# Coconut Based Farming System- a money spinner

**Jnanadevan R**

Integrated farming system in coconut holdings is an interactive practice in which integration of coconut farming with suitable inter/ mixed crops, livestock and other allied enterprises are undertaken with the aim of increasing income. The production alternatives can be a single intercrop, a mixture of crops, or a crop/ livestock combination which are compatible with each other and other environmental factors. One of the most common farming systems practiced by coconut growing traditional farmers is the coconut-based farming system (CBFS). This is a multiple cropping or crop/ livestock production system aimed at maximizing or complementing the benefits that can be derived from coconut. Different crop combinations are recommended by research to suit the availability of resources, sunlight, rainfall, irrigation and soil characteristics.

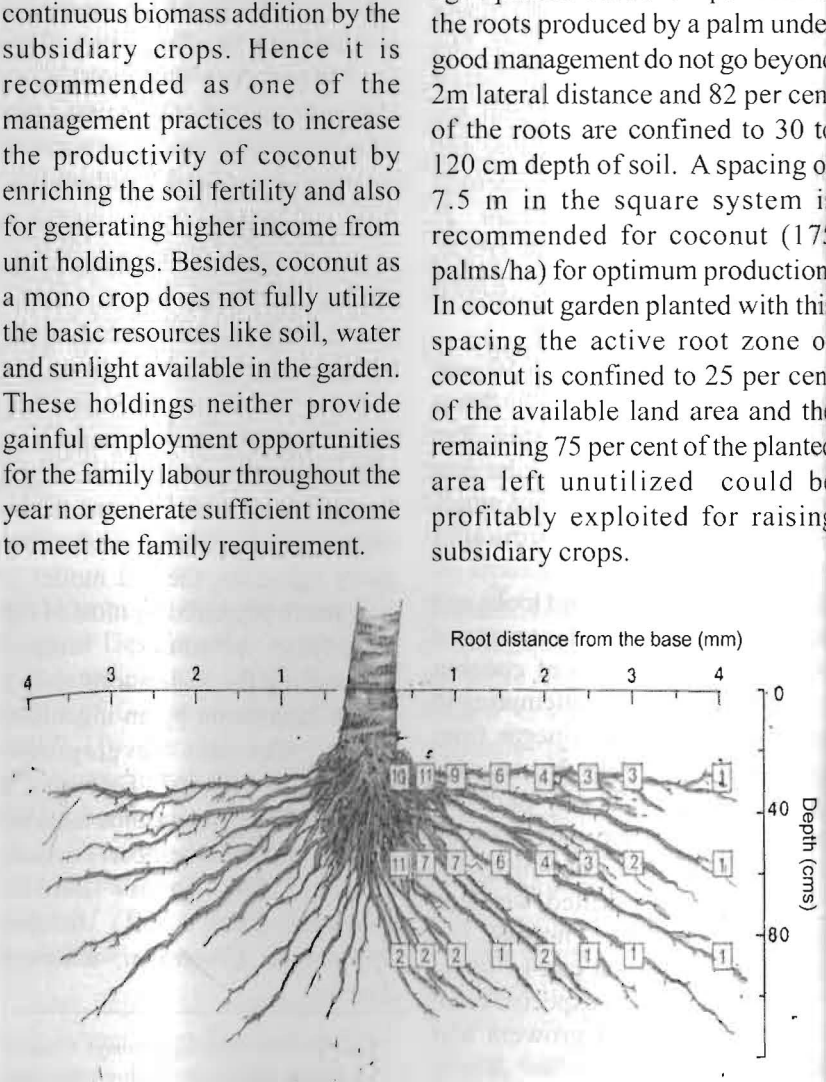
It ensures optimal utilization and conservation of available resources and effective recycling of farm residues within the system. Coconut being a voracious feeder removes large quantity of nutrients from the soil for its growth and production of numerous energy giving materials. A bearing palm producing 50 nuts per year removes 390g nitrogen, 100 g prosperous and 1 kg potash in each year. Since almost all parts of 'Kalpavriksha' are used, chances of recycling biomass from coconut are less. Hence regular application of manures is essential, especially in the traditional areas to compensate this and to maintain the soil fertility at optimum level for sustainable coconut production.

