

Intensive cropping possibilities in plantation crops

Production per unit area of agricultural land, time and inputs can be increased by improving efficiency of the rate and extent to which solar energy is converted into economic produce. While calculations based on theoretical productivity of a crop under conditions of optimum management is 281.05 tons/ha the total biological production from a hectare of coconut plantation yielding on an average 100 coconuts per palm per year is only 17.1 tons/year. This indicates the tremendous possibilities that exist in plantation crops which occupy about 2% of the area cultivated under all crops in India for increasing production. Unlike in annuals where increased production is achieved through multiple cropping — growing a sequence of crops in succession over a relevant time span — in plantations which commit the land to the main crop for decades, the strategy

gives maximum net return to the farmer. Basically this calls for the full and efficient utilisation of the soil, the air space above that and the solar energy. Root studies taken up in coconut have shown that in a unit area of the plantation, coconuts planted at 7.5 x 7.5 m, 23 per cent of soil on area basis is only being effectively utilised

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The solar energy utilisation in any crop will primarily depend upon the coverage of the ground by its canopy. In coconut and for that matter in almost all the plantation crops, there will be variation in the apparent coverage of ground with age. Fig. 1

TABLE 1: Effective air space utilisation in coconut gardens

Age of the plant (years)	Approx. space occupied by a single plant (M3)	Total space occupied by the plants (spacing: 7.5m x 7.5m) in one ha of land (M3)	Total space available in one ha of land (M3)	Percentage utilisation
1	0.50	88	5,000	1.7
5	180	32,040	70,000	45.8
10	220	39,160	75,000	52.2
20	270	48,060	1,15,000	41.8
30	320	56,960	1,55,000	36.7
40	330	58,740	1,90,000	30.9
50	344	61,232	2,25,000	27.2



Elephant foot yam as inter crop

for maximising production has to be intensive cropping involving annual and perennial crop mixes and different cropping systems.

In the ultimate analysis, intensive cropping is that cropping system which

by the coconut roots. On depth basis 80% of the roots are confined to 31 cm-120 cm layers of the soil. These indicate that the coconut roots utilise relatively a small proportion of the soil mass and as such the soil can support other crops provided they are compatible combinations.

If the air space is taken into consideration, over a period of years the coconut by virtue of its varied size at different ages occupies different proportions of the total space (Table 1).

It is evident from the above that during the majority of the life span of coconut palms they occupy less than 60 to 70 per cent of the air space. Thus even on simple physical considerations a coconut plantation can support other plant species.

shows the apparent coverage of ground by coconut crown. Such a change takes place due to changes in the frond size and height of the plant and the resultant increase in the amount of sun light from the slant rays.

OTHER CONSIDERATIONS

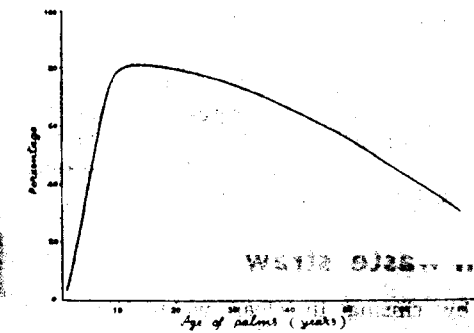
Intensive cropping systems through crop mixes can be most successful if the crops chosen for such systems have different nutrient and moisture requirement, varied feeding zones in the soil profile, different growing seasons for enabling the utilisation of natural precipitations, variable morphologic frame for fitting into the air space available and tapping the solar energy, varied life span which will make rotations possible and differential light requirement for the highest utilisation of solar energy. It is equally or more important that the crop combinations should not have any long term adverse effect

on the productivity of the soil. It will also be advantageous if the crop combinations include calory producing crops and also those which generate organic wastes that can get into the soil through a built-in recycling system or crops which can enrich the soil through other biological means. If crops are chosen on the basis of the above considerations for raising crop mixes they can be expected to contribute substantially to the production efficiency.

Research has been in progress at the Central Plantation Crops Research Institute for the last five years to study the possibilities of inter-cropping, mixed cropping, and mixed farming in coconut. The inter crops that have been tried consisted of tubers such as elephant foot yam, tapioca, sweet potato, coleus, and spices such as ginger, and turmeric. A few of the annual crop combinations that have been tried are given in Table II.

The economic advantage in cultivating crops such as yam, coleus, ginger etc. are very much evident.

In the mixed cropping trials, of the different crop combinations of coconut and cacao; coconut, cacao and pine apple; and coconut, cacao, pine-



apple and pepper, the highest estimated net return of Rs. 16,380 per ha. per year was obtained from the last combination as against a net income of Rs. 3,900/- per ha per year. Trials on mixed farming which consist of growing grass and legume and maintaining dairy animals gave an additional annual net profit of Rs. 2,850/- from a hectare of coconut garden during its initial years of operation.

