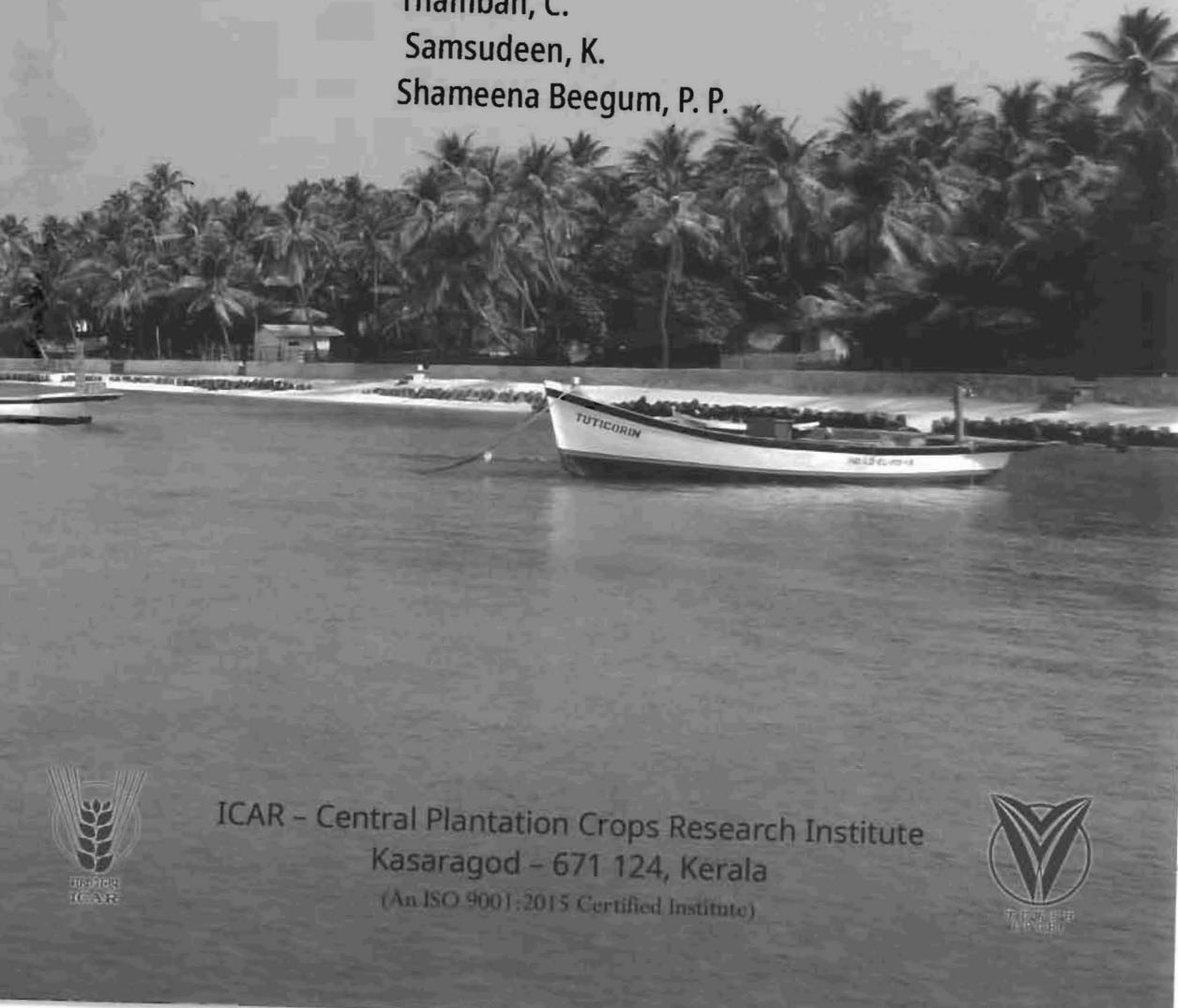


Coconut farming in Lakshadweep Islands - Strategies for enhancing sustainability

Thamban, C.
Samsudeen, K.
Shameena Beegum, P. P.



ICAR – Central Plantation Crops Research Institute
Kasaragod – 671 124, Kerala
(An ISO 9001:2015 Certified Institute)



COCONUT FARMING IN LAKSHADWEEP ISLANDS - *Strategies for enhancing sustainability*

Thamban, C.
Samsudeen, K.
Shameena Beegum, P. P.



ICAR – Central Plantation Crops Research Institute
Kasaragod – 671 124, Kerala



Citation:

Thamban, C., Samsudeen, K. and Shameena Beegum, P. P. (2020). Coconut Farming in Lakshadweep Islands - Strategies for Enhancing Sustainability. Technical Bulletin No. 149. ICAR- Central Plantation Crops Research Institute, Kasaragod. p 28.

Published by:

Dr. Anitha Karun

Director

ICAR-Central Plantation Crops Research Institute

KASARAGOD - 671 124, KERALA, INDIA

Phone : 04994 - 232893, 232894, 232895 & 232996

Fax : 04994-232322

Email : cpcri@icar.gov.in, director.cpcri@icar.gov.in,
directorcpcri@gmail.com

Website : <http://www.cpcri.gov.in/>

June 2020

Printed at:

NAVARANG The Print Shoppe, Chakkar Bazar, Kasaragod



Foreword

Coconut and Lakshadweep Islands are in co-existence for centuries. Coconut evolved in coastal ecosystem and Lakshadweep Islands are one of the original home. Treasure of variability in coconut available here are enormous and helped breeders to develop new varieties. Though natural home, coconut farming in Lakshadweep islands faces many constraints in its cultivation and processing for value addition. Socio-economic fabric in the Lakshadweep Islands is mainly supported by coconut. Improvement in the farm sector of islands should primarily focus on coconut based income generating activities. It is essential to know the realities on the ground, to formulate strategies to improve income from farming and farm based industries.

