

MIXED FARMING IN COCONUT GARDEN

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is tremendous scope for boosting up the net economic uplift of coconut growers, particularly small holders, depends on the proper utilization of available interspace for raising subsidiary crops. Coconut growing areas in India are favoured by soil climatic features for the cultivation of high value crops. Thus, a mixed farming unit in the coconut garden, raising fodder and maintaining milch animals—without doubt, a profitable venture as a component of an intercropping programme.

FORAGES WITH COCONUT

Intercropped fodders show a considerable degree of tolerance and compatibility as intercrop of coconut. The ability of perennial fodder grasses to prevent soil losses through their ramified root system and the ability of legumes to add nitrogen to the soil are added to the nature of association with coconut.

ADVANTAGES OF MIXED FARMING

Studies on the root system of coconut palms reveal that both horizontally and vertically, a major part of the soil in the plantation is only partially exploited. Only 30% of the soil on area basis is effectively utilized by the coconut roots in a coconut plantation, planted with 10 meter spacing. Studies have also indicated that 30% of light filters through the coconut canopy at the age of about 30 years. The amount of light that filters through with further growth of the coconut palms. In the use of forages, the economic produce consists of the vegetative tissue, and as vegetative growth of coconut under shade is reasonably good, there is scope for cultivating fodders along with coconut. Fodder crops grown in the interspaces of adult plantations come

up well, because the fodders are mostly surface feeders. From the point of view of conservation of soil and nutrients, leaving the soil free of live roots will not be advisable. Providing a crop cover requiring a minimum of intercultural operations will be the best for sustaining soil fertility. A perennial grass cover will take care of the above and the same time, give an economic produce. Grass roots, because they traverse the soil extensively, are also considered the best conservers of soil nitrogen. The carbon nitrogen ratio of grass roots is wide, and hence their debris decompose slowly. Any small amount of mineral nitrogen released in this process is appropriated again by the live roots. The same is the course of events that occurs in the case of added fertilizer nitrogen to a considerable degree. Legumes do not have an extensive root system as the grasses. The agronomic advantages of inclusion of legumes lies in fixation of molecular nitrogen symbiotically. This indicates that an efficient crop combination which will utilize the space, light, nutrients and moisture, without adversely affecting coconut will contribute to very high net returns.

Mixed farming programme in coconut gardens involves fodder cultivation in the interspaces and maintenance of milch animals and recycling of cattle waste. The high employment potential that can be generated by adopting this practice is another advantageous factor. The labour requirements of plantation with coconut alone, in a year is around 150 man days per hectare. In a mixed farm, it goes upto about 1,000 man days per hectare.

Mixed farming or alternate husbandry in coconut garden can solve the deficiency in milk production to some extent. Most of the coconut growers own less than



Hybrid napier grass and legume as intercrop in coconut gardens

one hectare of land and the income from their land is insufficient to maintain a decent standard of living. Further, since coconut cultivation does not require intensive utilization of labour, both the cultivator and his family can utilise their spare time for other useful work like dairying without much difficulty and improve their economy. Besides, cultivation of fodder grasses and fodder legumes enriches the soil by adding more organic matter and nitrogen. It also checks soil erosion. All these contribute indirectly to increasing the yield of the coconut palms. Since the dreaded coconut root (wilt) disease has spread in an area of about 2.5 lakhs of hectares in Kerala, causing losses to the tune of Rs. 30 crores, mixed farming has greater significance in the disease affected tract.

