table 3.

There is a potential for popularising CPCRI technology of neera collection using "Coco-sap chiller' and production of coconut sugar in the islands. Krishi Vigyan Kendra, Lakshadweep in collaboration with ICAR-CPCRI, Kasaragod has already initiated On Farm Testing of these technologies in few islands.

Conclusion

Coconut growers in Lakshadweep islands experience various constraints in coconut farming and there is a declining trend in productivity of coconut. It is necessary to implement interventions taking into account the field problems observed in coconut gardens and the policy on organic farming prevalent in Lakshadweep islands for sustainable coconut cultivation. Similarly, there is scope for modernizing the coconut based enterprises in the islands and bringing more efficiency. Utilization of advanced technologies for value addition, capacity building of labour and ensuring support to the enterprises through financial incentives are needed for rejuvenating the coconut based enterprises in Lakshadweep islands. The potential of marketing value added products under the brand as "Lakshadweep organic" should be encouraged to fetch better price for the local produce. Moreover, initiative should be made for Geographical Indication (GI) tagging for all coconut products from Lakshadweep highlighting its natural farming tradition. ■

Dweep Haritha

Promising indigenous dwarf coconut cultivars and varieties of Andaman and Nicobar Islands

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Andaman and Nicobar Islands

The coconut palm is known to be one of the most important crops among all cultivated crops in the world and is themost extensively grown and used nut in the world. Coconutpalm is one of the predominantly grown crops in the Islands which is used for various purposes. Coconut isaptly called 'Kalpavriksha' asall parts of the palm are useful. The coconut fruit provides food, edible oil,sweet water and milk for consumption and industrial uses.Coconut is one predominantly grown crop of Andaman& Nicobar Islands,and the crop is closely associated with the socio-culture life of the island communities. Coconut is consideredas one of the remunerative crops of these islands and the main economy of the Islandsdirectly depends on the fortunes of the crop. Traditionally, tall coconutcultivars of these islands are used for copra making and now for many otherkernel-based products such as desiccated coconut, VCO etc. The tall and dwarfcultivars are used for neera extortion in Nicobar Islands. The native dwarfcultivars of these islands which include Andaman Green Dwarf, Andaman YellowDwarf and Andaman Orange Dwarf

Dweep Haritha

are popularly used for tender coconut purposeand conserved at ICAR-CIARI, Port Blair. Selections from these conserved dwarfaccessions are recommended as better varieties for higher tender coconut yield,dwarfness, ornamental value and earliness. The salient features of thesecultivars and varietal selections are furnished here.

Dweep Haritha

It is a selection from Andaman Green Dwarf accession evaluated over 25 years.ICAR-CIARI has identified and selected this high yielding dwarf selection from Andaman Green Dwarf coconut population and released as Dweep Haritha, for promotion in the island areas suitable for tender coconut purpose. The palms are dwarf with slender stem, produces dark green leaves, petiole, rachis and fruits. The bunches are huge, fruits are round, medium sized, dehusked fruits are round with average weight of 370g. The palms are regular bearers with shorter drooping leaves, not very strong attachment of leaves with the stem when compared to yellow and orange dwarfs considering the observation of bunch buckling. The nuts are early germinating and delayed harvest may lead to viviparous germination on the crown itself. The palms are self-pollinating, hence, the seedling production is much easier to get true to type. Owing to the good tender nut water quantity (over 350ml), nut yield (over 150 fruits per palm per year), dwarfness and regular production of bunches, it could be a preferred variety to be grown under home gardens. The cultivar has not been affected by any major pests under field conditions but observed to be susceptible to spiraling whitefly when compared to other tall varieties. The palms give better performance with summer irrigation or else the bunch production may get affected.Owing to the market demand for the attractive dark green colour of fruits and tender coconut yield, the cultivar could be planted for tender coconut purpose in plantations and in home gardens.

Dweep Sona

Dweep Sona

Dweep Sona

It is a high yielding dwarf selection from Andaman Yellow Dwarf population made by ICAR-CIARI and released as Dweep Sona for promotion in the island areas suitable for tender coconut purpose. The palms of this selection exhibit attractive yellow coloured petiole, rachis and fruits. The fruits are round to oblong, bright attractive yellow coloured, bunches are huge with good number of fruits ranging from 10 to 20 per bunch. The palms produce round canopy and the leaf tip is drooping making the palms as ornamental with gracefully hanging leaves and bunches. The variety could be preferred for home gardens as well as avenue planting and for plantations suitable for tender coconut purpose. The palms are robust with medium sized stem and with no bole at the base. Tender fruits weigh over 2kg and tender nut water is sweet, quantity ranges from 300 to 400ml per nut with TSS above 5.5 to 6^{o} brix. The seedlings of the variety are early splitting, vigorous and the palms are early flowering (about 30 months after planting) with regular bunch production over the years. The variety has not recorded to be affected by any major pest under field conditions but observed to be moderately susceptible to scale insects and susceptible to spiralling whitefly. As the young leaves are attractive yellow in colour, they are preferred for making decorative items.

Andaman Orange Dwarf

Andaman Orange Dwarf cultivar is a very attractive variety with moderately thin stem with closely arranged leaf scars over the stem, short and erect leaves with orange petiole colour, very

Andaman Orange Dwarf

attractive bright orange-coloured fruits, high number of female flowers per bunch with very good taste of tender coconut water, higher tender water quantity (300 to 400 ml per nut) and high yielding (80 to 150 fruits per palm per year). It is predominantly grown in home gardens and preferred in landscapes as ornamental palms. Often the fruit fetches good price owing to the demand in the market. Keeping few trees of this promising cultivar in home gardens ensure good additional income and provide delicious tender coconuts to the family. The seedlings of this cultivar are early splitting, vigorous and the palms are early flowering (about 36 to 40 months after planting) with regular bunch production over the years. The cultivar has not recorded to be affected by any major pest under field conditions but observed to be susceptible to spiraling whitefly and rhinoceros beetles when compared to other dwarf cultivars and varieties. The palms give better performance with summer irrigation or else the bunch production may get affected. This cultivar is popularly called as 'King coconut' by the islanders. ■

Statement of ownership and other particulars about
INDIAN COCONUT JOURNAL
FORM IV
(See Rule 8)

1.	Place of Publication	:	Kochi - 11
2.	Periodicity of Publication	:	Monthly
3.	Printer's Name	:	Mini Mathew
	Nationality	:	Indian
	Address	:	Publicity Officer Coconut Development Board, Kochi - 11, Kerala.
4.	Publisher's Name	:	Mini Mathew
	Nationality	:	Indian
	Address	:	Publicity Officer Coconut Development Board, Kochi - 11, Kerala
5.	Editor's Name	:	Deepthi Nair S
	Nationality	:	Indian
	Address	:	Deputy Director Coconut Development Board, Kochi - 11, Kerala
6.	Names and addresses of individuals who own the newspaper and partners or shareholders holding more than one percent of the total capital	:	The periodical is owned by the Coconut Development Board which is a body corporate set up by the Government of India under the Coconut Development Board Act, 1979.