Coconut based integrated cropping systems enable better utilization of natural resources and improves the soil fertility due to the continuous biomass addition by the subsidiary crops. Hence it is recommended as one of the management practices to increase the productivity of coconut by enriching the soil fertility and also for generating higher income from unit holdings. Besides, coconut as a mono crop does not fully utilize the basic resources like soil, water and sunlight available in the garden. These holdings neither provide gainful employment opportunities for the family labour throughout the year nor generate sufficient income to meet the family requirement.

**Why coconut holdings are idea for Integrated farming system**

**Rooting pattern**

Coconut palm, like othe monocots, has a typical adventitiou root system. Under favorabl conditions, as many as 5,000 t 8,000 roots are found in the middl aged palms. About 74 per cent o the roots produced by a palm unde good management do not go beyon 2m lateral distance and 82 per cen of the roots are confined to 30 t 120 cm depth of soil. A spacing o 7.5 m in the square system i recommended for coconut (17 palms/ha) for optimum production In coconut garden planted with thi spacing the active root zone o coconut is confined to 25 per cen of the available land area and th remaining 75 per cent of the planted area left unutilized could b profitably exploited for raisin subsidiary crops.




Root growth pattern

**Canopy structure and light utilization**

The venation structure of the coconut crown and orientation of leaves allow part of incident solar radiation to pass through the canopy and fall on the ground. The space utilization of coconut is very low and plenty of sunlight falling on the ground remain unutilized. In an intercropping system, light is the main limiting factor for the growth of the intercrop since light penetration of a plant is reduced through interception and absorption by the taller canopy plants. As much as 56 per cent of the sunlight is transmitted through the canopy during peak hours (10.00-16.00 hrs) in palms aged around 25 years. The diffused sunlight facilitates growing a number of crops in the interspaces. Based on the growth habit of the palm and the amount of light transmitted through its canopy, the life span of coconut palm could be divided into three distinct phases from the point of view of intercropping. Planting till full development of canopy (up to 8 years) good light transmission initially. with suitable for growing intercrops with minimal competitions. young palms (9-25) years) with maximum ground coverage (80%) and low canopy due to shorter trunk; poor light availability is not suitable for growing of other crops in the interspaces. Grown up palms above 25 years facilitates gradual increase in the magnitude of light penetration to the ground and decrease in apparent ground coverage of canopy are ideal for raising annual / perennial crops.

**Criteria for selection of subsidiary crops.**

Crops should be selected according to their shade tolerance and amount of solar radiation available. It should not grow as tall as coconut and should not have an economic life longer than the main crop. Availability of resources like rainfall, irrigation facilities, soil characteristics, labour, farmers needs and market demands are the factors to be considered while selecting the crop combinations in a coconut based cropping system.

***Coconut-Nutmeg mixed system***

Nutmeg is a money spinning cash crop which requires filtered sunlight of coconut garden and constant care and moist soil in summer months. It is one of the most remunerative crop mix for irrigated coconut garden. Two year old nutmeg grafts are planted the centre of four coconut palms at a spacing of 7.5m x 7.5m accommodating 175 plants per hectare. It is preferable to use grafts prepared from high yielding female trees because of the dioeceous nature of the plant. While planting, the ratio between male and female grafts is to be kept 10:1 pits of 60 x60x60 cm size may be taken and filled with a mixture of farm yard manure or compost and top soil. Fertilizers @ 20g N, 18g $P_2O_5$ and 50g $K_2O$ ha to be applied in the first year. The dose has to be gradually increased so as to reach 500g N, 250g $P_2O_5$ and 1000g $K_2O$ per tree per year by the fifth year. Nutmeg flowers at 5-8 years of age and full bearing comes at 15-20 years. Fruits are to be harvested when they have split and when it turn bright red in colour. The mace is dried in the sun for 10-15 days, till it become brittle and turn yellowish brown from the initial red colour. The nuts are dried till the kernel rattles within the shell. On an average, 1500-2000 fruits per tree will be obtained which comes to 8-12 kg nuts and 1.5-2.0 kg mace. With the present market price (Rs.600/ kg for nuts and mace Rs.650/- a kg) an additional income of Rs.1 to 1.50 lakhs, per acre can be obtained by incorporating this crop in the coconut based farming system.