A team of scientists from ICAR-CPCRI visited different islands during 14-25 January 2019 for survey and selection of young farmers/entrepreneurs from Lakshadweep islands for Horticulture Entrepreneurship Development Programme sponsored by National Horticulture Board. The team explored various aspects of coconut cultivation, coconut based value addition, supply chain, support from various agencies and infrastructure in the Islands through stakeholder interaction sessions and field visits to formulate strategies for improvement.

This publication, describes coconut farming scenario in the Lakshadweep islands and suggests strategies for conservation and sustainable utilization of coconut genetic resources, production of quality planting material, agro-techniques for sustainable coconut production and coconut based multiple cropping and integrated farming, production and marketing of value added products besides capacity building programmes for youth, farmers and extension personnel. Role of farmer producer organizations (FPOs) and coordination between various agencies in improving the situation for sustainable coconut based industry are also flagged by the authors. I congratulate the authors for compiling the information and hope that this publication would be useful to planners and policy makers for formulating and implementing meaningful interventions for sustainable coconut farming in Lakshadweep islands.

Kasaragod
6th June 2020

Dr. Anitha Karun
(Director)



CONTENTS

Sl. No	Content	Page No.
1.	Background	1
2.	Coconut farming in Lakshadweep islands	1-12
	i. Maintenance of optimum palm density	2
	ii. Conservation and utilization of coconut genetic resources and production of quality planting material	4
	iii. Organic farming and soil health management	5
	iv. Coconut based multiple cropping and integrated farming	7
	v. Enhancing food and nutritional security through cultivation of vegetable and fruit crops	8
	vi. Management of pest and diseases	10
	vii. Capacity building initiatives to benefit youth	11
	viii. Capacity building programmes to benefit farmers and extension personnel	12
3.	Value Addition and Marketing	12-24
	i. Coconut consumption pattern	13
	ii. Marketing of coconut	14
	iii. Production and marketing of copra	14
	iv. Coconut oil	16
	v. Virgin Coconut Oil (VCO)	17
	vi. Neera	19
	vii. Desiccated Coconut Powder	20
	viii. Coir and coir products	21
	ix. Scope for production and marketing of value added coconut products	22
	x. Credit support	23
	xi. Transportation	23
	xii. Farmer Producer Organizations (FPOs)	23
	xiii. Co-ordination	24
4.	Conclusion	24





1. Background

Lakshadweep, India's smallest Union Territory located in Arabian sea, comprises of 36 tiny coral islands with 32 sq km in area and a population of 64429 (2011 census) in the ten inhabited islands. Farming activities in Lakshadweep islands are essentially coconut centred and efforts to improve farm sector in the islands need to primarily focus on coconut based income generating activities. Cultivation of vegetables and fruits is very meagre and the islanders mostly depend on the supply from mainland to meet their requirement for fruits and vegetable. A team of scientists from ICAR-CPCRI visited different islands during 14-25 January, 2019 as part of the expert team constituted by National Horticulture Board for survey and selection of young farmers/entrepreneurs from Lakshadweep islands for Horticultural Entrepreneurship Development Programme. The team conducted stakeholder interaction sessions and field visits to assess the coconut farming scenario in the islands and suggested strategies for sustainable coconut farming as presented below.



2. Coconut farming in Lakshadweep islands

Besides fishing, coconut cultivation and production & marketing of copra is the major livelihood option of people of Lakshadweep islands.

Table 1. Coconut cultivation in Lakshadweep islands (2017-18)

Name of island	Area (in ha)	Total no. of palms	Productivity (nuts per ha)	Production (no. of nuts)
Kavaratti	392.4	164808	35587	13964339
Agatti	338.12	142010	35880	12131746
Amini	243.5	102270	35630	8675905
Kadamath	306.10	128562	33650	10300265
Kiltan	149.6	62832	33880	5068448
Chetlath	100.1	42042	33760	3379376
Bitra	7.7	3234	6670	51359



Androth	452.75	190155	36650	16593288
Kalpeni	258.5	108570	34550	8931175
Minicoy	426.1	146962	19980	8513478
Total	2674.87	1091445	30623.7	87609378

(Source: Department of Agriculture, UT of Lakshadweep)

Coconut palms are in abundance in all the Lakshadweep islands. However, it is not cultivated in a systematic and scientific manner. Though productivity of coconut in Lakshadweep islands is higher compared to the national average, various constraints adversely affect coconut production. Major constraints include fragmented holdings, overcrowding of palms due to lack of adoption of optimum spacing recommended, senile and unproductive palms, lack of adoption of multiple cropping and integrated farming, lack of availability of skilled palm climbers and high wage rate, crop loss due to rodents, incidence of pests like rhinoceros beetle, eriophyid mite, spiralling white fly, diseases like bud rot, wide spread deficiency of micro nutrients like boron, low level of product diversification, lack of transport facilities, lack of storage and marketing facilities, inadequate extension support etc.