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Date : 01-03-2022

(Mini Mathew)

Coconut Leaf Mulching
a Boon for Ginger Farming

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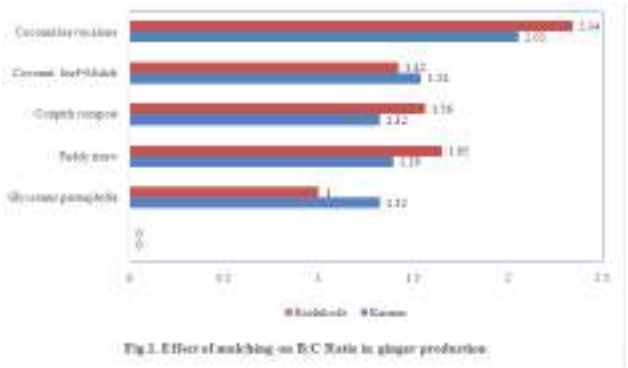
Plantation and spices always go hand in hand particularly in humid tropic climate. They are good components in multi-tier / multistory / multi-species cropping systems. Coconut based cropping system is important for the sustainability and better utilization of resources. Spices are another integral part of this system. Ginger is an ancient spice used in culinary, medicine etc. India is a leading producer of ginger which is grown in 27 states in an area of 1,78,135 ha and the production is 18, 68,435 tonnes of fresh ginger during 2019-20. (DASD, 2020) Mulching is an important cultural operation in ginger production, particularly in rainfed area. The mulch material used vary from dried leaves to polythene sheets.

Coconut is a unique crop and is useful to mankind in several ways. Although coconut occupies 41 percent of Kerala's cropped area more than 95 percent of coconut trees are grown in homesteads (Joseph, 2009). Unlike the large, scientifically managed plantations in other south Indian states like Tamil Nadu or Karnataka, in Kerala, the average size of coconut holding is 20-25 cents with an average number of 15-20 palms per holding. In a scientifically planted coconut garden inter and mixed cropping offers a lot of opportunities for improving the sustainability and livelihood security. In the state, coconut price is showing mixed trends and farmers are facing kick backs due to the escalating cost of inputs over the years.

Ginger is an important spice crop being grown by many farmers as a suitable crop for inter cropping in coconut based homesteads.The crop can also be cultivated in open conditions. Mulching in ginger is a common practice in many parts of India and its beneficial effects in enhancing sprouting, reducing soil erosion, conserving moisture, adding



organic matter, improving temperature and physical properties of soil and minimizing weed competition in rhizomatous crops have been reported under various agro-climatic situations by several workers.Mulching with green leaves is an important cultural operation in rainfed ginger cultivation which was in vogue since long due to its role in weed suppression,moisture conservation and ensuring suitable micro environment for rhizome development. Tree leaf mulch (Jayachandran 1997) has reported to significantly increase the yield of rhizomatous crops in India. But due to the fragmentation of land and destruction of trees around the homestead, the availability of green leaves is badly limiting the scientific ginger cultivation in the homesteads.

An adult coconut palm produces 12-16 leaves each year. A mature leaf is 3-4 meters in length and can have around 200 leaflets.In coastal areas leaves are used for roof thatching. Majority of the dried leaves are used for burning and a minor portion is being used for mulching and composting. Burning of dried leaves generates a large quantity of particulates which are carried by the wind which can reach deep in lung tissue of people around and can cause respiratory diseases.In order to reduce the harmful effect,and to utilize the fallen dried leaves effectively, a field experiment was conducted at Indian Institute

of Spices Research(ICAR-IISR), Kozhikode. The aim was to manage weeds in ginger fields and coconut leaf mulch was compared with plastic and control plot *(Glycosmis pentaphyllamulch).*

The trial was evaluated in farmers plot (Mr. Biju,Chowattukunnel,Cherupuzha, Kannur Dt.) and it was found that, 45 days after planting (DAP) there was significant reduction in mean dry weight of weeds(90 kg/ha) in plots where dried coconut leaves were used as mulch (@8kg/3m2or @ 5400kgha-1) compared to control (114 kg/ha) where under *Glycosmispentaphylla* was applied. Ginger rhizome yield (20.25 t/ha) (Table 1) and B:C ratio (2.04) (Fig.1) were high in dried coconut leaf mulched plot compared to control(14.75 t/ha) and B:C ratio (1.32).

Similar performance was also recorded in another farmer's field trial at Kozhikode (Saji Mathew, MadathilParambil house, Koorachundu).Ginger rhizome yield obtained was high(25.35t/ha) in dried coconut leaf used plot compared to control(11.25 t/ha). The B:C ratio for dried coconut leaf mulch applied treatment was 2.34 whereas, it was 1.0 for control.

The existence of more lasting favourable micro environment and microfloral involvement in releasing more N,K, Ca,Mg and Cu from dried coconut leaves compared to other treatments and lesser weed growth and less disease incidence could have contributed to the higher performance of the crop.

Treatments	Tiller (nos)		Dry weight of weeds (kg/ha)		Yield (t/ha)	
	Kannur	Kozhikode	Kannur	Kozhikode	Kannur	Kozhikode
Glycosmis pentaphylla (control)	7.25	6.750	216	114	14.75	11.25
Paddy straw	6.75	7.650	110	46	16.95	18.45
Coirpith compost	7.25	6.650	106	43	15.25	18.58
Coconut leaf+Mulch	6.00	7.000	108	35	19.75	16.20
Coconut leaves alone	10.25	10.750	90	19	20.25	25.35
CD(0.05)	1.59	1.01	12.1	17	4.11	2.72

Conclusion

It is concluded that application of dried coconut leaves@8kg/3m2or@5400kgha-1 at planting as mulch on ginger beds immediately after planting was beneficial in suppressing weeds and augmenting yield of rainfed ginger significantly besides its low cost, local availability, eco-friendly nature and ecosystem services compared other mulches used in the trial. Both the farmers have accepted the technology and wish to adopt the same in future also for ginger farming.

(Contact number of Mr. Saji 9946139248 and Mr.Biju -8075729537)

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Higher Productivity and Income from Coconut Based Farming Systems - Experiences of Shri. R. Nanda Gopal

A.C. Mathew, Thamban. C. and P. Subramanian
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Shri. R. Nanda Gopal from Pavaikalam, Anamalai near Pollachi in Tamil Nadu is a full time farmer who depends on coconut farming as the sole source of income for his livelihood. A BBM graduate, Sri Nanda Gopal took up farming as his full time occupation nearly 25 years ago. He is now 50 years old. Mrs. Sabitha, wife of Nanda Gopal is supporting him and she is actively involved in all the activities of their farm.

