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SOME USEFUL GUIDELINES TOWARDS ORGANISED INTERCROPPING

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ABSTRACT

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Preliminary observations on past trials suggest that a wide array of crops could be cultivated in association with coconut. This will lead to many advantages, increase in the yield of coconut, extra income from intercrops, more employment opportunities etc. For adopting an economically viable system of intercropping, a thorough understanding of the crop competition that exists between the coconut and intercrops for growth factors is an essential prerequisite. It will help to select coconut lands suitable for intercropping. Moreover, many of the failures of intercropping as well as accompanying drop in coconut yield have been mainly attributed to the wrong choice of intercrops. Rainfall, type of soil, terrain of the land, tolerance to shade, marketing and disposal of the final harvest are the main factors that have to be borne in mind in this respect. From the point of view of pest and disease outbreaks and maintenance of soil fertility, it is beneficial to adhere to a suitable system of crop rotation.

INTRODUCTION

In Sri Lanka, land which can be cultivated to give an economic return is limited. As such the most immediate need is to improve the returns per hectare by intensive use of available arable land. In the light of intensive cultivation of agricultural land, it is now felt that coconut cultivation as a monoculture is an outmoded concept. Considering the adequate interspaces and growth factors that remain unutilised in a pure stand of coconut, there is a tremendous potential for intercropping. In a conventional square system of planting, intercropping is possible for 35 - 40 years of the life span of palms. This change has been accepted in other coconut growing countries as well.

The Coconut Research Institute (CRI) has done extensive work on the cultivation and management of pasture and fodder species under coconut and these trials were mainly confined to the institute's estates at Lunuwila and Madampe. Since 1965, attempts were made to grow several other

crops in small plot trials to study their performance under these conditions but such findings appear to be of limited applicability.

Taking into account the fact that coconut plantations are distributed in the three agro-climatic zones viz., the Wet, Intermediate and Dry zones, preliminary trials were laid out in 1974 to study and demonstrate the most suitable crops and to assess their economic feasibility in respect of each zone. Lack of this information has greatly hampered the progress of intercropping.

SOCIO-ECONOMIC BENEFITS

The per hectare income obtained from coconut is the lowest among the three major plantation crops in Sri Lanka. The gross returns from coconut on the average is only about Rs. 625/- per hectare (anonymous, 1972). This is to be expected as nearly 65% of the total acreage of coconut lands is in the hands of the smallholder. In contrast, the gross average returns per hectare for Tea and Rubber are Rs. 3,500/- and Rs. 1,500/- respectively (anonymous 1972). As such, intercropping coconut lands could help the grower to maximise the net income from his holding.

Intercropping could also help to make the optimum use of land. Under the conventional system of spacing at 7.89 metre × 7.89 metre the percentage of land available for intercropping is about 69% after allowing 1.21 metres on either side of palm rows in the case of 0 - 5 year old palms and 54% after allowing 1.82 metres in respect of mature stands. Intercropping can be introduced with advantage into the main growing areas particularly the coconut triangle where there is a scarcity of cultivable land owing to the high density of population.

Generally, labour requirement of coconut is about 1 labourer for 4 hectares. With the introduction of an additional crop, extra labour is necessary, thus increasing the employment potential and providing a source of income to the farmer. From a preliminary survey conducted by the Agrarian Research and Training Institute in the Colombo district, it was revealed that a 20 hectare unit of class II coconut lands when intercropped could provide employment for 20 persons providing a monthly income of Rs. 354/- per head (unpublished information).

In experiments done at Lunuwila, it has been found that intercropping leads to an increase of nut yields (Santhirasegaram, 1966). This is to be expected since palms are indirectly benefitted by the added fertilizer, elimination of weeds and improvement of the soil fertility from regular tillage operations and crop rotation done to maintain the intercrops.

SELECTION OF SUITABLE COCONUT LAND

It is necessary that in attempting to intercrop coconut lands, there is no drop in coconut yields. Hence before embarking on intercropping

it becomes necessary to understand the basic concept of crop competition that exists between the main crop and intercrops for growth factors. Plant competition could be reduced to a minimum or eliminated altogether by selecting only suitable coconut land for intercropping. The intercrops would compete with coconut for soil moisture and plant nutrients while the main effect of coconut on intercrops would be the reduction of light available to them.

Competition for Soil Moisture

Moisture requirement of the coconut is very high and in fact it is the most important single factor that limits coconut yields. Intercropping will therefore be feasible only in areas where the rainfall is sufficient to eliminate the competition for soil moisture. There is experimental evidence to show that in all areas receiving an annual rainfall of 75" or more, there would be no competition (Santhirasegaram, 1966). Thus, intercropping could probably be practised successfully in coconut lands of the Wet and Intermediate zones under rainfed conditions during both Yala and Maha seasons whereas in the Dry Zone it could be successful only during the Maha season provided supplementary irrigation facilities are made available during critical periods of moisture stress.

