THE ECONOMICS OF COCONUT REPLANTING AND ASSOCIATED CROPPING (IN FIJI)

by
Dr. PATRICK MUMA[1]

1. INTRODUCTION

The importance of coconut stems primarily from its being an export crop. Coconut largely constitutes a crop of convenience in the basically agricultural, mainly subsistence, essentially rural-based economy of Fiji. It provides a basic dietary component and a source of cash income to meet social responsibilities, and employment opportunities in the various areas in which it is grown. Indeed, after sugar, coconut oil is Fiji's second most important agricultural export.

It is this importance which undergirds the significance of the concept of coconut replanting. With possible rejuvenation of the coconut plantations the coconut industry is expected to play an important role in supporting rural development. Such rejuvenation can be accomplished through inter-cropping as well as the introduction of high-yielding varieties (HYV).

This paper considers the economics of Coconut Replanting and associated cropping, not only as a viable option, but also a practically useful farming system towards achieving the development of a sustainable coconut industry.

The starting point of the discussion is the premise that in the circumstances suggested by the declining coconut industry, *poly-culture* (many crops system) has advantages over *mono-culture* (single crop system). My basic argument has a three-fold caveat. The first is that the need for coconut replanting and associated cropping arises from the different farming conditions of Fiji as a Less Developed Country (hereinafter LDC); in which case, the economics of coconut replanting must reflect recognition of the different conditions.

The second is that coconut replanting and associated cropping conforms to the logic of poly-culture as a farming system. This is because associated cropping is multi-cropping, involving poly-culture which also takes account of the different conditions of Fiji as a LDC. And thirdly, that as a farming system poly-culture or multi-cropping is consistent with the objective of reviving and developing the coconut industry to be economically viable and sustainable.

II. THE DECLINE OF THE COCONUT INDUSTRY IN FIJI

The decline of the coconut industry stems from a mainly three-fold cause due to conditions beyond the control of Fiji. The first deals with the natural (climate/weather) disasters which are rife in the region. Due to poor weather and adverse climatic conditions (such as Cyclone Sinha) copra production has often been affected.

The second is because of the vageries of a volatile worid market for most agricultural crops including Copra. Agricultural exports are subject to what is known as Engel's law: i.e. unlike manufactured goods their demand and prices do not rise as people's incomes increase; this means that both their demand and price elasiticities are relatively low, leading to price instability and declining production. The consequent unstable export demand, in turn, depresses production. Experience

[1] Chief Economist, Economic Planning and Statistics, Ministry of Primary Industries and Cooperatives; Suva, Fiji

shows that growers react negatively to a price fall, and this affects production, output and productivity.

The third concerns the senility of the coconut trees. The viability of coconut production is constrained by the advanced age of the coconut trees; so that the natural, inevitable occurence of senility of the trees, by reducing the returns to coconut development, does not stimulate coconut expansion by farmers.

All these factors have conspired to inhibit development of the coconut industry which has so far been plagued with low world market price and excessive competition by other coconut-producing countries.

TABLE 1 :
COCONUT PRICE TRENDS - CONSTANT 1990 DOLLARS F$ / TONNE

YEARS	WORLD COCONUT OIL FOR PHILIPPINES	EXPORT FOR FIJI	PRODUCER COPRA PRICE	
			WITH SUPPORT	WITHOUT SUPPORT
1980	972	947	551	588
1981	753	791	482	279
1982	657	665	451	216
1983	817	1,083	494	489
1984	1527	1,705	588	885
1985	847	994	489	464
1986	409	365	378	154
1987	577	588	364	278
1988	839	887	402	422
1989	791	619	337	367
1990	490	452		

SOURCES MPI Annual Report

As shown in Table 1, the price trends for world coconut oil, and producer copra prices (with and without support) as well as exports generally indicate a three-fold aspect, viz :