There are 650 coconut palms, mostly West Coast Tall variety, in their 11 acre coconut garden. The average age of coconut palms is 30 years. Besides coconut, 550 nutmeg trees and 2400 arecanut palms are cultivated as mixed crops in the coconut garden. The nutmeg trees are 13 years old but all trees are not currently yielding since Nanda Gopal did top working on the seedlings raised trees to rejuvenate them.

Nanda Gopal is quite aware of the fact that arecanut is not a recommended crop for intercropping in coconut garden. But price fluctuation of coconut in the market prompted him to plant arecanut along with coconut in his garden. Presently he is having 2400 areca palms mixed cropped in the coconut garden out of which only 350 are bearing. Age of arecanut trees ranges from two to seven years. Pepper is also intercropped with coconut in his farm though not in large numbers. They also cultivate many vegetable crops and fruits like papaya, though in small extent, in their farm.

Integrated farming

Nanda Gopal opines that farming in his 11 acre plot is economically viable mainly because of the integration of animal husbandry with coconut cultivation. The mixed farming unit in his farm has six cows, of Sahiwal cross, out of which three are

in milking stage at present. Fodder grass, Co5, intercropped in his coconut garden is the main feed. Cow dung obtained, also helps the farmer to meet partially his organic input requirement.

Nutrient Management

Integrated nutrient management has been effectively adopted to maintain soil fertility and plant nutrient supply at an optimum level for sustaining the desired productivity of all crops in the coconut based cropping system in Nanda Gopal's farm.

The farmer achieved it from sources of organic, inorganic and biological components in an integrated manner. Inorganic fertilizers and biological components are applied along with drip irrigation, and fertigation, where as organic manures are applied near to coconut basin.

Poultry manure, 30kg/coconut palm/year, cow dung, 30kg/coconut palm/year and goat manure20kg/coconut palm/year are the organic inputs applied. Coconut basins are opened during the first week of June and the organic fertilizers are applied near to the basin.

Organic recycling, mainly by mulching and vermiculturing using the organic matter available in the farm, also has been effectively practiced by the farmer to meet the organic input requirement. He has constructed a vermicomposting tank, with a dimension of 9m length,1.2m width and 90cm depth, protected with an overhead roofing utilizing the incentives received under the development scheme implemented by Coconut Development Board.

Chemical fertilizers are applied in six split dozes ie, once in 60 days, through fertigation to coconut, nutmeg and arecanut. Chemical fertilizers applied through fertigation include Factomphos, Muriate of Potash, and Urea. Magnesium sulphate is also applied through fertigation. Total quantity of chemical fertilizers applied once in 60 days through fertigation to 650 coconut palms, 550 nutmeg trees and 2400 arecanut palms is 400 kg Factomphos, 400 kg Muriate of Potash and 200 kg urea. Besides the above, micronutrient mixture is also supplied to the crops through fertigation.

Irrigation and water management

Coconut and the component crops viz., nutmeg and arecanut in Nanda Gopal's farm are irrigated through drip irrigation system. An open well and a tube well are the water sources in the farm. The farmer depends mainly on the open well for irrigating his entire farm. The tube well is mostly used for domestic purpose and as a standby arrangement for irrigation. Since the open well is situated adjacent to a stream the farmer does not face water shortage even in summer season.

Water is drawn from the open well using an electrical centrifugal pump of 7.5 HP. It is then filtered first using a pair of sand filters and screen filters, both connected parallel in the main pipe line. Irrigation system is attached with a fertigation unit also to provide fertilizer along with irrigation water.

The 11ha farm is split in to two halves for convenience of irrigation. The main pipe coming from the pump and filters is connected to two sub

mains with a control valve, ball valve, each at the beginning of the sub mains. The PVC sub mains laid underground then take water to the respective fields. 16mm laterals are connected to the sub mains and drawn to the individual plants for irrigation. Two laterals each are drawn for each row of coconut and other crops. The laterals are drawn at the opposite sides of the coconut basin. Drippers with eight litre per hour discharge rate, are connected to the laterals within the basin of each crop for irrigation. Coconut palms are provided with six dripping points, three each on each lateral at the opposite sides of the basin. In a similar fashion nutmeg is provided with four dripping points and bearing arecanut palms are provided with two dripping points. Young arecanut palms are irrigated using a single dripping point. Crops beyond the reach of the lateral are irrigated using a micro tube connected to a dripper fitted to the lateral at the nearest point.

It is by varying the number of dripping points for each crop the farmer is adjusting the water requirement of the particular crop. He provides irrigation for 1 to 1 ½ hours. Thus, coconut palms get 48 to 72 litres and nutmeg trees get 32 to 48 litres and yielding arecanut palms get 16 to 24 litres of water per day. Though the irrigation water is well filtered before using for irrigation, the drippers occasionally gets clogged and the farmer needs to remove it and clean it.

The farmer applies chemical fertilizers also along with irrigation water. A venturi type fertigation unit is provided in the main line at pump outlet for this purpose. However, the farmer was not satisfied with the operation of the venturi system. According to him flow regulation in the venturi system was not easy and by regulating the flow the outlet pressure also would come down thereby reducing the discharge rate of drippers. To overcome the situation the farmer made an innovative method for providing fertilizer along with irrigation water. The farmer is having a series of 200 litre capacity fibre tanks to prepare chemical fertilizer solution for irrigation and rearing different microbial consortia.

A one inch flexible pipe is drawn from the fertilizer tank and is connected to the inlet of the irrigation pump. When the pump is operated it draws fertilizer solution also along with irrigation water. The same system is being used to apply the microbial consortia also along with irrigation water. Irrigation is continued for some more time after each fertigation to flush out any fertilizer remaining in the pipeline. The sand and screen filters are back washed periodically to provide clean irrigation water thereby minimizing clogging of drippers.

The pump used by the farmer is a centrifugal pump. In order to enhance the efficiency of the centrifugal pump, the pump is always kept near to the water table in the open well. A rope and pulley arrangement is made by which the pump is raised or lowered according to the prevailing water table

Basins of all coconut palms are covered with thick mulch using coconut leaves and other farm waste to ensure high irrigation water use efficiency.

Plant protection

White fly infestation is the main concern of the farmer for the last two years. Coconut yield reduction in the current year is mainly because of white fly infestation, according to the farmer. However, he has not taken up any remedial measures so far. Besides, few coconut palms in the garden shows root (wilt) disease symptoms.

The symptoms started seven years back and is spreading slowly, according to him. 'COCOCON', a microbial consortium developed by Tamil Nadu Agricultural University is applied, through the fertigation unit twice a month against root (wilt)

disease symptoms. Health of few trees have started improving after the application of the microbial consortium, the farmer stated. According to the farmer it also improves the soil fertility and thereby improving the plant health. Nanda Gopal also regularly applies Trichoderma to coconut palms as part of plant protection measures.