Plantation crops being perennials require continuous attention all the year round in their management, harvesting and processing. For example, in tea, rubber and coconut harvesting is a continuous process. Crops such as arecanut, cashew, cacao, oil palm, coffee, pepper, cardamom, etc. which tend to be seasonal in relation to harvesting and processing come in the next cate-

creasing the intensity of cropping in plantations through mixed and inter cropping programmes and mixed farming techniques, employment potential could be further enhanced. In a cropping system involving coconut and cacao, the labour requirement per year per ha is of the order of 220 man-days as against 150 for a pure crop of coconut, while the same area of



Multistoreyed cropping.

gory in relation to the management and other requirements. Thus, the very nature of these crops is such that there is a necessity for continued employment in the plantation industry. By in-

coconut when cropped with a tuber like tapioca requires 400 man-days and when put to mixed farming requires 1,000 man-days.

ECONOMIC STABILITY

Unlike annuals most of the plantation crops are in the field continuously for decades together. This will mean that a given crop is subjected to the strain and stress of climatic parameters over years. To this extent the physiologic adaptability of these crops are much better as compared to the annuals, and consequently the crop losses that are met with in plantation crops are of a lower magnitude as compared to the annuals. The continuous income obtained from crops

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such as coconut, rubber and tea is also a point in favour. The situation can be further improved by mixed and intercropping patterns and mixed farming techniques all of which will considerably help to minimise the risk involved due to the market fluctuations and pests and diseases losses. In addition, there can be considerable saving in the cultivation expenses of these crops which will contribute substantially to the net return.

Coconut, being a palm has its own special features and the results obtained with this crop may not be applicable as they are in other plantation crops. Besides, coconut is essentially a small holders' crop and the conditions prevailing under such conditions are different from many other crops. In spite of these, based on the available data, it may not be very much wrong to state that plantation crops with their potential for intensive management probably represent one of the best avenues to stabilise income from agriculture.

TABLE 2. Yield and economic consideration of intercropping

Intercrop	Yield t/ha (net area)	Net return Rs./ha	Net return per unit amount of cost of cultivation.	Energy equivalent of harvested produce/ha* (million K Cal.)
Elephant yam (Local)	16.06	3608	1.28	10.15
Tapioca (H. 165)	11.90	2429	1.37	16.50
Sweet potato (H. 42)	13.61	1665	1.00	11.46
Ginger (Rio-de-janeiro)	15.90	10258	1.70	17.14
Turmeric (Armoor)	11.25	1172	1.29	12.06
Coleus (Local)	9.23	3104	1.83	2.94
Yam (Local)	17.80	4004	2.46	7.75
Lesser yam (Local)	19.90	3044	0.29	11.25

* Hectare gross area of coconut plantation

Company Notes

Jay Shree Tea & Industries Ltd.

The working results of the Company for the year ended 31st March 1975 show a further impressive improvement over the previous year's results. The profits before tax for the year touched Rs. 4.65 crores as against Rs. 1.97 crores in 1973-74. The rise in profits, which was achieved in spite of the substantial increase in costs of production, was contributed by practically all the units of the Company. The improved performance is attributed to three factors, (i) increase in the sale prices of all the products, (ii) Better manufacturing techniques which resulted in higher production, better quality and lowering of costs, (iii) Continuous programme of renovation and modernisation of machinery and equipment.

The increase in tea crop was marginal at 10.42 million kgs. as against 10.82 million kgs. during last year. The sale price of tea at Calcutta and Cochin auctions showed an improvement of Rs. 3.46 and Rs. 2.54 per kg. respectively at Rs. 10.99 and Rs. 8.53 per kg.

There was a major breakdown in one of the units of the plywood factories, which affected production adversely. However the damage has been repaired and the factory has resumed normal production.

The production of the fertiliser and chemicals touched all-time records.

In view of the record profits ob-

tained, the Company could declare a dividend at the rate of Rs. 1.60 per share on 21,86,650 equity shares as against Rs. 1.20 per share paid for 1973-74.

The share capital of the Company stood at Rs. 2.19 crores and the Reserves and Surplus increased to Rs. 7.74 crores as against Rs. 3.34 crores during the previous year.

Animal feed from waste straw

A pilot plant is now in production at Kimbolton, in Eastern England's grain-growing area, converting 20,000 tons of waste straw a year into a palatable raw material for animal feed.

By a patented process, based on the principle of using an alkali to rupture the cell walls of the straw, nutritionally improved straw is produced in pelleted form for inclusion in balanced livestock rations.

While the old way on the farm was to dip sheaves in caustic soda followed

by rinsing in clear water, the new automatic plant chops and grinds the straw, mixes in precisely metered quantities of alkali and, by very heavy pressure, extrudes the mixture through pelleting dies. The controlled action of the alkali takes place in the conditions of pressure and heat created in the extrusion process.

The nutritionally improved straw has an SE (starch equivalent) value of 45 to 50, roughly double that of untreated straw.