i. Maintenance of optimum palm density

Maintenance of optimum palm density is important to realise higher yield from coconut palm. As has been already mentioned, overcrowding of palms due to lack of adoption of recommended spacing is a major problem in coconut cultivation in all islands. Majority of holdings are small & marginal and farmers try to accommodate as many palms as possible in their tiny holdings. Every farmer demarcates the boundaries of his landed property with closely planted coconut. There is no systematic replanting, and gap filling with new planting is continuously done when coconut trees are damaged/dead due to senility, diseases or natural calamities. And as such coconut gardens in the islands are having densely planted coconut palms of different age groups which adversely affect productivity. Crop loss due to rodent damage is mainly due to the overlapping of leaves in the crown because of the overcrowded coconut palms which facilitate easy movement of rodents from palm to palm without climbing down to ground. Since there is no sufficient inter space available due to overcrowding of palms, systematic inter/mixed cropping in coconut gardens also is very much restricted or rather it is not



there except for planting of vegetables and fruit plants in the small area of vacant land without coconut palms available in the islands. As per the statistics made available by Department of Agriculture for the year 2017-18, average number of coconut palms per ha in Lakshadweep is 408 compared to the recommended



palm density of 175 palms per ha recommended for main land. The observations at the Regional Station of CPCRI at Minicoy had revealed that per palm yield is much higher when recommended spacing is adopted compared to overcrowding situation. Department of Agriculture and Coconut Development Board have been implementing interventions in the islands for coconut rejuvenation/ replanting by cutting and removing old and senile coconut palms and replanting by maintaining optimum plant density but the coverage of the initiatives has been insignificant and without much success.



Strategies

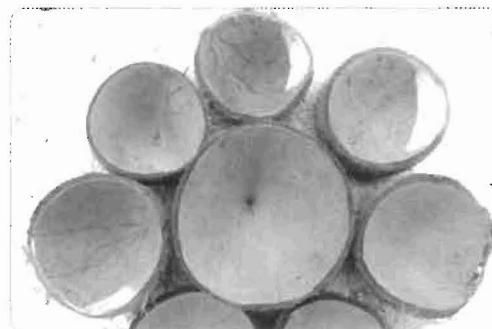
- Considering the island ecosystem and socioeconomic condition, optimum coconut density needs to be worked out experimenting with various spacing of palms that can optimally harvest available sunlight.
- Coconut farmers need to be made aware about the significance of thinning down the palm density to maintain optimum palm density for higher productivity. Model coconut gardens highlighting the benefits of maintenance of optimum palm density should be developed in all islands.
- Interventions for cutting and removing old and senile coconut palms and



scientific replanting by maintaining optimum plant density should be given emphasis while formulating strategies for enhancing efficiency of coconut sector in the islands and farmers should be provided with adequate incentives for the same.

ii. Conservation and utilisation of coconut genetic resources and production of quality planting material

Lakshadweep islands situated in the tropical region are home to diverse coconut genetic resources. Laccadive Ordinary Tall and Laccadive Micro Tall are the predominant coconut cultivars found in Lakshadweep islands. Laccadive Micro has the highest oil content (72%). In addition to these prominent ones, there are a few other types like Laccadive Orange Dwarf, Laccadive Yellow Dwarf, Laccadive Green Dwarf and Laccadive Mini-micro tall. Selection from Laccadive Ordinary Tall (LCT) has been released by ICAR-CPCRI as Chandrakalpa which is a high yielding tall variety. LCT is also one of the parents in the hybrid Chandralaksha released



by ICAR-CPCRI. Production of planting material in these improved varieties is limited by scarcity of mother palms in the main land. Planting material production can be enhanced by utilizing mother palms in the Lakshadweep islands. Many institutions and entrepreneurs from Kerala are keen to procure coconut seed nuts from Lakshadweep islands and as such the potential for production and distribution of planting material through FPOs can be utilised as a source of





income to the coconut farmers in islands.

Strategies

- Coconut genetic resources endemic to Lakshadweep islands need to be thoroughly explored and documented in the biodiversity register at village panchayat level.
- Mother palms of released varieties of coconut available in the islands should be identified and geo-tagged for production quality planting material.
- Farmer producer organizations need to be formed and facilitated to take up production and distribution of quality planting material in all islands.



iii. Organic farming and soil health management

As per the official policy of UT of Lakshadweep use of chemicals in farming is restricted. Coconut farming in the islands is natural farming without doing any cultivation practices except planting and harvesting. Hence, it can be considered organic mode of crop production by default and no farmer applies any inorganic input in coconut farming. Soil in the islands is calcareous and sandy. As has been already mentioned, farmers are not applying any inputs to coconut palms and problems due to deficiency of nutrients are quite evident on coconut palms and vegetable and fruit crops grown in the islands. Symptoms of boron deficiency are observed widely in coconut palms in all the islands. Vegetable and fruit plants, which are grown in limited scale in the islands, are also affected by nutrient deficiencies. Soil erosion is also observed in the sea shore. Systematic efforts to assess the soil health status of islands for formulating suitable interventions for nutrient management are yet to be made. Lack of availability of quality organic manure is a limiting factor in promoting organic farming practices in the islands. ICAR-CPCRI has



developed a simple technology for production of vermicompost using coconut leaves. Coconut leaves are available in plenty in the islands and this technology can be utilised effectively to make available quality organic manure required for coconut and subsidiary crops. Since the year 2015 agriculture in Lakshadweep islands has been declared as organic and Department of Agriculture has been implementing a comprehensive programme for organic certification of farm holdings since 2007. Organic certification process has been completed in about 500 holdings in each of the islands and efforts are on to cover the remaining holdings under organic certification in the second phase. Organic farmers' societies are facilitated in all the islands by the Department of Agriculture as part of promoting marketing of coconut and by products as organic. Except for conducting few meetings not many activities are being implemented through these societies and even the office bearers of these societies are not quite aware of the activities to be taken up. However, few entrepreneurs in some of the islands, especially in Andrott, have made use of the opportunity to market coconut oil branded as organic in the domestic market of islands and markets in Kerala and even abroad. Though a substantial amount is being spent for organic certification of agricultural holdings in the islands, concrete plan for interventions viz., follow up activities, renewal of organic certification, agricultural products from the islands to be promoted and marketed as organic, ensuring premium price for the organic products, developing 'Lakshadweep brand' of organic products etc are lacking.