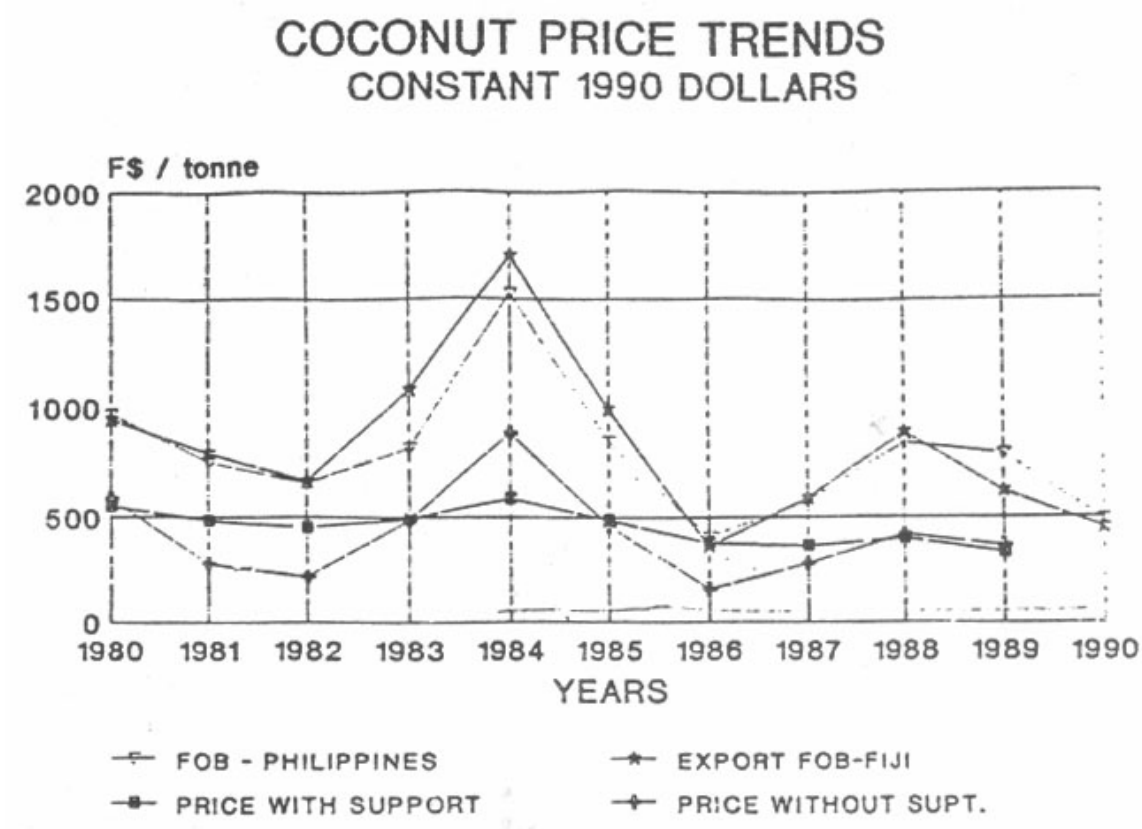
(a) an erratic feature on the whole, which reflects the volatility of world market price and demand conditions;

(b) an uncertain, and somewhat inpredictable, demand pattern which underscores the fragile demand-supply equation in the case of copra; and

(c) a general downswing especially in the case of producer copra price, which highfights the low price elasticifies of agricultural products like copra.

All the items reveal trends which, to a large.extent, explain the instability of the coconut industry except in the case of price with support which is in fact aimed at restoring some measure of stability as indicated in Chart 1.

CHART 1



But the declining role and importance of the coconut industry comes into sharp focus by considering coconut oil as the main commodity.

As shown in Table 2, despite occasional minor interruptions (in 1982, 1984 and 1986) the pattern of exports indicates a declining trend for quantity exported; which is almost equally matched in the case of *value* and *price* for the exports as highlighted also in Chart 2.