Competition for Light

Age of the palm has a direct bearing on the availability of light to the intercrops. Under the conventional square system of planting at a spacing of 7.89 metres × 7.89 metres availability of light under a mature stand is about 40% - 60%. This amount of sunlight does not limit the cultivation of several intercrops. Work at this Institute has shown that intercropping can be satisfactorily done at two stages of the coconut stand, namely during the first 4 - 5 years and the period following the 25th - 30th year of age provided the palms stand at a distance of not less than 7.89 metres apart (Santhirasegaram, 1967).

Competition for Plant Nutrients

Competition for plant nutrients especially for Nitrogen, Phosphorus and Potassium can arise particularly in the less fertile soils. To prevent such competition liberal application of adequate amounts of fertilizer must be done, which will result in a proper growth of the main crop as well as the intercrops. To obtain best results, coconut should be manured as recommended by the Coconut Research Institute (see C.R.I. leaflet Nos. 8 and 36) and the intercrops manured with fertilizer mixtures recommended by the Department of Agriculture.

CHOICE OF SUITABLE CROPS

Distribution of coconut plantations in different climates and soil types permits the cultivation of a wide variety of intercrops and hence

selection of intercrops does not appear to be a difficult task. But it is worth remembering that many of the failures of intercropping as well as the accompanying drop in coconut yields have been mainly attributed to the wrong choice of intercrops. There are a few important factors that have to be borne in mind in the choice of intercrops if intercropping is to be successful.

Climate

Rainfall is the most critical factor in the choice of intercrops. The growth habits of the selected intercrops should fit into the rainfall regime of the different zones. Preliminary observations made on feasibility trials suggest that root crops (manioc, sweet patato, colocasia and dioscorea yams), fruit crops (banana, pineapple and passion-fruit), spices and condiments (turmeric, ginger and green chillies) and minor export crops (coffee, cocoa, pepper and cinnamon) appear to be successful in the Wet zone while cereals (maize and sorghum), pulses (cowpea, green gram and ground nut), fruit crops (banana, pineapple, passion-fruit and papaw), spices and condiments (turmeric, ginger and chillies), root crops (manioc, sweet potato, colocasia and dioscorea) and minor export crops (coffee, cocoa, pepper and cinnamon) could well fit into the rainfall pattern of the Intermediate zone. There is also reason to believe that cereals such as maize, sorghum and kurakkan, pulses such as ground nut, gingelly, castor and sunflower, root crops such as manioc, dioscorea yams, fruit crops like bananas and spices like chillies could give satisfactory results in the Dry zone.

Soil

In the selection of suitable intercrops considerable weightage should be given to the type of soil representing a particular area. This is necessary because the amount of water which the soil can retain and fertility of the soil depend to a large extent on the type of soil. For instance, crops like manioc, sweet potato, ginger, turmeric, chillies, pineapple and banana thrive better in a well-drained loamy type of soil.

Terrain

Coconut lands vary in gradient from flat to moderately sloping lands. From the point of view of the economic use of land, it is important to select the intercrops to suit the terrain of the land. In this respect, all permanent and semi-permanent crops that exhibit a dwarf growth habit and short-age crops which are closely spaced should be confined to the sloping areas while semi-permanent crops with a tall growing habit and short-age crops which are widely spaced and require supplementary irrigation should be limited to the flat areas of the land. In sloping areas it is important to plant them along the contour as a measure of soil and water conservation.

Tolerance to Shade

In a coconut land, one cannot expect a uniform light distribution everywhere whereas the intercrops should be established in such a way that they receive the maximum amount of light required for optimum performance. Generally, crops such as colocasia, dioscorea yams, coffee, cocoa, pepper, ginger and turmeric tolerate shady conditions and therefore should be planted in areas which receive relatively less light.

Marketing and Disposal

The demand and consumer preference of the intercrops in a particular locality will have to be considered to facilitate easy marketing and disposal of the crop harvest and thus avoid any wastage. It is also worth noting that crops which are perishable and hence cannot withstand the rigours of transportation should be located in areas close to the market.

ROTATION OF CROPS

Once the suitable intercrops are earmarked for a particular area, it is important to adhere to a system of crop rotation for their optimum performance. Such a system would eliminate crop losses due to pests and disease outbreaks as well as depletion of soil nutrients and soil moisture and thus maintain the soil fertility. Examples: chillies followed by ground nut and manioc followed by cowpea.

CONCLUSION

In the present context of providing food for the fast-increasing population, intercropping with food crops could exert a tremendous impact towards improving the agricultural productivity of coconut lands. It is estimated that over 200,000 hectares of coconut lands could be utilized for this purpose (Santhirasegaram, 1967).

With the creation of a large number of smallholdings of coconut lands as a result of the Land Reform Law, new owners will seek to increase the income from their coconut lands by way of intercropping. The information furnished in this article, it is hoped, will serve as useful guidelines for adopting a viable system of intercropping.

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Shade-tolerant turmeric grown under coconut in the Wet zone.
Green gram grown under coconut in the Intermediate zone.
Colocasia grown under coconut in the Wet zone.
Banana and turmeric grown under coconut in the Intermediate zone.