

COCONUT BASED CROPPING SYSTEMS

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Coconut is essentially a crop of small and marginal farmers in the coastal Kerala and Karnataka. Throughout the west coast of India, the farmers are accustomed to the homestead system of farming. As the availability of land for extending the area under coconut is increasingly difficult, the imperative need to increase the productivity of the gardens is evident. Coconut based cropping systems enable farmers of small holdings to diversify their crops thereby reducing the risk of crop failure or price fluctuations, to intensify the use of their land to maintain soil fertility, to gain more cash income and to meet varied requirements of their family.

Coconut being perennial in nature and widely spaced, provides ample scope to grow a variety of crops in its interspaces. Accordingly, attempts have been made at the Central Plantation Crops Research Institute and elsewhere to identify crops which can be comfortably grown in the coconut interspace to suit diverse soil and climatic conditions. The results of the studies carried out till now is reviewed in this paper.

CROPPING SYSTEMS FOR RAINFED CONDITIONS

Various crops can be grown in the coconut inter-spaces under rainfed situations taking advantage of monsoon rain. A variety of crops such as cereals, millets, oil seeds, tropical tubers, rhizome spices and

fruit crops can be grown as inter-crops in coconut gardens (Gopalasundram and Nelliath, 1979).

Among the crops tested, tuber

and 66.9 qtl per ha in the case of amaranthus. Attempts have been made to screen suitable varieties for these identified vegetable crops (Hegde *et al.*, 1993).



Coconut + Cocoa + Pepper

crops, rhizome spices and banana were found to be better. Tropical tubers like tapioca and elephant foot yam are the most profitable crops. Their yield ranges from 5.6 to 12.2 tonnes per ha and provide additional employment for 76 to 132 mandays per ha. (Verghese *et al.*, 1978.)

Various vegetable crops like Amaranthus, Brinjal and snakegourd can be grown under coconut shade in rainy season. The yield of these crops ranged from 106 qtl per ha in case of snakegourd, 61.9 qtl per ha in the case of brinjal



Mixed farming model

Table - 1. Cultural and manurial requirement of mixed crops

Crops	No. of plants/ha	Fertilizer dose N:P ₂ O ₅ :K ₂ O (9 per tree)	Yield
Cocoa	450	100 : 40 : 140	6750 kg pods
Pepper	175	100 : 40 : 140	175 kg dry
Clove	175	300 : 250 : 750	375 kg dry
Nutmeg	175	500 : 250 : 1000	750 kg nutmeg & 120 kg mace

CROPPING SYSTEMS FOR IRRIGATED SITUATIONS

Various cropping / farming systems have been perfected for irrigated situations. Among them mixed cropping with pepper, banana, clove, nutmeg and cocoa has been found to be successful. Studies conducted at CPCRI, Kasaragod has shown that cocoa performs better when grown in single hedge system with a spacing of 3 m between plants in the row to accommodate about 450 plants/ha. Whenever clove and nutmeg are to be grown they may be accommodated in the centre of 4 coconut plants. Details regarding cultural, manurial requirement and yield are given in Table-1.

MULTISTOREYED CROPPING SYSTEM

This is an intensive system of mixed cropping where four species of perennial crops, viz., coconut, pepper, cocoa and pineapple having varying morphological frame work and rooting habits are mixed in such a manner that their canopies intercept solar energy at various heights and roots forage the soil at different zones. In this system pineapple can be successfully grown during the initial 3-4 years. The productivity of various crops in this system is given in Table 2.

Table 2. Performance of various component crops

Crops	Yield per ha.
Coconut	18200 nuts
Pepper	112 kg
Cocoa	14,400 pods
Pineapple	6800 kg