TABLE 2

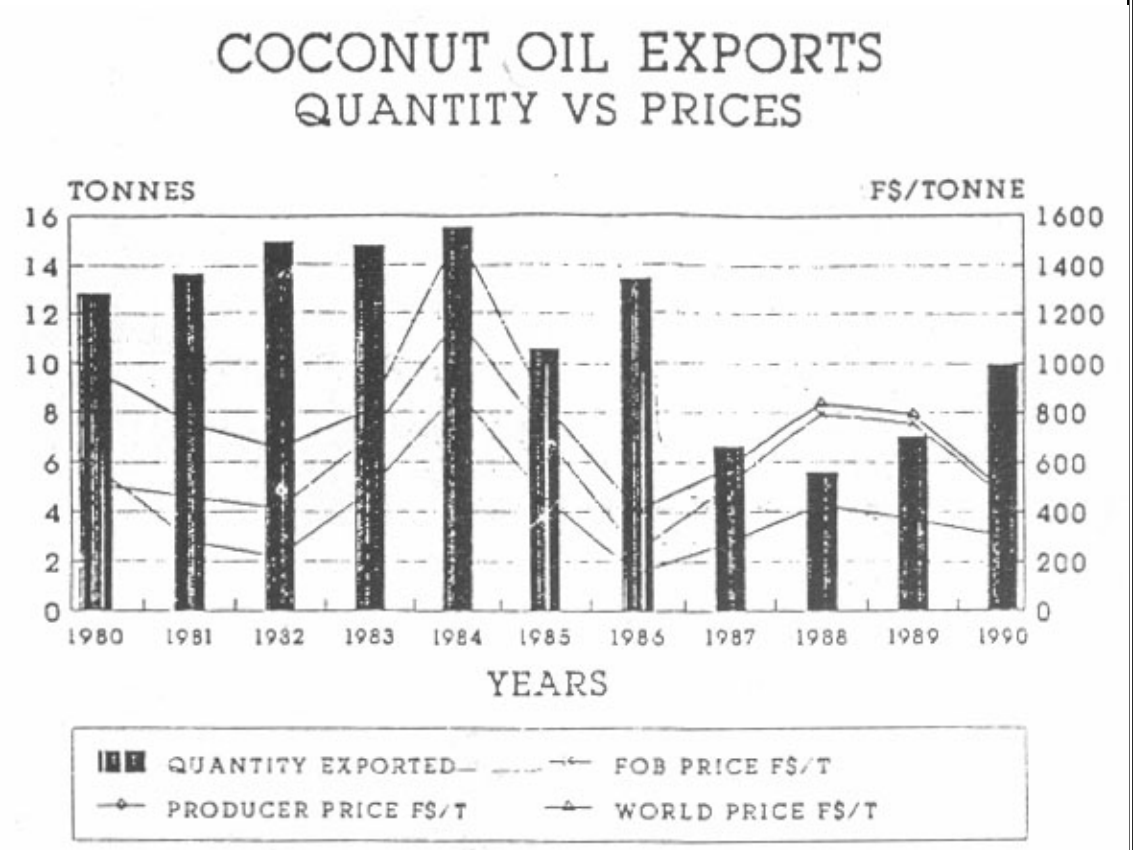
YEAR	PRODUCTION COPRA (TONNE)	PRODUCTION COCONUT OIL (TONNE)	QUANTITY EXPORTED (TONNE)	FOB VALUE F$'000	FOB PRICE F$/T	PRODUCERS PRICE 1/ F$/T	WORLD PRICE 2/ F$/T
1979			15,238.00	11,683.00	767.00	433.00	820.00
1980			12,845.00	6,578.00	512.00	588.00	372.00
1981			13,659.00	6,470.00	459.00	279.00	753.00
1982			14,940.00	6,175.00	413.00	216.00	657.00
1983			14,757.00	10,425.00	706.00	489.00	817.00
1984			15,513.00	18,448.00	1,189.00	885.00	1,527.00
1985			10,642.00	7,637.00	718.00	464.00	847.00
1986	22,476.00		13,395.00	3,260.00	243.00	154.00	409.00
1987	13,095.00		6,624.00	3,354.00	506.00	278.00	577.00
1988	10,713.00		5,570.00	4,411.00	792.00	422.00	839.00
1989	13,367.00		7,009.00	5,270.00	752.00	367.00	791.00
1990	18,937.00		9,972.00	4,630.00	464.00	300.00	490.00
Projected ……							
1991							
1992							
1993							
1994							
1995			10,000.00	8,000.00	800.00	400.00	482.00
2000			10000.00	9,000.00	900.00	600.00	448.00

Source: Copra Board Annual Reports, Bureau ofStatistics, world bank.

l/- Fij copra price as assessed using official formula Price expressed does not include price support at constant 1990 dollars.