Strategies

- 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.
- Interventions to popularise vermicomposting of coconut leaves and raising green manure crops in coconut gardens are to be implemented to enhance the availability of quality organic manure and for improving soil fertility status.
- Farmer Producer Organisations (FPOs) are to be facilitated to take up production and marketing of organic products and incubation support provided to them through appropriate entrepreneurship development programmes.
- Common brand 'Lakshadweep organic' to be developed for exploiting the potential of organic market.

iv. Coconut based multiple cropping and integrated farming

The agronomic feasibility and economic viability of adoption of coconut based farming systems have been amply demonstrated in research stations and farmers' fields. In spite of the obvious benefits of coconut based farming system over the traditional monoculture, the extent of adoption of the same is very low mainly due to the overcrowding of palms due to lack of adoption of recommended spacing. Majority of holdings are small and marginal and farmers try to accommodate as many palms as possible in their tiny holdings and as such the scope for accommodating other crops and enterprises along with the coconut palms is very much limited. Interventions to promote coconut based farming systems as part of enhancing agro-biodiversity in Lakshadweep islands are highly relevant and significant. The potential for inter/mixed cropping of vegetables and fruits in coconut gardens if properly utilized can considerably reduce the dependence of the islands on import of such items from the mainland. However, to popularise the adoption of coconut based farming systems it is necessary that restructuring of the existing coconut gardens to ensure optimum palm density is carried out which is not practically an easy task. Hence, it would be better to link the interventions to promote coconut based farming systems with interventions



for cutting and removing old and senile coconut palms and scientific replanting by maintaining optimum plant density. Coconut replanting in areas affected by natural calamities such as cyclones also need to consider the option for streamlining interventions to promote coconut based multiple cropping and integrated farming.

Strategies

- Preference of farmers in the islands about the component crops and subsidiary enterprises to be integrated with coconut cultivation need to be analysed and performance of such combinations to be assessed in farmers' field.
- Establish demonstration plots on coconut based inter/mixed cropping and integrated farming in all islands.
- Link the interventions to promote coconut based farming systems with interventions for cutting and removing old and senile coconut palms and scientific replanting by maintaining optimum plant density.

v. Enhancing food and nutritional security through cultivation of vegetable and fruit crops

In Lakshadweep islands, vegetable and fruit crops are cultivated in very small area only. Islanders mostly depend on the mainland for meeting their requirement of vegetables and fruits. Of late, many people have started growing these crops in roof top gardens in the terraces of their houses; mostly in grow bags with the support of Department of Agriculture. Vegetable crops like brinjal, bhindi, tomato, amaranthus, chilli, cabbage, cauliflower etc are grown in grow bags in terraces of houses. Vegetable and fruit plants are affected by various pests (aphids, mites, white fly, mealy bug etc.) and diseases (bacterial wilt, mosaic etc.). Due to various reasons such as lack of awareness about crop protection technologies, lack of availability of inputs for plant protection measures, inadequate extension support etc farmers are unable to effectively adopt any pest/disease management measures in vegetables and fruits. Incidence of pests and diseases, nutrient deficiencies, lack of availability of quality seeds and planting material, lack of changing/refilling grow bags with suitable potting mixture etc are some of the problems experienced in cultivation of vegetables and fruit crops in terrace farming. Under the scheme for development of horticulture,





Department of Agriculture is facilitating cultivation of vegetables, fruits and tuber crops in demonstration plots and the produce is sold to the public. Few farmers are cultivating vegetable and fruits in low lying areas of islands known as 'thottam'. Banana is mostly cultivated in such areas.



Strategies

- Facilitate formation of FPOs and provide incubation support to take up enterprises on poly house/ hi-tech farms for production and marketing of vegetables in suitable localities in islands where open space is available.
- Facilitate formation of women SHGs to take up production and marketing of quality seeds and planting material of vegetables, fruit plants and tuber crops in farms under Department of Agriculture. Besides, potting mixture for grow bags also can be prepared and sold by these SHGs for the islanders.
- Implement interventions to support farmers for the cultivation of vegetables, fruit plants and tuber crops in the low lying areas ('thottam') and in the homesteads.
- Schemes to support farmers for effectively utilising potential for marketing of organic vegetables should also be implemented.