"I have seventy yielding nutmeg plant in my 1.25 acre coconut garden that too is affected by root wilt disease. My nutmeg plants are about 15 years old and yielding regularly and I got an additional income of Rs.1.50 lakhs last year" says Shri. Joseph, a very enterprising farmer from Poovathussery in Ernakulam district of Kerala." I am spending Rs.25, 000/-only in a year for the maintenance of my nutmeg crop including cost of inputs for getting the above income. I am of the view that partial shade in coconut garden with irrigation is ideal for nutmeg cultivation, but plants do not perform well under too much shade. I am applying poultry manure, cow dung and goat manure as organic manures and 1.00 kg potash per plant. I am also irrigating the plants regularly during summer."

***Coconut-Cocoa mixed system***

Cocoa an ideal, mutually beneficial mixed crop for coconut garden has been proved to be highly remunerative with less cost. One year old F1 hybrid cocoa is planted at a spacing of 3m between plants in a single row system in between two rows of coconut palms. In a coconut garden with palms spaced at 7.5m x 7.5m, about 500

cocoa plants can be accommodated. The distribution of roots of these crops show that they did not overlap. Cocoa has tap root system. Most of its roots lay within a radius of 80-100 cm laterally at 15 cm. depth in the surface soil. This system requires irrigation during summer months. Recommended dose of fertilizers are to be given to each of the component crops. Regular pruning should be done from the second year onwards to give better shape to the canopy when it is grown as mixed crop with coconut. First tier should develop at 1m to 1.5m ht. and one healthy chupon shoot may be allowed to grow. Additional chupons arising from main chupon are to be removed periodically. Vertical growth is to be limited to single tier. Drooping fan branches may be cut off during Dec-Jan & July- August. On an average 60 fresh pods per tree are obtained every year. 30 pods give 3.0 kg wet beans and 3.0 kg of wet beans give 1.0kg of dry beans.ie on an average 2 kg. wet bean per plant. With the present market price an additional income of Rs.50,000/-per acre can be obtained from this crop.

"I am getting Rs.5000/- per week during peak harvest season from my 200 cocoa plants in 1.5 acre coconut garden" says Shri.P.T. Jose, Pasukkadavu, Maruthakara Panchayat of Kozhikode district. "I got Rs.1.20 lakhs from my cocoa plants during last year when price was ruling very high. Now the price has decreased to Rs.120 per kg. but still it is a remunerative crop as the cost of production is less compared to other crops".

***Coconut -Clove mixed system***

Clove can be grown as a remunerative mixed crop in coconut gardens in fertile, well drained soils with assured irrigation. It is planted at the centre of four coconut palms. Two year old clove seedlings may be planted in 60cm x 60cm x 60cm pit filled with a mixture of top soil and 15kg farm yard manure or compost. In one hectare of coconut garden, about 150 clove seedlings can be planted. During the first year, fertilizers @ 20g N, 18g $P_2O_5$ and 50g of $K_2O$ per tree is to be applied. The dose is gradually increased so that the adult dose of 300g N, 250g $P_2O_5$, 750g $K_2O$ is supplied in the fifth year. Fertilizers are supplied in two equal splits in May and September. Clove starts flowering at the age of six and reaching full bearing at the age of 20. The flower buds are harvested when they turn light pink from green. Flower buds are dried in sun for 4-5 days till they turn brown in colour. An average yield of 3 kg is obtained from a tree per year. An additional income of Rs1.20 lakh can be obtained from one acre coconut–clove system with the present market price of Rs.700/- per kg.


