

## In Coconut and Arecanut... Enhancing income through system approach and value-addition

**Plantation sector assumes a crucial role by supporting livelihood to millions of small and marginal holders in our country. Besides, this sector contributes towards employment generation on account of its labour intensity, facilitating inclusive development. Of late, most of the plantation crops are confronted with umpteen challenges that affect the profitability and sustainability as a whole. It is a challenging task to convert the production node into farming systems because the structural rigidity of most of the conventional cropping methods does not allow this. Adoption of any cropping system by farming community will ultimately be decided by its economic advantage. The interest for palm-based farming systems has stemmed from both technical and economic grounds. When we consider the monocropping of trees from the labour utilization point of view, we find that barring the establishment stage, labour absorption is low and seasonal, for the remaining life span. For the regions with surplus labour, this type of systems may not be desirable. Another economic disadvantage of monocropping is that the investment in establishing the crop till its bearing age becomes sizable, which a small holder may not be able to afford.**

**T**HE average size of operational holdings of plantation crops in Kerala is about 0.27 hectare against the all India average of 1.41 hectares. Such small units obviously do not provide adequate income and employment to dependent families, when crops are monocropped. When system approach is recommended for production node, it is indubitably proven that minimal processing along with value-addition and product diversification is the need of the hour to upgrade from the production node to the business node of the plantation value chain and reap the benefits of the economic growth.

### SYSTEM APPROACH IN PLANTATIONS

A large number of annual and perennial crops have been introduced for feasibility studies and to evolve different crop combinations with coconut. Perennials such as cocoa, cinnamon, pepper etc. require meticulous care in early stages of their establishment, whereas annuals could be grown as a rainfed crop with relatively lesser ease in management. Such systems have income through the sale of additional products. Furthermore, coconut/arecanut based mixed farming provides considerable safeguard to smallholder's returns, against the failure of crops as well as crash in prices of nuts and copra. Besides, farmer obtains a higher productivity of nuts from his palms when they are grown in mixed farming systems as compared to monoculture. It is because the palms are benefited from the application of fertilizers and irrigation to the associated crops and the cultural operations given

### Coconut-based Cropping

The coconut-based cropping system and coconut-based mixed farming system categorically proved the advantages of the system approach. The system using multispecies cropping of coconut with pepper, banana, nutmeg, pineapple, ginger, turmeric and elephant-foot yam generated a net income of ₹3,62,595/ha, which is 150% higher than that of coconut monocrop (₹1,41,505), while the CMFS wherein the components are coconut, pepper, banana, crossbred cows, poultry birds, goat, and pisciculture generated a net return of ₹5,50,214 which is 288% higher than that of coconut monocrop.



## Arecanut in Karnataka

About 13.6% of total area in southern Karnataka is under released arecanut varieties. The economic impact of released arecanut varieties in monetary terms is found to be ₹ 521 million/year. The presence of improved varieties is more prominent in the young plantations. The holding wise observations revealed that the presence of released varieties was more in small holding groups. In another study to quantify the economic impact of arecanut based cropping systems in Karnataka, it was observed that, farmers are predominantly following three different cropping systems such as: 1) arecanut+banana, 2) arecanut+cocoa and 3) arecanut+banana+pepper other than arecanut alone as monocrop. These systems are compared with arecanut monocrop and found that the percentage increase in net returns from systems 1, 2 and 3 over monocrop are 32, 40 and 44 respectively. It is observed that, percentage adoption of arecanut monocrop is 26, while it is 36, 11 and 27 for system 1, 2 and 3 respectively. The total economic impact in monetary terms due to adoption of cropping systems in arecanut tracts is found to be ₹ 1122 million/year.

to them which are generally not available to pure stand of coconuts. Even though the smallholders have been practicing coconut/arecanut based mixed farming with consideration that the systems provide with a higher return per unit area, input and time than monoculture; opportunities to maximize the economic gains are lost in most cases because of unscientific selection and arrangement of component crops. The choice and arrangement of intercrops under palms are, however, influenced by technical factors such as age of palms, climatic conditions, irrigation facilities and soil types, and economic factors like availability of labour, financial resources and other inputs.