vi. Management of pest and diseases

Crop loss due to pest and disease incidence in coconut and subsidiary crops is a major problem experienced by farmers in the islands. It is estimated that rodent attack results in 33-44 % damage to coconut palms in the islands. Reasons like overcrowding of coconut palms, inadequate crown cleaning and delayed harvest of coconuts, heaping husks and fallen fronds in the coconut gardens, absence of predators like owls, snakes etc in the islands, and lack of adoption of proper crop management practices. Many farmers perceived that restriction to use rodenticides for controlling rats as per the organic farming policy has resulted in increased crop loss due to rat menace. Though the Department of Agriculture is implementing some interventions for rat control in the islands, the earlier practice of 'eli nayattu' (hunting rats) campaign conducted in all the islands covering the coconut gardens from one end to the other end of the island in which rats harbouring the crown of coconut palms were driven down to the ground and killed by a team of palm climbers and farmers has also not been conducted since the last few years. Incidence of bud rot and stem bleeding disease has been observed in few coconut gardens in some of the islands. Damage due to rhinoceros beetle and eriophyid mite is noticed in all the islands. Recently, infestation of coconut palms by rugose spiralling white fly is observed in Kavaratti island. Vegetable and fruit plants also are affected by various pests and diseases. Due to various reasons such as lack of awareness about crop protection technologies, lack of availability of inputs for plant protection measures, inadequate extension support etc farmers are unable to effectively adopt any pest/disease management measures in coconut and subsidiary crops.





Strategies

- As has been already mentioned, evolve package of practices recommendations for crop health management in coconut and subsidiary crops taking into account the organic farming policy for the islands.
- Organise capacity building programmes on crop protection technologies for coconut and subsidiary crops to benefit extension personnel, farmers, palm climbers and agricultural labourers
- Implement farmer participatory extension interventions to enhance adoption of crop protection technologies in coconut and subsidiary crops

vii. Capacity building initiatives to benefit youth

Lack of availability of skilled palm climbers is a major problem experienced by farmers of all islands which adversely affect timely harvest and plant protection operations, especially rodent control, in coconut. In some of the islands the frequency of harvesting in coconut has come down to four times per year. Department of Agriculture has been implementing insurance scheme for the benefit of coconut climbers. Currently palm climbing is done by skilled workers belonging to certain sections of island population only. Service of the skilled workers from main land also is utilised by the farmers. Even though the present wage rate is quite attractive for the climbers (as high as 50 rupees per palm)



climbing coconut trees is considered as an inferior job by the upper elite sections of the population. Mechanical device for climbing coconut palms is used by climbers of some islands like Kadmat.

Strategies

- Conduct sensitisation programmes to develop favourable attitude towards



the job of coconut climbing among all sections of island population.

- Organise capacity building programmes in all islands for youth on coconut palm climbing using mechanical device in line with the 'Friends of Coconut Trees' scheme implemented by Coconut Development Board.
- Topics related to crown cleaning, hybridization technique for production of coconut hybrids, control measures for bud rot disease, control of rodents etc should also be included in the capacity development programme for youth besides coconut harvesting.

viii. Capacity building programmes to benefit farmers and extension personnel

As part of the coconut development schemes of Department of Agriculture coconut farmers in the islands can be provided exposure to sustainable coconut production technologies to enhance their knowledge and skill. Apart from the training programmes on the technologies to enhance productivity and income from coconut farming the farmers are to be trained on formation and management of Farmer Producer Organisations (FPOs) to reduce cost of cultivation and to enhance income from coconut farming. Training-cum-exposure visit programmes on coconut production technologies can be organised at ICAR-CPCRI Kasaragod to benefit the coconut growers from Lakshadweep islands. Off campus training programmes for coconut farmers on selected topics also can be conducted in different islands in collaboration with ICAR-CPCRI. Similarly, extension personnel under the Department of Agriculture in Lakshadweep islands also need to be kept abreast with the advances in coconut production technologies through appropriate capacity building programmes. Training programmes on coconut production technologies can be organised at ICAR-CPCRI, Kasaragod for the extension personnel including the officers of the farms under the Department of Agriculture in Lakshadweep islands.

3. Value Addition and Marketing

Though tremendous opportunities exist in the Lakshadweep islands for enhancing income from coconut farming through production and marketing of value added products, there are only very few coconut based processing units functioning in the islands. The opportunity to market value added coconut products from the islands as 'Lakshadweep organic brand' is also yet to be properly utilised. Inadequacy of entrepreneurship among the islanders for exploring the potential



for income generation through coconut based value addition enterprises is quite evident. Few entrepreneurs who have ventured to market organic coconut oil are encountered with many problems especially those related to marketing. Copra, coconut oil, coir and coir products, neera (coconut inflorescence sap) and coconut jaggery are the major traditional coconut based enterprises available in the islands. Enterprises for value addition using advanced processing machineries and infrastructure are yet to be established. Problems due to limited transportation and marketing facilities, lack of difficulty in repair and maintenance of the existing old machinery in the coconut processing units functioning under government agencies, lack of efforts for facilitating farmer collectives to take up value addition enterprises, lack of proper guidance for individual private entrepreneurs in the islands for the production and marketing of coconut value added products, lack of labour and high wage rate etc adversely affect the sector.

i. Coconut consumption pattern

A substantial quantity, roughly one-fourth, of nuts produced in the islands are used for domestic consumption. Coconut is the key ingredient in all the culinary preparations of the islands. There are a number of recipes using fresh matured kernel, half matured kernel and tender kernel. Major share, nearly two-third, of coconuts produced are used for copra preparation. Tendernut consumption is very limited; about less than 5% of total production of nuts. Islanders use tendernut mostly during 'Eid', the festival season. Tendernuts are also harvested for the tourists visiting the islands. Limited quantity, may be about 2%, of nuts are used for making coconut oil for domestic consumption. A small quantity of nuts are sold by farmers to desiccated coconut factories in Kadmat, Amini, Androth, Kalpeni and Agatti islands under Laccadive Development Corporation Limited (LDCL). The consumption pattern of coconuts in Lakshadweep islands clearly indicate the unutilised potential for value addition through product diversification for higher income.

