

Horticulture Development in Lakshadweep Islands - status and strategies

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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. Besides fishing and tourism, coconut cultivation, production and marketing of copra constitute the major livelihood option of people of Lakshadweep 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 the mainland to meet their requirements for vegetable and fruits. A team of scientists from ICAR-CPCRI recently visited different islands as part of the expert

team constituted by National Horticulture Board for survey and selection of young farmers/entrepreneurs from Lakshadweep islands for Horticulture 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. Optimum utilization of resources, appropriate technology intervention and capacity building holds the key for development of horticulture sector in the islands.

Coconut farming in Lakshadweep Islands

Farming activities in Lakshadweep islands are essentially coconut based and hence any effort to enhance income from farming should necessarily focus on coconut cultivation and value addition.



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
Kad-amath	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. As per 2017-18 statistics (table 1) coconut is cultivated in Lakshadweep in an area of 2675 ha. with annual production of 87.6 million nuts. However, it is not cultivated in a systematic and scientific manner. Though productivity of coconut in Lakshadweep islands is high 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, lack of efforts for developing value chain in coconut sector, inadequate extension support etc.

i. Ecological stability and agro-biodiversity of Lakshadweep Islands

Coconut is the principal component of vegetation and the base crop in the Lakshadweep islands and plays a significant role in maintenance of ecological stability and agro-biodiversity. Overcrowding of palms is the feature of coconut cultivation in all the islands. Majority of holdings are small and 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. The problem is compounded by the use of planting material without assuring the quality. Crop loss due to rodent damage is mainly due to the overcrowding of coconut palms which facilitate easy movement of rodents from palm to palm. 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 completely absent 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 175 palms per ha. recommended for the main land. The observations at the erstwhile 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 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. Optimum spacing of coconut would favour incorporation of fruits, vegetables and spices crops for the domestic consumption as well as export to mainland.



► Strategies

- Considering the island ecosystem and socioeconomic situation, optimum palm density for coconut needs to be worked out testing with various spacing of palms that can optimally harvest available sunlight. Model coconut gardens highlighting the benefits of maintenance of optimum palm density thus worked out should be developed in all islands. It has been proved that the yield of coconut is not affected when the palm fronds do not touch each other in the field. The spacing should be such that the palms get enough sunlight during the active yielding stage i.e from 20 to 50 years of age. Spacing of 7.5 x 7.5 has been recommended for tall coconut cultivars in mainland. However, due to several factors, the palm density is observed to be very high in Lakshadweep resulting in many unproductive trees amidst good yielding trees. Sufficient interspaces in coconut plantations favour the introduction of inter and mixed crops.

- Interventions for removing old and senile coconut palms and 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. Replanting should be taken up with quality planting material selected from most adapted palms under island ecosystem. However, in narrow strips of lands near sea coast, removal of coconut palms will actually put the land in problem as they serve as protective cover from winds and sea erosion. Hence, palm removal shall be avoided in the extreme coastal areas where their presence is essential for the sustenance of the coast. In other words, coconut palm removal in coastal areas is to be decided case to case basis considering the wave line and availability of other vegetation or protective rocks etc.

ii. Coconut based cropping system and integrated farming for enhancing food and nutritional security

In spite of the obvious benefits of coconut based cropping/farming system over the traditional monoculture, the extent of adoption of the same in Lakshadweep islands 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.

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.

Research conducted at erstwhile Regional Station of CPCRI at Minicoy had revealed the possibility of organic production of several vegetables and fruits which includes, banana, papaya, guava, sapota, acid lime, annona, tomato, brinjal, chilli, moringa, bhendi, bitter gourd, snake gourd, ridge gourd,



cabbage, cauliflower, coriander, tapioca, sweet potato, betel vine, curry leaves, amaranthus and palak in the interspaces of coconut. Significant yield improvement could be possible through use of selected varieties with different organic nutrition and pest management practices. Coconut leaf vermicomposting and vermiwash were found to be highly useful in increasing the yield of several vegetable crops under Island conditions.

► Strategies

- Preference of farmers in the islands about the component crops including different vegetable/fruit 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. KVK Lakshadweep can take up OFTs for assessing the performance of crops and enterprises. Suitable crops/enterprise as part of coconut based farming system can be demonstrated through FLDs. In some of the Islands few farmers have made efforts to integrate cattle rearing with coconut farming. Coconut based integrated farming models suitable to the Island's agro eco system should be promoted through appropriate interventions.

- Extension activities for popularising coconut based cropping/farming systems suitable for island situations can be organised. KVK can support Department of Agriculture for conducting training on coconut based cropping/farming systems for farmers, farm women and entrepreneurs. Demonstration plots on coconut based inter/mixed cropping and integrated farming need to be established in all islands.

- Production of coconut leaf vermicompost, vermiwash to be taken up by govt and private organizations to ensure the supply of organic manures for open field cultivation as well as grow bag vegetable culture. The poultry manure available in the Islands from poultry units could also be utilized after proper curing.