It was perhaps assumed that magnitude of economic viability of a model is closely associated with its degree of success based on technical feasibility. This assumption stems from some of the following basic considerations. Firstly, coconut lands in India, by and large are conducive to produce a variety of annuals, biennials and perennials. Secondly, since coconut is planted at a wider spacing due to its characteristic morphological features, the inter-and intra-row spaces in coconut gardens are adequate to provide the best forms of cropping system without adversely affecting the productivity of the palms. Thirdly, several inter/mixed crops yield reasonably well because of their ability to tolerate coconut shade. On these accounts, the returns from the system offset the costs and ensure profits.

### Evidence on Economic Gain

Intercropping with annuals like elephant-foot yam, tapioca, sweet potato, ginger, turmeric, coleus and yam can bring handsome profits to the coconut grower. The maximum favorable cost:benefit ratio is observed in ginger and minimum in turmeric (net returns ₹ 2.46 and 0.29, respectively, per rupee invested). This lower return for turmeric is mainly due to lower market rate of commodity. The cost:benefit analysis of food crops like tubers cannot be compared with that of ginger. A net return of more than a rupee per rupee invested is a very encouraging economic consideration in food crops, especially when they are grown as intercrops.

Under rainfed conditions, a profitable net income could be obtained by growing tuber crops in coconut gardens. Elephant-foot yam followed by ginger gives highest total net return per hectare. The elephant-foot yam and ginger are more labour-intensive than tapioca and sweet potato. Elephant-foot yam doubles the employment potential per unit area of land compared to sole crop of coconut. Intercropping in coconut reveals that raising tuber crops has no adverse effect on main crop of coconut, provided, the same intercrop is not grown on the same plot every year and that both the intercrop and the main crop are manured adequately and separately. A 5% increased yield of coconut over pre-experimental yield is obtained



Arecanut + cocoa + black pepper cropping system



Arecanut + cocoa + banana cropping system



Heliconia in coconut garden at Ratnagiri

when tapioca, elephant-foot yam, sweet potato, ginger and turmeric are grown in rotation as intercrops and 15 % increase when greater yam, lesser yam, colocasia, and Chinese potato are rotated. Tapioca, cultivars yielded 4.5 tonnes/ha when grown continuously in the same plot as against 6.3 tonnes/ha when it is alternated with elephant-foot yam. Similarly, yield of elephant foot yam increased from 6.4 tonnes/ha (continuous crop) to 11.8 tonnes/ha (in rotation with tapioca). Further improvement in yield of these crops is noticed in 5 year rotations. Among intercrops, elephant-foot yam and ginger are the most

profitable. Besides giving higher net returns per unit area, intercrops generates additional employment of 130 mandays/ha/year.

The 'Rohini' upland rice variety with a three year mean yield of 1,646 kg/ha is most remunerative as intercrop under coconut gardens. In Kerala, coconut+elephant-foot yam combination gives two times net profit than monocropping and coconut+ginger system

### Compatible Crops

A sole crop of coconut, at the recommended spacing does not fully utilize the available soil and air space and incident solar radiation. Crops identified as compatible ones with coconut include many tuber crops (cassava, elephant foot yam, yams and colocasia), rhizome-spices (ginger and turmeric), pulses (cowpea), oilseeds (groundnut and soybean), upland rice, fruit crops (banana and pineapple) and vegetables among the annuals and cocoa, black pepper, clove and nutmeg among perennials. Many intensive crop combinations which involve different annuals and perennials over a period of time such as multistoried cropping system and High Density Multi Species Crop Models (HDMSCs) have also been developed. Mixed farming systems, which integrate other enterprises like dairying and sericulture provide higher employment generation and enhanced net income.



Garden rue as intercrop in coconut garden



## Sugar-based value-added Coconut products



fermentation process), coconut chips, coconut honey, jaggery and sugar. The coconut inflorescence sap is called Kalparasa that can be preserved up to 45 days under cold condition (in refrigerator) without adding any preservatives and additives with the bottling technology. It was demonstrated that a farmer tapping 15 coconut palms for Kalparasa could earn on an average ₹45,000 a month, while a tapper can earn about ₹20,000/month. For sustaining the value-added coconut sector, Women Self Help Groups can be equipped with technical know-how and smooth