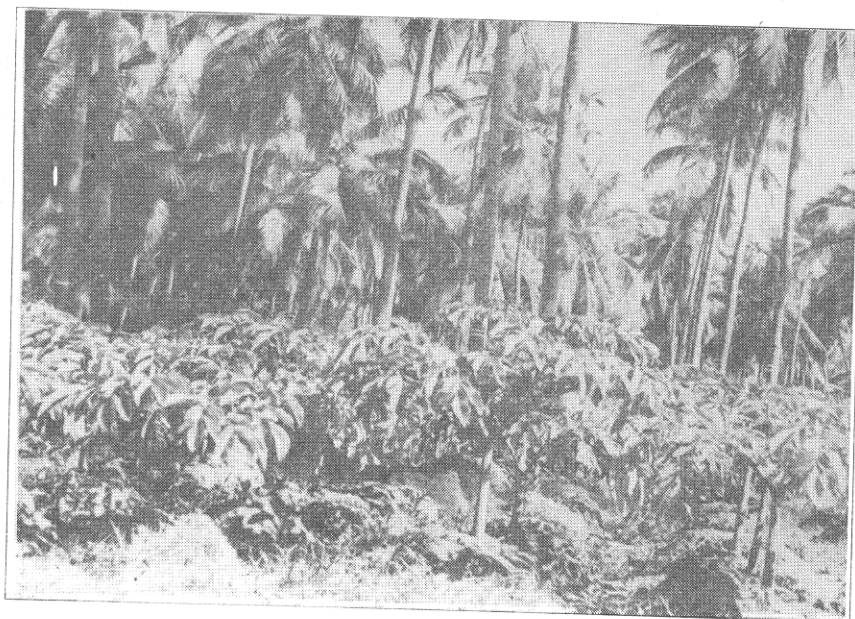
HIGH DENSITY MULTI-SPECIES CROPPING SYSTEM

This system involves growing of large number of crops to meet the diverse needs of farmers such as food, fodder, fuel and cash and

is ideally suited for small holdings.

This system aims at maximising production per unit area and time with minimum or no deterioration of land. In one such system at CPCRI, Kasaragod 17 crops were included in addition to coconut with a plant population of 13,030 plants/ha.

This kind of cropping system can be adopted in irrigated coconut plantations where average age of coconut farm is above 25 years. The component plant species, their population and planting pattern are decided by taking several factors into consideration. An important aspect to be considered in the selection of crops is that the system should be in a position to give income to the farmer at regular intervals. Atleast some of the crops selected should leave some residue in the field to take care of soil fertility. Over a period of time the system should become self sustained so that it can be maintained with minimum fertilizer input.



Coconut + Elephant foot yam

COCONUT BASED MIXED FARMING SYSTEM

Mixed farming in coconut involves establishing pasture in the interspaces of coconut, maintenance of milch animals and re-cycling of the cattle manure in the coconut-fodder mixed stand. To study the productivity of such a farming system a model is in progress at CPCRI, Kasaragod since 1972. This study has revealed that fodder grasses viz., guinea and IVB-21 perform better under coconut shade with a fodder yield of 50 tonnes/ha. From the fodder produced it is able to maintain 5 to 6 milking cows. The average out put from such 1 hectare model is given in Table 3.



A view of the integrated poultry system

Table 3. Out-turn of various components in mixed farming system.

Components	Output
Coconut	117292 nuts
Milk	7089 litres Ω
Pepper (dry)	80 kg
Banana	250 kg
Broiler birds	600 kg live wt
Poultry eggs	10000 Nos
Quails	25 kg live wt
Rabbit	85 kg live wt
Bio-gas	1032 m ³

REFERENCE

- Gopalasundaram P and Nelliath EV, 1979, *Inter-cropping in Coconut*. In : Multiple Cropping in Coconut and Arecanut Gardens. Nelliath EV and Bhat KS (Eds) Tech. Bull. No. 3, pp:6-23, CPCRI, Kasaragod.
- Hegde MR, Mohammed Yusuf and Gopala Sundaram P. 1993. *Inter-cropping of vegetables in coconut gardens*. In : Advances in Coconut Research and Dev., Nair MK et al., (Eds.) pp:407-412.
- Varghese PT, Nair PKB, Nelliath EV, Ramu Varma and Gopala Sundaram P, 1978a. *Intercropping with tuber crops in coconut gardens*. In : Proc. Placrosym I. Indian Society for Plantation Crops, Kasaragod. pp: 399-415.

USE OF BAKER'S YEAST FOR COCONUT OIL EXTRACTION

The Institute for R & D of Agro based industry in Indonesia has developed an improved method of extracting coconut oil by fermentation. With the addition of baker's yeast, the oil recovered is reported at 87% and has a pleasant flavour. Coconut milk was left for 30 minutes at room temperature. The cream was separated from the skim milk, mixed with 20% starter and incubated for 24 hours. The starter was prepared by the addition of 2% of baker's yeast into the coconut water-coconut skim milk medium and left for 22 hours at 30°C. Extraction of coconut oil through fermentation is being practised in Indonesia at a small scale level. One major disadvantage of the method is poor quality of the oil and the residue is inedible due to the growth of micro-organisms.

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