Harvesting and yield

Coconut is harvested once in 60 days. On an average Nanda Gopal used to get 150 nuts/coconut tree per year. However, the yield has reduced to 125 nuts/tree recently. According to the farmer, the yield reduction is mainly due to white fly infestation. According to him, the cost of production of one coconut is Rs.12/nut. Though the farmer is having 550 nutmeg plants, all the trees have not started bearing with full potential since the nutmeg trees were top worked for rejuvenation 3-4 years back. He gets 560kg nuts and 170kg mace from his nutmeg trees. Majority of arecanut palms are still in juvenile stage and not started yielding. From the small quantity of arecanut he gets approximately Rs 200per kg unhusked nuts.

Sri Nanda Gopal opined that the major constraint in coconut farming is the low market price for coconuts. According to him, he is able to overcome the difficulties due to the price crash/price fluctuation of coconut because he is adopting coconut based multiple cropping and integrated farming system in his farm. He is very much involved in the activities of 'KalpakaVriksham Coconut Producers Company', Anamalai.He maintains close contact with the local extension personnel of the Department of Agriculture and also co-operates with the scientists of TNAU in implementing the field trials on use of microbial consortium for the management of root (wilt) disease of coconut.According to Sri Nanda Gopal, co-ordinated efforts involving research institutions like ICAR-CPCRI, TNAU,development agencies like CDB, State Department of Agriculture and FPOs in coconut sector are needed to effectively manage problems experienced by coconut growers including the recent incidence of root (wilt) disease and white fly infestation in coconut gardens. ■

Cafeteria of intercrops in Coconut gardens

Women farmers' community based success story

Anithakumari.P, Jithin Shaju, Anju Krishnan and Kalpanamol.K
ICAR CPCRI, Regional Station, Krishnapuram P.O., Kayamkulam

Coconut gardens are ecological units of integrated systems providing environmental and livelihood opportunities. Most of the coconut gardens in general are small and marginal holdings, following homestead patterns customized to the farm family, food preferences, major income sources and resource base of the farmer. Research and extension interventions warrant refinement and adaptations for effective delivery of results in achieving desired impact.

ICAR CPCRI Farmer FIRST Program (FFP) started in 2016 is being implemented at Pathiyoor panchayat, Alappuzha district, Kerala state. The major objectives were interventions for participatory technology integration to empower and ensure livelihood security of farmers/farm women. The major problems identified in the location were:

- Poor or average management of coconut and other crops in homesteads
- Non awareness and non adoption of HYV of inter crops in coconut homesteads
- Lack of access to advisory services and extension support
- Absence of processing and value addition of farm produces
- Poor extension advisory support and field services
- Very low level of knowledge and skills on technologies
- Absence of farmer organizations or groups active in the panchayat

ICAR CPCRI Farmer FIRST Program (FFP)

Farmer FIRST Program is a national flagship program of Indian Council of Agricultural Research (ICAR) in various states. Farmer FIRST (farm/farmer, Innovation, Resources, Science and Technology) program deals with participatory research and extension interventions in six modules. Technologies are generally recommended for crop based adoption by the farmers. But in the process of adoption umpteen factors are directly and indirectly related

along with extraneous variables as indicated in several reports and studies. This warrants for appropriate refinements and adaptations of the technology *per se* with research based support and process documentation models from social science researchers and field functionaries. These will be influenced by the farmers' choices of crops, resources and inputs, attitudes, social compulsions and consequences, field experiences, situational attributes and cultural factors. The scope for integration of innovations with recommended technologies improves the ownership and acceptance among farming community. The modules are Crop, Horticulture, Livestock, Natural Resource Management (NRM), Entrepreneurship development and Value addition and Integrated Farming Systems (IFS). The modules can be selected as per the location specific objectives. The FFP is fully funded by ICAR and ICAR CPCRI initiated interventions in Pathiyoor panchayat since 2016 onwards and is continuing.

Coconut homesteads and cropping system- Overview before FFP interventions

The Farmer FIRST Program (FFP) pre project survey in Pathiyoor grama panchayat, indicated that majority of the land holdings were 25-100 cents (0.1 –0.4 ha category). The study involved 740 sample farmers. Farmers having landholding size of 10 cents and below were 16.1% , 11 – 25 cents (29 %), 26 – 50 cents (24.8%), 51- 100 cent (20.6%), above 1 acre (8.7 %). This scenario indicated the appropriateness of group or cluster farming in overcoming the probable low level market surplus in production. The results also showed that rain fed cultivation rules the farming situation with very low adoption of irrigation methods. Location specific farm planning and situation specific, decentralized policy making may have to look into and evolve strategies for community and area based water conservation and irrigation methodologies. One of the notable points of homestead gardens was the adoption of small vegetable gardens. It is encouraging to note that 71 percentage of the sample farmers adopted vegetable gardens for their own home consumption, which guaranteed fresh and organic vegetables to the family. Almost 11 per cent of the farmers were reported to produce, marketable surplus besides home consumption. Only 18 per cent of farmers are not adopting homestead vegetable gardens, as per the sample survey. The data showed the need for extension advisory services to adopt scientific interventions for better output from unit area. The inter cropping in coconut gardens are constrained with climate change problems of untimely and heavy rains, flooding and long spells of summer season. The major pest and disease problems were rhizome rot of ginger, fungal diseases in turmeric and colocasia, severe nematode problems in amorphophallus, stem borer in ginger and turmeric, aphids in pulses, rat and crab attacks in vegetables of low lying areas, white rust and leaf spot in amaranthus, fruit fly in cucurbitaceous vegetables etc. Other general problems were labour shortage and high cost of laborers, lack of social mechanisms for equitable distribution and information on government projects and support system, reduced soil-fertility, low profitability in farming and acute water scarcity during summer seasons. The major intercrops in Pathiyoor panchayat were tubers, vegetables, turmeric/ginger, and banana in very small plots for home consumption mainly.

Field visits and survey in Bharanikkavu grama panchayat, Alappuzha district also indicated similar status regarding intercrops in coconut gardens. The major inter crops were tubers, spices, banana and vegetables in small scale mostly for home purpose with modest market surplus in some gardens. The selection criteria for inter crops were mainly family preferences, food consumption behaviour of family members and interest in involvement and economic conditions. Approximately one fourth of the farmers only adopt inter cropping in their coconut gardens. This requires serious interventions, since diet diversity, ecological factors and food production are major concerns. Coconut based homesteads are classic models in achieving goals of eliminating hunger and hidden hunger, as well. Generally the coconut based homesteads of root (wilt) disease affected areas are varied widely in terms of age of palms, resource base, management adoption and requirements.