PREVIOUS WORK AND OBJECTIVE

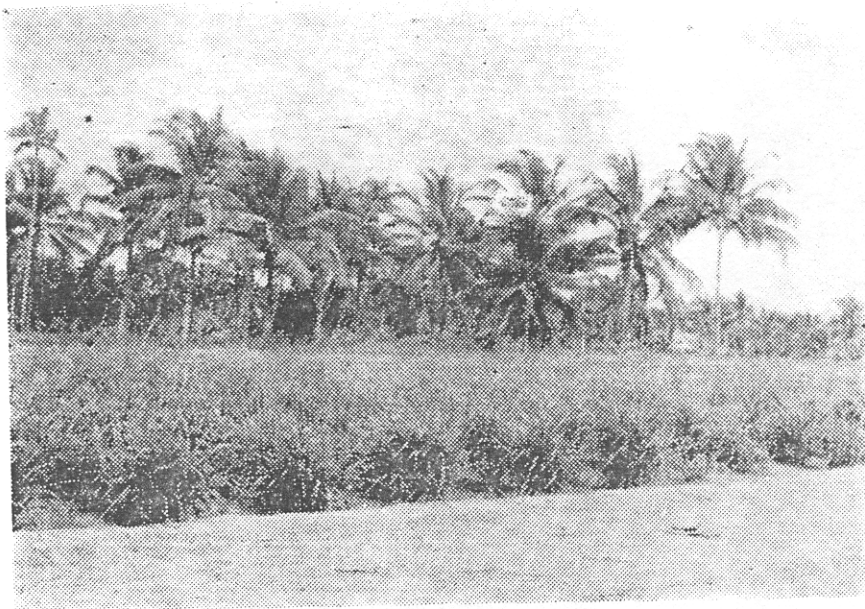
Work carried out in Sree Lanka and Philippines has proved that mixed farming has beneficial effect in coconut garden. Since no work on this aspect was done in India earlier, a research project on mixed farming was conducted at the Regional Station of the Central Plantation Crops Research Institute at Kayangulam during the period 1970-75 in collaboration with Indo-Swiss Project and Intensive Cattle Development Scheme of Kerala. The programme consisted of cultivation

of fodder grasses and legumes in the interspaces of coconut and maintaining milch animals. The objectives were to assess the effect of inter-cropping with fodders and recycling of cattle waste on the intensity of root (wilt) disease and the yield of disease affected palms and also to evaluate the economics of mixed farming under these conditions.

At Kasaragod Unit, the mixed farming experiment was entrusted to a family farmer of three members. The project envisages a study as to how far a small holder can benefit and support his family by mixed farming practices.

EXPERIMENT DONE AT CPCRI, KAYANGULAM AND KASARAGOD

Hybrid napier grass, Var. Gajaraj mixed with legumes such as Brazilian lucerne (*Stylosanthes gracilis*) *Puevavia javanica* and *Centrosema pubescense* were raised an intercrops in an area of 1.3 hectares in a randomised block design with 7 treatments and 4 replications. The treatment consists of growing grass alone and grass plus legumes. The grass legume fodder at the rate of 75:25 are fed to graded Brown Swiss cows maintained in the dairy unit attached to the Regional Station at Kayangulam. Hybrid napier grass



Growing hybrid napier grass as forage

about 10-12% protein and gives about 120 tonnes of fodder per ha. per year in the open and 150 tonnes when grown under the shade of coconuts.

Experiment conducted at the C.P.C.R.I., Kasarsa was managed by a farmer family with four Jersey cows. It showed that the fodder grasses, guinea grass (*Tripsacum laxum*), hybrid napier, Var. NB guinea grass (*Panicum maximum*) gave an yield of 120 tonnes per hectare of green fodder in a year under coconut shade and the legumes, Brazilian lucerne (*Medicago sativa*) and cowpea (*Vigna unguiculata*) gave 30 tonnes. At a feeding rate of 30 to 40 kg of green fodder to one animal per day, a minimum of 10% of which should be contributed by legumes, the yield of one hectare can support four milch animals.

OTHER CROPS AND THEIR MANAGEMENT

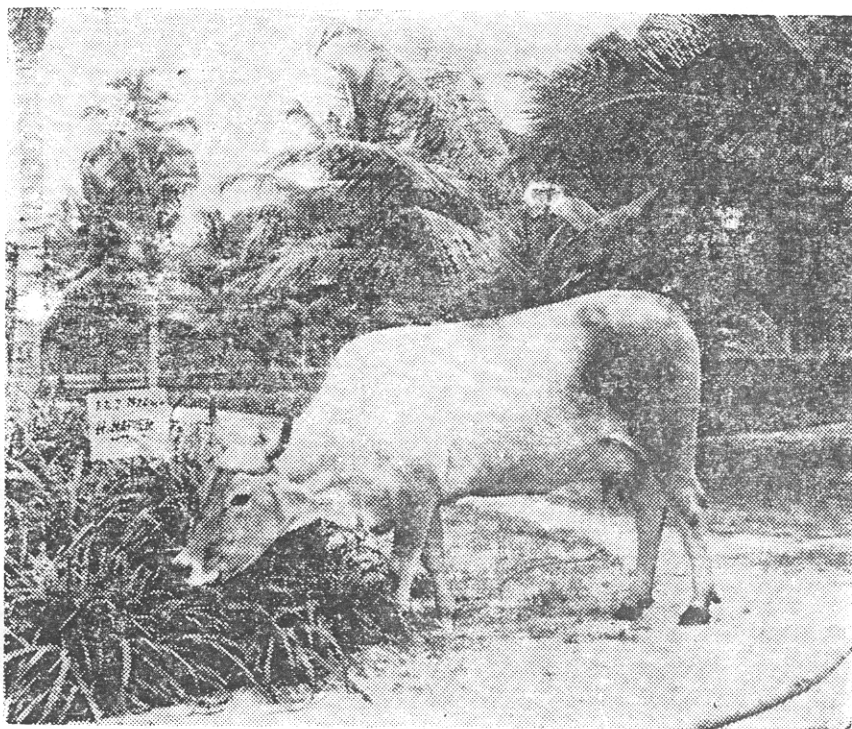
In the coconut growing areas of South India, grasses like hybrid napier, guatemala and guinea and legumes like Brazilian lucerne, *Pueraria javanica*, *Centrosema pubescens* and cowpea are found to perform well. All the above crops excepting cowpea may be planted in the field for a period of three years. Before subsequent planting, the soil may be given a deep digging to prevent root matting and spread of weeds.