ii. Marketing of coconut

In the olden days marketable surplus of nuts were converted to copra and sold. But of late the trend is changing. Many farmers do not show any interest in copra preparation, instead they directly sell fresh mature nuts to the local traders. This trend is prevalent more in islands like Andrott, Minicoy and Kavaratti which have

more transport facilities for shipping nuts to the markets in the mainland, mainly in Kozhikode. In Andrott island it is observed that 90% of the produce is sold as nuts and only 10% of nuts are made into copra. Lack of interest among the new generation for the traditional activities like copra making, shortage of skilled labour and high wage rate are some of the reasons attributed for the shift towards selling as nuts.



iii. Production and marketing of copra

Traditional method of copra making and marketing is the major economic activity in the farm sector in the islands. Copra is made by sun drying in the traditional way. Everything related to copra making is done manually. Modern copra dryers are used by only few entrepreneurs in islands like Andrott who are in to production and marketing of coconut oil. The season 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, after deshelling nuts are packed in gunny bags after proper drying for sending to markets. Drying time usually taken is seven days. Farmers assess the proper drying of nuts by test 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 meeting the minimum standards specified by the procuring agencies and thus realising less income. During rainy season after May, farmers store the harvested nuts.



There are two predominant marketing channels for copra in the islands:

i. Farmers sell copra to private local trader (who can be the agent of main land trader also) who in turn transport it to mainland and sell to big traders in the mainland. ii. Farmers sell copra to co-operative society in the island. The volume of copra transaction through these two channels differ from island to island. For example, in Kiltan island about 80% of copra is sold to the society by farmers and only the remaining is traded through the private traders. But in some islands, societies do not procure copra to that extent mainly due to lack of fund allocation in time by Lakshadweep Cooperative marketing Federation.

There is a third marketing channel also in which big farmers or group of farmers who are close relatives or neighbours transport their copra to mainland and sell copra to private traders in the mainland. Only a small quantity of copra is traded through that type of channel. Motor Sailing Vessels (MSV) locally called 'Manchu', transport copra every fortnight from the islands to the mainland markets. During earlier days group of 3-4 farmers used to transport copra in sailing boats (locally called as "uru") to the mainland markets located at Mangalore, Kozhikode and Kochi to directly sell to traders. Using the money obtained by selling copra all household items required for the next season are purchased and brought to the islands.

ii. Co-operative Supply and Marketing Society in the islands functioning under the Department of Co-operation procure copra from farmers during the

season from January to May. The society will issue a slip to the farmer when the copra is procured and a part of the market price will be paid next day at the Kozhikode market rate published in the newspaper (Kozhikode edition) on the date of procurement in the island. The balance amount will be settled only after disposal of copra in the mainland market. While procuring copra the societies ensure good quality of the copra as per the specification; ensuring that copra procured conform to the standards for the maximum limits of tolerance for fungal infected copra (5% by count), wrinkled kernels rubbery copra (5% by count), smoky kernels (5% by count), moisture (5%)and insect infestation (nil). Island farmers often experience difficulties due to the delay in payment for the copra sold and insistence for the quality standards by the co-operative societies. Societies will send the copra to the apex body viz., The Lakshadweep Co-operative Marketing Federation at Beypore, Kozhikode. The federation in turn sell the copra from Kozhikode to NAFED or big private enterprises like MARICO or other big private traders in the mainland; usually within two days. Farmers in the islands will be paid the balance amount by the society in the next day after the copra is sold in the mainland market by the federation. Though societies most of the times offer higher market rate for copra compared to the private traders, delay in payment is a problem experienced by farmers and hence many of the farmers transact with private traders.

iv. Coconut oil

Earlier days people of Lakshadweep prepared coconut oil for their domestic consumption through the indigenous copra milling method using 'chakku'. Currently a few modern small scale copra milling units are functioning in the islands in private sector to meet the demand for coconut oil. Few of them export the oil to mainland and one private entrepreneur from Andrott island has started exporting coconut oil to the Middle East countries.

The commercial enterprises in the private sector are trying to sell coconut oil as 'Lakshadweep organic' making use of the government programme to get organic certification for the farm



holdings in the islands. However, the coconut oil production units experience various constraints which include problems in marketing, lack of sufficient funds for procurement of nuts, lack of labour, high cost of transportation of oil to mainland and difficulty in transportation during the adverse climatic condition of monsoon period etc.

The entrepreneurs also perceived that the support from governmental agencies including the Department of Industries is inadequate for successfully running the enterprises. They further opined that public sector agencies under the UT administration like LDCL, SPORTS (Society for Promotion of Nature Tourism and Sports) etc. can procure coconut oil from them for supply/use and sales through their outlets. Another difficulty experienced by the coconut oil enterprises in the islands is that there is no technical expertise available in the islands in the event of any damage or malfunctioning of equipments and machineries.



v. Virgin Coconut Oil (VCO)

Home scale processing of Virgin Coconut Oil has been a traditional practice in the households of Lakshadweep islands. The traditional method of VCO preparation involves grating the kernel of mature coconuts, extraction of milk from the gratings, keeping the milk thus extracted for cooling overnight, boiling the milk next day for about two and half hours and separating the VCO.