Extension strategies in FFP for improving inter crops in coconut gardens

Extension support needs social process documentation and evolving workable models through action research for crossing the chasm in technology adoption and improving the use and impact of research in farmers' fields. The participatory strategies evolved through field level action research involving peoples' representatives, progressive and small/marginal farmers, women farmers groups and other stakeholders. The points of successful action in the FFP were as follows:

1. Convergence with MGNREGS in the panchayat as an innovation in technology dissemination and area wide adoption.

MGNREGS can be effectively integrated with local resource based agricultural plan and implementation as demonstrated successfully in the Farmer FIRST Program since 2016 onwards. The land consolidation process was necessitated as a responsible extension intervention for promoting women MGNREGS participants, of whom 88.44 percent had less than 0.08 hectares of land. Through the land consolidation approach, 354 acres of fallow land were brought under cultivation each year, during 2017-20 under various crops. The fallow land as inter-spaces in coconut gardens were consolidated contiguously in discussion and consent of coconut farmers and convergence farming plans were submitted to Rural Development Department through Grama panchayat MGNREGS section. The planting/ seed materials of HYV procured linking with various Agricultural Universities and provided by ICAR CPCRI FFP free of cost initially. The varieties were screened for suitability in the area and acceptance among farmers through participatory evaluation process.

4. Area spread of HYV through convergence interventions

The area spread and adoption of HYV of intercrops were achieved through the joint identification of contiguous area of minimum one acre for each crop in ward basis. The joint effort of peoples representatives, women SHG farmers, other farmers and stakeholders was through discussion with land owners, obtained their mutual consent and identified contiguous areas for crops and technologies like High Yielding Varieties (HYV) of inter crops. The cultural management of the perennial base crop, coconut in the consolidated lands, was also included under the interventions by women labourers voluntarily. A crop calendar was prepared after personal field visits by a team of experts from ICAR-CPCRI, Regional Station, Kayamkulam, in consultation with farmers. Hence an action plan for the area to be cultivated, HYV varieties to be introduced from institutes/ Universities, human and other resources needed for technology adoption, and interventions for rapid area spread, were documented for MGNREGS and FFP convergence. The action plans were vetted with the concerned administrative units.

The farming community demanded that participatory micro planning of agricultural schemes or interventions be developed based on the diverse local problems or situations. We have learned that the 19 wards of Pathiyoor panchayat had different problems – land-based issues (flood prone, soil nutrient status, and fragmented land holding size), and other concerns such as crop suitability, integration choices under the integrated farming system (IFS), very low income from farming, lack of a value chain, socio economic variables – and low involvement/ leadership of local people's representatives. Agricultural extension interventions in FFP, can lead

to holistic and broader empowerment of the lower most farmers or labourers through participatory micro planning of activities in the panchayat. This called for sequential extension interventions based on emerging needs, facilitating specific problems, equitable and transparent transactions/critical input provision, addressing failures and sustaining successful models, in a proactive and farmer-driven mode.

5. Breaking barriers of potential yield attainment in niche crops

The farmers were not aware of or aspiring for obtaining potential yield of intercrops or any crop they cultivate. The farm planning must include the potential yield to be realized as per the soil type and fertility status, knowledge and adoption potential of individual and group of farmers, resilient approaches, extension advisory services, competence and field orientation of extension field functionaries and the decentralized vision of grama panchayats in food production and conservation and management of natural/human resources efficiently sustainable. The potential yield of varieties of crops in coconut based inter-cropping system varies with locations and deviates from research results as observed in FFP cases. Hence demonstrations among small and marginal coconut farmers needs to be farmers participatory in a contiguous area, mutually observed and evaluated by experts and farmers. The breaking barriers in achieving potential yield can thus be demonstrated and learning occurs across farmers. This approach critically enables them in adopting technology combinations to economically integrate and profitably sustain.

6. Procurement mechanisms for surplus production

The production of intercrops improved due to group cultivation and adoption of HYV under scientific management. The readily edible produces could get neighbourhood markets, since the sources of production are known and consumers prefer farm fresh. Procurement plans and processing mechanisms were in need for turmeric, coconut and sesamum in the first phase. This intervention was enabled through Odanadu Farmer Producer Company (OFPC) with ICAR CPCRI as the Producer Organization promoting Institution (POPI) with NABARD support.

▶ *Problems prioritized for women SHG for adopting inter cropping*

1. Access to land for farming is very low or nil

for landless /women

2. Technology based agricultural activities in MGNREGS was absent

3. Access to knowledge on farming and farming skills were only traditional based.

4. Linkage or communication with scientists / researchers was absent

5. Income enhancement through technology adoption, skill / knowledge empowerment in agriculture got feasible potential

Social approaches in FFP

1. Land consolidation for farming by the women SHGs in MGNREGS for crop / horticulture/ NRM modules of FFP interventions. The fallow inter spaces in coconut gardens of farmers of respective wards were shared free of cost on a mutual social agreement facilitated by ward members (people's representatives) and women SHG leaders.

2. Training programmes, linkage with MGNREGS units of the panchayat, regular and frequent visits, whatsapp group for problem solving, method demonstration of each farming unit, support with HYV crop varieties / critical inputs.

3. Women SHGs were made partners in participatory evaluation/ experimentation of various modules.

The impact of the convergence process is not only reflected in the area spread of HYV but also in income enhancement and creation of technical assets.

- A total of 354 acres of farm land were consolidated for FFP intervention in convergence with MGNREGS across 19 wards of Pathiyoor panchayat. The panchayat was declared as 'fallow free' by the Haritha Keralam initiative of Kerala State indicating success of the interventions.
- Technical impact of women MGNREGS beneficiaries from FFP convergence were mainly in the form of access and participation in agricultural training programmes.
- In spite of the efforts, all the women participants could not attend the training sessions. This gap was filled by key farmer experts and mutual exchange of information within and among the women groups. It was observed that overall 64.33 percent of participants gained practical knowledge and skill in farming. Almost 70 per cent of the women farmers could attend training programs in off campus mode in their fields. The maximum number of training programs they could attend was 21 by 1.38 percent and 44.44 per cent attended more than 5 trainings in a year.
- Technologies identified for imparting training are on: cultivation of high yielding varieties (various crops), appropriate spacing, bed preparation, application of chemical fertilizers, cultural operations, plant protection measures, harvesting and post-harvest, and value addition, use of ICT, climate resilient practices, skills in small machinery use and marketing;
- The training programs were scheduled as on-farm sessions, at the respective work sites, apart from off-farm sessions for group leaders for developing them as key farmer experts. This change in training mode enabled modifying the curriculum as per emerging needs at the field level.
- Almost 97 percent of the beneficiary women farmers adopted more than three technologies, viz., high yielding varieties, spacing, chemical fertilizers and organic inputs for plant protection.
- The productivity or yield improvement as perceived by women farmers indicated that, even though 5.56 percent perceived lower yield, majority (94.44%) could get 30-50 percent more yield due to adoption of good agricultural practices and high yielding varieties after the interventions.
- Indirect impact was on improved diet diversity among the families of the beneficiaries as a result of growing diverse crops, including millets and vegetables, and sharing of excess production equally by all the group members. This also improved the willingness and involvement of family members in farming activities of the groups.
- The most visible impact was the value addition units for coconut, turmeric and finger millet in the panchayat so as to utilize surplus production. Five rural youths established small enterprises for processing and marketing of turmeric powder, sesamum oil and coconut oil under the 'Pathiyoor Farmers' brand.