- Link the interventions to promote coconut based farming systems with interventions for removing old and senile coconut palms and replanting by maintaining optimum plant density.

- Facilitate formation of FPOs and provide incubation support to take up enterprises on rain shelter farming/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. At least one protected cultivation structure need to be established per island to address the conservation, planting material production and demonstration of vegetable production under protected structures. Development of organic production technologies for protected cultivation is necessary for the Islands as use of chemicals in farming is prohibited and not desirable.

- The transported fruits and vegetables from mainland India need to be subjected to quarantine to arrest the spread of new pests and diseases in the Islands.

- Mini refrigerated storage chambers may be provided to the farmers in the Islands for storing fruits and vegetables grown in the Islands.

iii. 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 seednuts 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.

- A certification process should be evolved to label the quality planting material

- Farmer Producer Organizations need to be formed, trained and facilitated to take up production and distribution of quality planting material in all islands.



iv. 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. And 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 of farm holdings was done through an accredited third-party organic certification agency. Organic certification process has been completed in about 500 holdings in each of the islands. Organic farmers' societies were 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. A substantial amount has been spent for organic certification of agricultural holdings in the islands. It is necessary that a concrete plan for taking up various interventions viz., completing the process of organic certification of remaining holdings, implementing follow up activities such as renewal of organic certification, selecting 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 is formulated and implemented with active participation of farming community. Of late, it is learnt that a comprehensive scheme for organic certification of farm holdings in all the islands is being formulated with the support of Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India, under the domestic organic certification programme under the Nation Mission for Sustainable Agriculture. Under this initiative Participatory Guarantee System (PGS) will be followed for certification of farm holdings. PGS is a quality assurance initiative that is locally relevant, emphasize the participation of stakeholders, including producers and consumers and operate outside the frame of third party certification.

► 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. Similarly interventions have to be implemented for promoting enterprises on production of organic manure using fish waste can also be taken up.

- 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.

- A common brand 'Lakshadweep organic' with logo has to be developed for exploiting the potential of organic market for the products from the Island.

v. 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 40-50 % damage to coconut palms in the islands. Reasons attributed for the heavy damage due to rats include 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 systematically since the last few years due to many reasons. Since Lakshadweep islands are declared as organic use of chemical methods for rat control can't be adopted and hence adoption of biological control methods for managing rat menace assumes much significance. In this background, Department of Agriculture under Lakshadweep administration has already initiated action for introducing barn owl from Kerala to the

Islands for controlling rats. Incidences of bud rot and stem bleeding disease have 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

- 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 eco-friendly 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 eco-friendly crop protection technologies in coconut and subsidiary crops

vi. Value addition and commercialization of traditional products



Organic cultivation of coconut in the Islands is an advantage for the production and marketing of value added products that can be marketed worldwide as organic. Products like desiccated coconut, coconut cream, coconut milk and coconut sugar have markets all over the world. Latest additions like coconut ice-cream and coconut chocolates can find domestic and export market in the future. There are few traditional products like dweep burfy and dweep sugar that can enter the markets outside the Lakshadweep.

► Strategies

- Empower local entrepreneurs, women SHGs and Farmer Producer Organisations through skill development in production and marketing of value added products
- Develop infrastructure for production and marketing of value added products
- Procedures for providing credit support to the entrepreneurs are to be made more simple and effective by evolving appropriate norms for sanctioning credit by taking into account the prevailing socio-economic situation in the islands.

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 only. Voluntary organizations of youth are already functioning in some of the Islands which manages small enterprises on production and marketing of value added coconut products. There are also youth clubs involved in cultivation of vegetables and fruits.

► 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.

- Conduct training programmes to benefit voluntary organizations of youth on production and marketing of value added coconut products, inter/ mixed cropping of fruits and vegetables in coconut gardens etc.

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. It is worthwhile to mention here that Entrepreneurship

Development Programmes (EDP) for selected young farmers/ entrepreneurs from different islands have already been scheduled to be conducted at ICAR-CPCRI Kasaragod and KVK Baramathi with the support of National Horticulture Board. The EDP for the first batch of selected farmers from Lakshadweep islands is scheduled to begin at ICAR-CPCRI during the last week of April 2019.

An annual calendar for organizing training programmes on coconut based income generating technologies to benefit farmers, farm woman, youth and entrepreneurs of Lakshadweep Islands can be prepared. Co-ordination among agencies such as ICAR-CPCRI, KVK Lakshadweep, Department of Agriculture under UT of Lakshadweep and active participation of FPOs are essential for effectively planning and implementing the annual calendar of capacity development programmes.

► Conclusion

Coconut cultivation is the major source of income for the people of Lakshadweep islands besides fisheries and tourism and hence any effort to improve horticulture sector in the islands need to primarily focus on coconut based income generating activities. Interventions on coconut based multiple cropping and integrated farming, conservation and utilisation of coconut genetic resources and production of quality planting material, organic farming and soil health management, 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 horticulture sector in Lakshadweep islands. Active involvement of coconut growers and other stakeholders is to be ensured in the planning and implementation such interventions. ■