Women folks of the islands are the skilled work force involved in VCO preparation and marketing. VCO thus produced is sold locally is used as hair oil, baby oil, massage oil etc. The pricing for the produced VCO is improper and cheap as

we could visualize from the visits made to two units in Amini (Rs. 380/- and Rs. 260/- per Litre respectively). Village Dweep panchayat supports VCO production through interventions under which coconuts are supplied to women and VCO produced by them is collected back and sold @Rs. 100/- per 100 ml. The women enrolled in this scheme gets about Rs. 360/- as wages per day.

Though VCO is attracting attention worldwide as a value added coconut product having a number of medicinal and nutraceutical properties there are no commercial VCO production units in the islands employing modern methods and machineries except one unit owned by a private entrepreneur, Mr Mohammed Iqbal, in Andrott island. He is manufacturing VCO through Direct Micro Expelling



(DME) technology in his enterprise 'Dweep Fibres and Traders'. Mr. Iqbal is not aware much about the advanced and efficient methods for production of VCO. His unit processes about 350 kg coconuts a day and produces about 35 kg VCO which is sold in the mainland, mainly in Kozhikode market. He is selling the product in retail at Rs. 350/- per litre. Major problem experienced by him in successfully managing the VCO production unit is related to transportation and marketing. The mature coconut water, the by product obtained during the processing is presently has no use and is disposed as such. The technology for vinegar, mature coconut based unfermented beverages such as squashes, Ready- To-Serve etc. can be included in his unit to get more income and to solve the problem of waste disposal.

Conventional hot processing of VCO is practiced in many units. The by-products such as mature coconut water, coconut milk residue, VCO cake are presently under utilized. Coconut water based value added products, coconut milk residue based snacks, bakery and confectionary products, VCO cake based confectionary products. There is potential for commercial production and marketing of VCO as a value added coconut product under the 'Lakshadweep organic brand' which is

not presently utilised/ explored. Interventions are required for facilitating FPOs and women SHGs for tapping the potential for production and marketing VCO.

vi. Neera

'Neera' (coconut inflorescence sap) tapping and utilization of the sap for consumption and preparation of spread/jaggery/sugar and vinegar is a traditional practice in all the Lakshadweep islands. The conventional method of neera (locally known as 'meera') tapping involves cutting the unopened spadix for about 15 cm from the tip of spathe. After a week, the entire spathe will be removed. The inflorescence sap oozing out is collected twice in a day in plastic can/bottle kept close to the cut end of the spadix. Tapping is done for about 45 days.



Department of Agriculture has been implementing a major scheme for promoting neera tapping and jaggery preparation in the islands. As part of the scheme, Department of Agriculture lease in coconut palms from farmers for neera tapping and pay them lease amount @ Rs 1000/palm/year. Experienced and skilled casual labourers are engaged as neera tappers through the village Dweep Panchayat and the department pays them wages. During 2018-19, 25 neera tappers are engaged in tapping in Andrott island who tap coconut palms in 21 selected coconut gardens of farmers. Neera thus collected is sold to the public in the form of neera, vinegar and jaggery. About 80% of vinegar and jaggery requirements of the Andrott island is met under this scheme. In Andrott island, a voluntary organisation of youth (Socio Economic Arts and Sports Empowerment Society, SEASES) is also involved in procuring neera from tappers and produce and market coconut jaggery among the islanders. The club purchase on an average 50 litres of neera from tappers @ Rs. 70/- per litre, out of which



they produce about 7 kg of coconut spread/jaggery which is sold @ Rs. 550/- per kg. They also sell neera @ Rs. 80/- per litre. There is scope for improving the neera tapping method and methods of preparation of vinegar and jaggery. The technology of neera collection and sugar production was demonstrated by CPCRI in the islands and 3-5 tappers were trained for collection of neera using "Coco-sap chiller".



vii. Desiccated Coconut Powder

Desiccated Coconut Powder (DCP) is produced and marketed by LDCL through the coconut processing units located at Kadmat, Amini, Androth, Kalpeni and Agatti islands. A part (35-40%) of DCP produced are sold locally at Rs.250/- per kg. There is good demand for DCP during the tourist season from October to March and buyers are attracted since the DCP made available is made from organically produced coconuts. The unit at Kadmat also has an oil expelling unit for utilising the testa, the co-product of DCP. Presently LDCL, Kochi is the main outlet for marketing DCP. However, outlets available for marketing the product in other localities can also be explored, especially by highlighting the special feature of 'DC processed from organically grown coconuts from the islands'. There is a huge scope for improving the functioning of the coconut processing units under



LDCL. The old buildings and infrastructure need to be renovated and advanced equipments and machineries can be introduced. More attention needs to be paid for maintaining quality standards for the value added coconut products and for introducing improved packaging system such as Form Fill Seal (FFS) machines. In the DCP factory the process chain can be completely mechanized for producing export quality DC powder from Lakshadweep. In addition, a small quality control laboratory needs to be set up along with the existing plant.

viii. Coir and coir products

Five coir fibre factories, five production demonstration centres and seven fibre curling units are functioning in Lakshadweep islands under the Department of Industries, U.T of Lakshadweep. These units produce coir fibre, coir yarn, and curled fibre and coir mats. In the coir fibre factory in Kadmat island about 1200 coconut husks are processed per day for coir fibre using the retting method. The yield of fibre obtained is about 70-75 kg. Coir pith, the by product, is unutilised. Women labourers (10 women workers) are engaged for coir spinning. The conveyer belt is not in working condition. The existing machineries can be replaced with improved alternatives. Setting up of facility with improved machineries will result in drudgery reduction and improving the output. Sales of the mat produced is confined only to the factory outlet. Collaboration with Institutes/agencies like Coir Board should be made useful for marketing these coir based



products. The Coir Production Centre in Andrott island engage 12 workers; 11 women and one male. There are eight spinning machines in the centre, two are damaged and need to be repaired. The centre experience difficulties such as lack of availability sufficient quantity of coir fibre, delay in getting spare parts of machineries. Once the machines are damaged there is huge delay in getting the same repaired. The efficiency of coir fibre and spinning units can be enhanced by improving infrastructure, introducing new machineries and equipments, timely repair of machineries, product diversification etc.