Ensuring additional investment in agricultural interventions

ICAR-CPCRI FFP faced constraints in getting adequate quantity of HYV to be introduced. The suitability of the varieties or crops in the location was also a question begging answers. Participatory evaluation of HYV/crops introduced were planned and executed with participation of 25 percent of selected women MGNREGS groups. The supervision and monitoring of this important step was entrusted

to a sub-committee of women group leaders, people's representative of the location, scientist and retired technical persons from Department of Agriculture, Rural Development, and farm clubs of the locality. The first batch of planting materials/seeds of released HYV were procured directly from the relevant research institutes and provided free of cost to 25 percent of groups as a starter quantity. Sharing of additional investment was agreed upon among group members and between groups besides sharing of quality planting materials. Chemical fertilizers and plant protection chemicals were provided from FFP on a 60:40 ratio, 60 per cent by FFP and 40 percent shared by women's groups. Organic manure (FYM) was collected locally from farm families. Burning of cleared weeds and organic residues were positively converted to recycling, mulching materials and composted, through method demonstrations and trainings, thus reducing the costs of organic inputs

Lessons learned

The Responsible Extension Approach (REA) evolved for quality planting material production facilitation by scientists can achieve area spread of new varieties in the following steps.

- Forming social responsible groups comprising agricultural experts, local people representatives, women SHGs for cultivating, progressive farmers and representatives of general public is necessary for REA interventions.
- Cultivation in identified contiguous area through land consolidation and convergence with MGNREGS can expand the farming area with effective labour
- Technical facilitation by concerned ICAR Institute and FFP team, supervising is mandatory and regular field visits, training programmes before and during the activities.
- The groups initially formed for the further production of planting material also have to agree with the memorandum of understanding (MoU) and the varieties could be spread to all the 19 wards of the panchayat in a responsible and rapid way.
- The responsible extension strategy enabled knowledge and skill on the varieties and the planting materials among women farmers and coconut farmers is inevitable. This can effectively surpass the usual technology demonstration and OFT through social consensus and conviction.
- The percentage increase in yield of the crops compared to the check varieties can be easily achieved when the coordinated works in the field level is systematic and timely. ■

Activities of the three tier FPOs in coconut sector commendable:

Dr.Abhilaksh Likhi IAS Additional Secretary, Agriculture, Government of India

In order to review and to have firsthand knowledge on the activities of the Farmer Producer Organizations (FPOs)in coconut sector, Dr.Abhilaksh Likhi IAS, Additional Secretary, Agriculture, Government of India visited Theeradesa Nalikera Utpadaka Federation, Ezhupunna in Alapuzha District, Kerala and interacted with farmers at the farmers filed. He also interacted with the Friends of Coconut Tree (FoCT) trainees who were trained with the support of Coconut Development Board for ensuring timely harvesting and plant protection operations of the coconut trees. Dr.Abhilaksh Likhi appreciated the functioning of the three tier Farmer Producer Organizations in coconut sector which are innovative good models that can be replicated in other sectors too. Dr.Likhi was appraised that the Federation has organized training programmes for various coconut farmer groups on intercrop cultivation of turmeric and ginger.

Dr. Likhi interacted with the coconut farmers regarding the implementation of schemes and programmes of various central government agencies under the Ministry of Agriculture and Farmers Welfare. The office bearers of the Federation informed that they are planning to scale up the Federation into a Company and requested for the support of the Board and Government of India to form a Producer Company. Dr. LIkhi assured the necessary cooperation to form a Company and to include the same under the new FPO concept of the Government of India.

Theeradesa Nalikera Utpadaka Federation is a consortium of eight Coconut Producer Societies

which is taking up various activities as envisaged in the three tier system. The various schemes of the Coconut Development Board are implemented through the Federation which is having 761 member farmers. 41722 palms under the purview of the Federation. The Federation is taking up activities like the establishment of coconut nursery and the production of quality planting material. The Friends of Coconut Tree (FOCT) training programme of CDB is also being organized by the Federation.

Dr. Likhi later had a review meeting of Centrally Sponsored Schemes of the Ministry of Agriculture & Farmers Welfare at Coconut Development Board, Kochi, Kerala. The officials from Coconut Development Board, Directorate of Cocoa and Cashew Development (DCCD), Directorate of Marketing& Inspection (DMI) Mission Director,

Mission for Integrated Development of Horticulture (MIDH) Kerala, Director, Rashtriya Krishi Vikas Yojana (RKVY), Director (Seeds), ADC, Mechanization and Technology (M&T) and Directorate of Plant Protection, Quarantine & Storage (DPPQS) participated in the meeting.

Agri Vision

Agri Vision 2022, an international conference on Agriculture for Sustainable Future was organized at Ravenshaw University, Cuttack from 6th to 8th March 2022 in collaboration with Evation business solution and other agricultural Institution. Coconut Development Board, State Centre, Pittappilli, Odisha participated in the programme.

Agri Vision-2022 was inaugurated by Dr. Trilochan Mohapatra, Secretary & Director General, ICAR, New Delhi on 6th March 2022 in the presence of other dignitaries Dr. J.K Jena, DDG (Fisheries Science), Dr. P.K. Agrawal, Vice- Chancellor, OUAT, Bhubaneswar and Dr. Sanjay K Nayak, Vice-Chancellor, Ravenshaw University.

Agri Vision-2022 showcased different coconut based value added products. Around 600 visitors including students and farmers visited the stall of Coconut Development Board.

Board's officials interacted and briefed on coconut cultivation technology, value added products and different ongoing schemes of the Board. In addition, various value added coconut products, leaflets, booklets and publication were displayed in the Board's stall.

Farmers and visitors raised queries mostly on the varieties of coconut. Also queries were raised on the varieties of palms suitable for tender nuts and mature nuts which is suitable in Odisha condition.

Panel discussion was held with all the coconut stakeholders and farmers wherein farmers raised various questions on coconut cultivation. Dr. Rajat Kumar Pal, Deputy Director, CDB replied to the queries.

Krishi Vigyan Mela

Coconut Development Board, MDIC, Delhi participated in Krishi Vigyan Mela from 9th to 11th March 2022 held at IARI, mela ground , New Delhi. Various value added products, handicraft items and leaflet on schemes of the Board were displayed in CDB stall.