*Coconut - cocoa mixed system*

Many crops which were grown only in the open space exposed them to direct sunlight are now finding comfortable occupation under coconut garden. One among the same is Cashew. "The common belief is that cashew will come up well only in open space but I have no land to leave vacant. I have successfully grown cashew in my coconut garden." says Shri P.V.Koran, another enterprising farmer of Pallikkare, Kasaragod District. The hardy cashew crop is sucessfully grown as mixed crop in his widely spaced coconut garden. Since he is not having any vacant land, he planted 30 hybrid cashew (Dharasree) in his 0.70 acre coconut garden. Six month old cashew grafts was planted in between coconut trees where sufficient sunlight is available. He claims that the grafts started bearing from the second year onwards. Now the plants are at the 4$^{th}$ year and he is getting 2kg cashew per tree. He is expecting 12-15kg /tree when it reaches full bearing stage. Several farmers in Kasaragod district of Kerala now started growing cashew as a mixed crop in coconut house

*Nutgmeg grown as intercrop with coconut*

*Dharasee - Hybrid cashew variety*

holdings. Pruning of the plants from 2nd year onwards during May-June at the onset of monsoon for better shape and size of the canopy is most important for mixing cashew with coconut garden. Removal of lower side shoots / branches up to a height of 1m should be done. Side shoots below the graft joint should be removed periodically. The lower branches should be removed so that the clear trunk up to a height of 1m may be attained after 4-5 years after planting. An additional income of Rs.40,000/- per acre can be obtained from cashew with the prevailing market price (Rs.70/- per kg of raw nuts.)

The experience of these farmers indicate that there is wide scope for promoting high yielding early bearing cashew varieties like Dharasree and Dhana alongwith coconut as a mixed crop.

In Kerala other crops like tapioca, elephant foot yam, colocasia, greater yam and lesser yam are the tropical tuber crops cultivated as intercrops in coconut garden. Presently there is high demand for medicinal plants, as natural herbs used in the preparation of ayurvedic medicines. Crops such as lemon grass, kacholam, dioscorea, arrowroot, sida, thippali (long pepper), neela amari and adapathiyan are suitable as intercrops in Indian condition in coconut gardens. In Kerala intercropping with medicinal and aromatic plants is nowadays a common practice and has been found remunerative.

Financial assistance is extended to farmers under National Horticulture Mission for the development of cocoa and cashew plantations with clones of high yielding varieties of cashew and F1 hybrid seedlings. The rate of assistance is Rs.20,000 per ha (85% government of India share and 15% state government share) by the Central and State government. The scheme is limited to a maximum of 4 ha per beneficiary is extended for undertaking of new planting. The financial assistance is extended for a period of 3 years i.e. Rs.12,000/- (10200+1800) in the first year and Rs.4000/- (Rs.3400 + Rs.600/-) in the second and third year is extended under the scheme. The scheme is implemented by Directorate of Cashew and Cocoa Development and by State Horticulture Mission on cluster basis through the field level officers of concerned state Horticulture/ Agriculture departments and selected NGOs.

Coconut based farming system render enhanced employment opportunities, make available multiple farm produce and ensures ecological sustainability. The beneficial effects include improvement in soil fertility status, increased microbial activities, higher interception of sunlight, better micro-climate and reduced weed growth. Deleterious effects of surface run off and soil erosion will also be reduced in this system. The litters from the falling leaves and other plant parts have a salutary effect on the properties of soil through the degradation process and related activities undergoing in the soil. Experimental results from various coconut based cropping systems show that the high level of productivity could be sustained with lower level of fertilizer input which is one of the most costly input for farming. Coconut based integrated farming system as described above not only provides additional income but also would help achieve higher productivity of coconut on a sustainable basis.

*Dy. Director, Directorate of Cashew and Cocoa Development, Kochi-11*