### Value-addition in Coconut

The processing and value addition in the coconut sector has to be scaled up manifold. India is lagging far behind in processing for value-addition and export even in comparison with Sri Lanka. The coconut industry will revive dramatically if it is made part of Prime Minister's 'Make in India' campaign. This can be made possible through formation of coconut parks across the major hubs, which can provide new impetus to coconut industry by ensuring economic enhancement of farmers and other stakeholders through large-scale activities. The international norms stipulated for similar parks should be followed and facilities of park should be extended to entrepreneurs willing to set up coconut-based value-addition/processing units. As a proactive step to enter into the premium value export sector, establishment of quality control and testing lab in accordance to the sanitary and phytosanitary (SPS) regulations should be envisaged. An effective establishment of coconut park can contribute huge returns to the sectoral domestic product along with the tangible positive externalities spreading across different facets. Besides, once the global value chain is established through the park to high-value overseas markets, the revenue generation increase manifold. Furthermore, the positive externalities emerging from such a park would contribute towards a cascading impact on further employment generation.

functioning of the coconut value chain was ensured through continuous supply of value added products to the downstream part of the chain. Coconut sugar based chocolates and drinking chocolates have been developed.

Though India is the largest producer of raw coconut in the world, desiccated coconut export is only to the tune of less than 1% of the global demand. Nevertheless during 2015-

16, India exported 4,261 tonnes desiccated coconut worth ₹52.60 crore. In comparison with the export figure of previous year, India achieved an increase of 63%, which is indeed remarkable. Due to the growing consumer demand for desiccated coconut across the world, there exists an immense export potential for the product. The capital investment



Arecanut leaf sheath plates and mushroom production from coconut wastes

required to start up a desiccated coconut production unit, of capacity to process 15,000 coconuts/day, amounts to ₹1.29 crores. It is noteworthy that there are attractive export promotional schemes initiated by the Government of India in this under the new Foreign Trade Policy (2015-20), wherein under Merchandise Export from India Scheme, 5% export subsidy can be availed on Free on Board (FoB) prices. There is also a Duty Draw Back scheme wherein up to 1% of the FoB prices are refunded for the service taxes paid for raw materials and other input services for the production of desiccated coconut.

Even though several value added technologies are available for arecanut byproduct utilization such as making of eco-friendly disposable plates and bowls from areca leaf sheath, leaf sheath fodder, oyster mushroom production from leaf and bunch wastes and vermicomposting, there are only very few commercial small-scale ventures. About 3.5 billion arecanut leaves and leaf sheaths are produced every year and have the potential to facilitate production of 0.3 billion kg of mushroom and ₹7 billion worth areca nut leaf sheath plates and bowls. Production of vermicompost from arecanut wastes is done on a very limited scale by farmers. Vermicomposting of arecanut leaf wastes per hectare can generate a net income of ₹20,000 and can be taken up as micro-enterprise instead of unscientific dumping of wastes in the plantations.

Skill development/capacity building for women SHG's and rural youth for efficient by-product utilization in arecanut by various means is necessary to ensure value addition and income generation. In this regard, required support for establishment of producers associations, societies and companies at village level for production of disposable plates/bowls by providing credit, quality grading and marketing facilities coupled with export promotion of this eco-friendly product. Initiating village level mushroom and vermicomposting production units in arecanut tract with the help of local manpower and establishment of large scale enterprise by integration of plate making, mushroom production and

vermicomposting on a single platform and ensuring online trading facilities are also strategic considerations for supporting entrepreneurship development in the arecanut sector.

### SUMMARY

In the evolving trade liberalization regime sustaining the plantation crops as a profitable enterprise, is extremely challenging. Hence, policies should focus more on competitiveness through higher productivity. One way to achieve this goal is through reduction in cost of production or in other words increase net returns. There are possibilities of increasing the productivity and net returns from plantation gardens by raising compatible subsidiary crops and/or integrating with livestock. The farming system models have conclusively proved that the scientifically designed coconut/arecanut-based farming system is not only capable of generating higher income, but also generating employment potential of small-holders. In a scientifically laid out plantation-based farming, unlike the traditional ones, the resource-use efficiency gets considerably enhanced from crop inter-actions in the system.

Since, most of the plantation are less than one hectare in extent, in developing the inter/mixed cropping system, the feasibility and economics including employment opportunities that may be generated and credit requirements for such intensive cropping systems and size of holdings should be carefully taken into account. Of the outlay in initial establishment period, investment on intercrops alone becomes recoverable during the course of year, as the response to inputs in coconut accrues only from the third year. This would mean that credit facilities are necessary for successful adoption of this intensive cropping programmes and realization of enhanced agricultural production.

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