Handicraft Training programme

Coconut Development Board, Regional Office, Patna, Bihar conducted six days handicraft training programme at Coconut Development Board, Regional Office, Patna Campus from 24th February to 1st March 2022. Shri Manishankar was the master trainer of the programme and 15 trainees attended the programme.

Farmers' training programme on intercropping of cinnamon in coconut garden

A training programme for farmers on Intercropping of cinnamon in coconut garden was organized at Pathiri in Mullankolli grama panchayat, Wayanad, Kerala on 4th March 2022. The programme was conducted by ICAR-Central Plantation Crops Research Institute (CPCRI) Kasaragod in collaboration with Regional Agricultural Research Station (RARS) Ambalavayal, Wayanad as part of the project Cinnamon intercropping in coconut gardens funded by Directorate of Arecanut and Spices Development (DASD), Kozhikode. The training program was inaugurated by Dr. K Ajith Kumar, Associate Director of Research, RARS, Ambalavayal. In his inaugural address Dr Ajithkumar highlighted the importance of promoting spices as intercrop in coconut garden to enhance income and employment opportunities. He also stressed the need to make available quality planting material of cinnamon for successfully raising it as intercrop. As part of agro-techniques, farmers should give adequate attention for adopting soil and water conservation measures in coconut gardens for sustainable production of coconut and intercrops, Dr Ajithkumar added. Mr. Vijayakumar, Secretary, Farmers Group, Pathiri presided over the inaugural session. Dr. C Thamban, Principal Scientist, CPCRI, Kasaragod and Mr. P Bhasi, President, Farmers group, Pathiri offered felicitations. Dr. Sreeram V, Asst. Professor, RARS Ambalavayal welcomed the gathering and Dr. Najeeb Naduthodi, Asst. Professor,

RARS, Ambalavayal proposed vote of thanks in the inaugural session of the training programme. In the technical section, Dr. P. Subramanian, Principal scientist, handled the session on agro-techniques for cinnamon intercropping in coconut garden. A demonstration session on cinnamon peeling was also conducted as part of the programme.

Friends of Coconut Tree Training programme

As part of creating more employment opportunities and equipping the sector with more trained workforce in harvesting and plant protection operations, Coconut Development Board conducted 12 Friends of Coconut Tree (FoCT) training programmes across the country during March 2022. 240 persons were given training through the programmes organised by the various offices of the Board through various organisations. Two batches each of the programme was conducted in Kerala, Tamil Nadu, Karnataka, Maharashtra, Odisha and Assam.

CDB organized Farmers Field Day Training Programmes

DSP Farm, Hichachera, Tripura organized Farmers Field Day Training Programme for SC/ST farmers from Kalachara to acquaint them on scientific coconut cultivation, processing and value addition at DSP Farm, Tripura. Another programme was organized for SC/ST farmers from South Jolaibari on 3rd March 2022 and Sakbari on 4th March 2022. Each participant farmer received two coconut seedlings as part of promotion of coconut in North East.

Coconut Development Board , Regional Office, Guwahati, Assam in association with Udjal Coconut Producers Society, Nalbari District ,Assam conducted a Farmer's Field day programme at Ghorathal, Nalbari District, on 4th March 2022. Thirty farmers belonging to SC category attended the programme. Shri Simanta Das, Farm Manager (Horticulture),KVK, Nalbari, Shri Mirzapur Rahman Agriculture Extension Assistant (AEA), Mukalmua, Nalbari and Shri Rajak Ali, Agricultural extension Assistant(AEA), Ghorathal, Nalbari were the Resource Persons in the programme.

Cultivation practices for coconut - April

Collection and storage of seed nuts

Continue seed nut collection 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

Continue irrigation for the seedlings in the nursery. 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. Spiralling white fly infestation is observed in coconut nurseries in many localities. Spraying of water on the lower surface of leaves of seedlings can be done against spiralling white fly attack.

Fertilizer application

In irrigated coconut gardens, apply one fourth of the recommended dose of chemical fertilizers to the coconut palms, if not applied during March.

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, especially under water scarce situation. The number of dripping points should be six for sandy soils and four for other soil types.

Moisture conservation

Hot dry weather continues in most of the coconut growing tracts and scarcity of water for irrigation is going to be a major problem in coconut farming. Hence, coconut growers need to judiciously use water for irrigation. Drip irrigation has to be adopted to save water. Thick mulch need to be provided in the palm basin within two metre radius. In water scarce

areas, wherever feasible, life saving/protective irrigation has to be provided to coconut palms. Mulched materials are to be removed in the basin before giving such life saving/protective irrigation and immediately after providing irrigation the basin should be covered again with the mulching materials.

Shading

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

Management of pests and diseases

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

Black headed caterpillar, *Opisina arenosella*

The coconut black headed caterpillar, *Opisina arenosella*, is a major pest prevalent in almost all coconut growing tracts across the country especially along the water bodies during winter. The infested portions get dried and form conspicuous grey patches on the upper surface of the lower fronds. Severe pest damage results in complete drying of middle to inner whorl of fronds leaving a burnt appearance. Presence of black headed caterpillars, webbing of leaflets and occurrence of dried faecal matter on the leaflets are the characteristic features of pest incidence. In the absence of natural enemies in the new area of emergence, the outbreak becomes faster and expands at high speed. Damage results in tremendous reduction in photosynthetic area, decline in rate of production of spikes, increased premature nut fall and retarded growth. Extensive feeding of caterpillars causes a crop loss of 45.4%

Pest infested field

Black headed caterpillar

Goniozus nephantidis

in terms of nut yield in addition to rendering the fronds unsuitable for thatching and other purposes. Farmers need not panic and this approach is one of the classical examples of successful augmentative biological control suppressed by natural enemies.

▶ Management

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

Rugose Spiralling Whitefly *(Aleurodicus rugioperculatus)*

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

▶ Management

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

Rugose spiralling whitefly Parasitized pupae

Encarsia guadeloupae

Sooty mould scavenger beetle

- Ensure good nutrition and adequate watering to improve the health of juvenile and adult palms
- No insecticide should be used as this causes resurgence of the pest and complete kill of the natural aphelinid parasitoid, *Encarsia guadeloupae.* A pesticide holiday approach is advocated for the build up of the parasitoid.
- Installation of yellow sticky traps and conservatory biological control using *E. guadeloupae* could reduce the pest incidence by 70% and enhance parasitism by 80%.
- Habitat preservation of the sooty mould scavenger beetle, *Leiochrinus nilgirianus* could eat away all the sooty moulds deposited on palm leaflets and cleanse them reviving the photosynthetic efficiency of palms.
- A close scrutiny should be made for the presence of other whiteflies including the nesting whiteflies on coconut system.