Coconut fibre based jewellery making and handicrafts: During 2009 five women from Andrott island were trained on Coconut fibre based jewellery making and handicrafts at National Coir Training & Design Centre (NCT&DC) functioning under the Central Coir Research Institute of Coir Board, Kalavoor, Alappuzha in Kerala state. On their return after training, these women started making coconut fibre based jewellery items and once they had sent the prepared items to NCT&DC. In 2016, these master trainers started imparting training to selected women from the island. Presently the unit is having 40 trainees in two shifts. The trained women make very attractive jewellery items using coir fibre. Minimum two days are required to finish a product. However, they find it difficult to market the items and there are no schemes by the concerned governmental agencies to support these trained women. Interventions are needed for facilitating the formation of a women SHG on coconut fibre based jewellery making and handicrafts in the islands along with support for arranging exhibition and sales of items, especially in islands which are visited by more number of tourists. Presently the coir jewellery making unit is located adjacent to the fish market which, according to the women workers, is not at all a conducive working environment. There is scope for starting a coir fibre jewellery unit –cum- incubation centre as part of the coir factory for which financial assistance can be made available from Coir Board or CDB.



ix. Scope for production and marketing of value added coconut products

Apart from the value added products discussed above, there is scope for initiating interventions to facilitate establishing enterprises for the production

and marketing of other value added coconut products such as coconut ice cream, coconut chips, etc. FPOs and women SHGs can be formed and facilitated in selected islands for managing such enterprises.

x. Credit support

Individual entrepreneurs involved in coconut based enterprises in the islands perceived that norms related to collateral security for availing credit for making investment to manage their enterprises often are not quite supportive. This has caused difficulty for the entrepreneurs to avail credit and also incentives/subsidy from various governmental agencies. Credit support to the entrepreneurs is to be made more effective by evolving appropriate norms for sanctioning credit by taking into account the prevailing socio-economic situation in the islands.

xi. Transportation

Transportation channels for the products to find markets in main land and other countries are not very conducive for the entrepreneurial development. Exclusive channel for cargo movement for island produces is essential for the successful ventures from islanders.

xii. Farmer Producer Organizations (FPOs)

The average land holding size in the islands is only 0.27 hectare. Hence, it imperative that group approach is facilitated among the small and marginal farmers of the island to enable them to overcome the resource limitations and to effectively make use of technologies for higher productivity and income from coconut farming. As has been already mentioned, individual entrepreneurs involved in production and marketing of coconut based products in the islands are facing challenges, especially problems related to marketing, to effectively manage their enterprises. Department of Agriculture, UT of Lakshadweep has facilitated formation of coconut farmers' societies in the islands in connection with organic certification programme. However, these societies are almost defunct and are not active enough to take up various interventions to strengthen the coconut sector. It is necessary that in all the islands the existing FPOs are revitalised and new farmer collectives facilitated to take up coconut production, processing and marketing initiatives. Self help groups of women also need to be facilitated and support given to take up coconut based microenterprises.



xiii. Co-ordination

Interventions for enhancing efficiency of coconut sector in Lakshadweep islands to be effective, need concerted and coordinated efforts of various stakeholders including research institutions like CPCRI, CIARI, KAU, development agencies such as Department of Agriculture, Department of Industries and Department of Co-operation under UT administration, Lakshadweep Development Corporation Ltd.(LDCL), KVK, Coconut Development Board, Local self Governments (village Dweep Panchayats and Lakshadweep District Panchayat), coconut Farmer Producer Organizations, Women Self Help Groups and private entrepreneurs.

4. Conclusion

Coconut cultivation is the major livelihood of the people of Lakshadweep islands and hence any effort to improve farm sector in the islands need to primarily focus on coconut based income generating activities. Interventions on conservation and utilisation of coconut genetic resources and production of quality planting material, organic farming and soil health management, coconut based multiple cropping and integrated farming, management of pest and diseases, capacity building initiatives to benefit youth, farmers and extension personnel are to be formulated and implemented for the sustainable development of coconut sector in Lakshadweep islands. Technologies available for value addition through product diversification in coconut can be effectively utilised for enhancing income and improve livelihood of people of Lakshadweep islands. Hence, it is highly relevant and significant to formulate and conduct entrepreneurship development programmes on coconut production and processing of coconut and subsidiary crops to benefit farmers and youth from the islands. Taking into cognizance the resource limitations including the fragmented holdings, FPOs and women SHGs are to be facilitated among growers of the islands to make the coconut based interventions effective. Co-ordinated efforts of various agencies are also essential for effectively implementing the interventions for sustainable development of farm sector in Lakshadweep islands. Active involvement of coconut growers and other stakeholders is to be ensured in the planning and implementation