Interspaces in coconut garden should first be filled with a mixture of 15 to 20 tonnes of cattle dung or

compost per hectare, 500 kg. of superphosphate and 133 kg. muriate of potash may be supplied as basic manure. This it may be remembered is a part from the manurial schedule recommended for coconut. The grass slips are planted in rows 50 cm apart and at a spacing of 30 cm. within rows. For a hectare at the rate of one slip per planting hole, about 30,000 to 40,000 slips will be required. Grass slips are to be planted 2 metres away from the base of coconut palms. Nitrogenous fertilizers are applied at the rate of 20 kg per hectare once at planting and again at the same rate after every cutting. In addition, 50 kg. of phosphate and 100 kg. of potash per hectare are to be given in two equal split doses before and after the monsoon. The first cutting is taken after 60-70 days of the planting and thereafter at 40-45 days intervals. The grass is cut at a height of 10-15 cm from ground level. The grass may be cut before it flowers, lest the protein content should decrease. To prevent loss of nutrients, the daily collection of cattle manure should be put back to the soil. Providing summer irrigation is necessary to ensure steady growth of forages throughout the year.

DAIRY UNIT

Graded Brown Swiss Cows supplied by the Collaborators were maintained in the dairy unit at Kayangulam. They are acclimatised to our climatic conditions. They are high yielders and some of them yield



Graded Brown Swiss Cow

upto 15 litres of milk per day. Eight of them were maintained at Kayangulam during the period 1970-75. At Kasaragod, four graded Jersey cows were maintained by the family farmer.

FEEDING SCHEDULE

Cows giving upto 3 kg. of milk a day can get all the nutrients required from good quality green alone if fed enough (35-40 kg/day). It will be well and good, if a portion of this is made up of a legume which will increase the palatability and the nutrient intake. For higher yielders, concentrates can supplement grass as follows:—

Quantity of milk kg.	Grass & legume 75 : 25 kg.	Concentrates kg.	Common salt grams	Minerals grams
4	40.0	0.5	30	30
5	38.0	1.0	30	30
6	35.0	1.5	30	30
7	35.0	2.0	30	30
8	32.0	2.5	30	30
9	32.0	2.5	30	30
10	32.0	3.0	30	30
11	30.0	3.5	30	30
12	30.0	4.0	30	30

plus enough drinking water

During the last two months of gestation period, extra nutrients are required for the cow. This is provided

by giving 1 kg. of extra concentrate ration over the maintenance ration. The Brown Swiss cows are trained to remain within sheds. They are washed and brushed daily. The feed is served thrice a day and the cows milked twice a day at fixed hours. Cattle shed should be maintained clean. Artificial insemination can be effected three months after calving. The calves are weaned at birth and may be fed as indicated below.

Age of calf	Quantity of milk fed (litre)
0-5 days	2 (mother's colostrum)
6-15 days	3.5
16-30 days	4.0
1-2 months	4.5

BIOGAS FROM CATTLE MANURE

About 40% of the dry weight of cattle waste is constituted of carbon. Left in aerobic atmosphere, most of it undergoes microbial oxidation to carbon dioxide. Storing the produce in an aerobic medium results in microbial reduction of the carbonaceous fraction to methane. It is this principle that is used in the partially controlled decomposition process in the Gobar Gas Plant. Manure from four animals can generate fuel gas enough for a family. Though the cost of installation of the plant is a bit high, it requires no running expenditure and the gas is safe and innocuous. A Gobar Gas Plant has been installed at Kasaragod Centre and is working satisfactorily.

—Intensive Agriculture