Nesting whiteflies (Paraleyrodes bondari and Paraleyrodes minei)

In addition to the rugose spiralling whitefly, two more nesting whiteflies (*Paraleyrodes bondari and Paraleyrodes minei*) are found associated with palm leaflets. Nesting whiteflies are smaller in size (1.1 mm) than rugose spiralling whitefly (2.5 mm). The nymphs are flatter with fibreglass like strands emerging form dorsum whereas the nymphs of rugose spiralling whitefly are convex in shape. Adult

P. bondari

P minei

Cybocephalus sp.

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.

▶ *Management*

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

Disease

Leaf blight of coconut *(Lasiodiplodia theobromae)*

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

▶ *Management*

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

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

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

Market Review – February 2022

Domestic Price

Coconut Oil

During the month of February 2022 the price of coconut oil opened at Rs. 15700 per quintal at Kochi, Alappuzha and Kozhikode market. The price closed with a net loss of Rs. 300 per quintal at Kochi and Alappuzha market and a net gain of Rs.100 per quintal at Kozhikode market.

The price of coconut oil closed at Rs. 15400 per quintal at Kochi and Alappuzha market and Rs. 15800 per quintal at Kozhikode market.

During the month, the price of coconut oil at Kangayam market opened at Rs. 13200 per quintal and closed at Rs. 13533 per quintal with a net gain of Rs. 333 per quintal.

Weekly price of coconut oil at major markets Rs/Quintal)				
	Kochi	Alappuzha	Kozhikode	Kangayam
01.02.2022	15700	15700	15700	13200
05.02.2022	15700	15700	15700	12867
12.02.2022	15700	15700	15800	12800
19.02.2022	15600	15700	15800	12933
26.02.2022	15400	15400	15800	13067
28.02.2022	15400	15400	15800	13533

Milling copra

During the month, the price of milling copra opened at Rs.9300 per quintal at Kochi and Rs.9250 per quintal at Alappuzha market and Rs. 9600 per quintal at Kozhikode market.

The prices of milling copra closed at Rs. 9200 per quintal at Kochi market, Rs. 9100 per quintal at Alappuzha market and Rs. 9350 per quintal at Kozhikode market with a net loss of Rs.100 at Kochi, Rs. 150 per quintal at Alappuzha market and Rs. 250 per quintal at Kozhikode market.

During the month the price of milling copra at Kangayam market opened at Rs.9000 and closed at Rs.8900 per quintal with a net loss of Rs.100 per quintal.

Weekly price of Milling Copra at major markets (Rs/Quintal)				
	Kochi	Alappuzha (Rasi Copra)	Kozhikode	Kangayam
01.02.2022	9300	9250	9600	9000
05.02.2022	9300	9250	9500	8800
12.02.2022	9300	9250	9500	8600
19.02.2022	9200	9250	9400	8700
26.02.2022	9200	9100	9350	8600
28.02.2022	9200	9100	9350	8900

Edible copra

During the month the price of Rajpur copra at Kozhikode market opened at Rs. 16700 per quintal and closed at Rs. 16800 per quintal with a net gain of Rs. 100 per quintal.

Weekly price of edible copra at Kozhikode market (Rs/Quintal)	
01.02.2022	16700
05.02.2022	16800
12.02.2022	17100
19.02.2022	16650
26.02.2022	16700
28.02.2022	16800

Ball copra

The price of ball copra at Tiptur market opened at Rs. 17200 per quintal and the price was not reported from 19.02.2022 to 28.02.2022.

Weekly price of Ball copra at major markets in Karnataka (Rs/Quintal) (Sorce: Krishimarata vahini)	
01.02.2022	17200
05.02.2022	17200
12.02.2022	17300
19.02.2022	NR
26.02.2022	NR
28.02.2022	NR

*NR-Not reported

Dry coconut

At Kozhikode market, the price of dry coconut opened at Rs.14900 per quintal and closed at Rs.13000 per quintal with a net loss of Rs.1900 per quintal.

Weekly price of Dry Coconut at Kozhikode market (Rs/Quintal)	
01.02.2022	14900
05.02.2022	14900
12.02.2022	14900
19.02.2022	14900
26.02.2022	13000
28.02.2022	13000

Coconut

At Nedumangad market in Kerala, the price of coconut opened and closed at the same price during the month.

At Pollachi market in Tamilnadu, the price of coconut opened Rs. 27000 per tonne and closed at Rs.26500 per tonne during the month with a net loss of Rs. 500 per tonne.

At Bangalore market in Karnataka, the price of coconut opened at Rs. 20000 and closed at Rs. 17500 per thousand nuts during the month with a net loss of Rs. 2500 per thousand nuts.

At Mangalore market in Karnataka, the price of coconut opened and closed at the same price during the month.

Weekly price of coconut at major markets				
	Nedumangad (Rs./1000 coconuts)#	Pollachi (Rs./MT) ##	Bangalore Grade-1 coconut,(Rs./ 1000 coconuts) ##	Mangalore Black coconut (1 ton) ##
01.02.2022	16000	27000	20000	32000
05.02.2022	16000	26500	20000	32000
12.02.2022	16000	26000	17500	30000
19.02.2022	16000	26500	17500	30000
26.02.2022	16000	26500	17500	32000
28.02.2022	16000	26500	17500	32000

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*
05.02.2022	236	222	296	351
12.02.2022	237	209	NR	344
19.02.2022	236	225	NR	351
26.02.2022	NR	270	NR	351
				*Pollachi market

Coconut Oil

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

Weekly price of coconut oil in major coconut oil producing countries					
	International Price(US$/MT)	Domestic Price(US$/MT)			
	Philippines/ Indonesia (CIF Europe)	Philippines	Indonesia	Sri lanka	India*
05.02.2022	2166	NR	NR	3111	1704
12.02.2022	2228	NR	NR	NR	1696
19.02.2022	2077	NR	NR	NR	1713
26.02.2022	NR	NR	NR	NR	1731
					*Kangayam

Copra

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

Weekly International price of copra in major copra producing countries				
Date	Domestic Price (US$/MT)			
	Philippines	Indonesia	Srilanka	India* * Kangayam
05.02.2022	1142	1031	1618	1166
12.02.2022	1127	1075	NR	1139
19.02.2022	1134	1081	NR	1153
26.02.2022	NR	1091	NR	1139
				* Kangayam

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

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March 2022
Vol. LXIV No.9
Price: Rs.6

Registered No.KL/EKM/721/2021-23
Licence No. KL/CR/EKM/WPP-18/2021-23
Licensed to Post Without Prepayment
RNI No. 3032/1957

INDIAN COCONUT JOURNAL
Date of Publication - 24/03/2022

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Printed and Published by Mini Mathew on behalf of Coconut Development Board, Printed at M/s KBPS, Kakkanad, Kochi-30 and Published at Coconut Development Board, Govt. of India,
Ministry of Agriculture and Farmer's Welfare, Kera Bhavan, Kochi-11, Editor: Deepthi Nair S