2/- World Price hased on Philippine oil cif Rotterdam in 1990 constant dollars World prices projection sourced from World Bank price forecasts.

CHART2:



SOURCES : MPI Annual Report

III. THE ECONOMICS OF COCONUT REPLANTING

While there is need to foster development of the coconut industry, the options open include diversification away from an oil-based industry to other alternative by-products, as well as introducing HYV's and adopting a more viable farming system ofcoconut replanting, and so on.

Coconut replanting also involves multi-cropping which can be regarded as a farming strategy of survival to enable the farmers reduce the financial, technical and managerial problems and/or avoid the climatic and other environmental constraints or contradictions.

If so, what are the multi-cropping/inter-cropping approaches used?; or why should replanting and associated cropping be recommended as a desirable system ? With which crops can multicropping best be accomplished? Are the products marketable ?; Where? In short, does the economics of coconut replanting justify a particular approach or system in the bid to revive the coconut industry?

These questions raise important issues. To address these issues it, is necessary to grasp what we really mean by the economics of coconut replanting and associated cropping. But first, some brief clarification of the extent of application of conventional economic (farming) model or textbook theory or concepts to the different farming conditions of Fiji and other LDC's is necessary and useful.

a) Economics and LDC's

As a textbook *paradigm* economics initially referred to the advanced countries (AC's) : developed and industrialised, largely urbanbased and wholly monetised, especially the Western capitalist countries. Considerable modification/adjustment is needed before applying the economic concepts and models, principles and axioms to the LDC's: elimatically uncertain, essentially agricultural and mainly subsistence, rural-based and partly un-monetised.

In Fiji (as in Affica or Asia) economic activities mostly revolve around the cultural core of land, village and family; and while these key pillars of society determine socio-economic actions, ecortomic activities and business transactions are closely tied to social customs and village institutions. The problems and circurnstances of the economic agents and business actors under these conditions are therefore different from those of the A.C.'s.

Consider the case of the rural farmer (or peasant), including the small holder coconut grower. He is subject to a number of constraints and problems, including harsh and unpredictable weather conditions and/or climatic hazards (e.g. droughts and floods), etc. He is also poor and lacks financial, technical and managerial capacity. He cannot afford to take risks: for him risk-premium is an increasing function of asset, and a decreasing function of risk.

All this suggests not so much that he is irrational, but that he has to be cautious. The choices open to him are either nill or negligible: they are so very limited that he bases his decisions and actions on a survival strategy. In other words, in the bid to survive the range of constraints and problems confronting him, he adopts a survival *algorithm* by *choosing* a bundle of (traditional) practices which may not be, or appear, efficient; but which nevertheless may serve him and his objective to survive quite well. After all, his prime concern is to ensure security.

In short, he is more of a *pessimising optant* than an *optimising peasant.* (as alleged in traditional (textbook) economic theory). He opts for a bundle of practices which may only add up to an economic activity in which his marginal productivity is equal to zero: he is not, after all, an optimiser, but a choosing, risk-averting survivor (or pessimising optant).

Under such conditions his MVPE (Marginal Value Product Equalisation) translates into MEVPE (Marginal Expected Value Product Equalisation): e.g. it depends on the amount of rainfall (or lack of it), the occurence and extent of damage of cyclone, drought or flood etc; and indeed, on how far he can cope with the existing constraints or problems.

The conditions of coconut farming in Fiji is more closely related to the latter (MEVPE) than the former (MVPE). Considerable adjustment or modification/adaptation is therefore needed before applying conventional models (including farming systems etc) to the economies operating under such conditions.

b) The Question Of Choice

So what do we mean by the economics of coconut replanting under the above conditions?

It is sometimes said that definitions warm the beart of Humpty Dumpty. It is not easy to define economics; nor is it desirable or necessary to do so for our purpose. Without therefore delving into the technical definitions (and there are plenty!) of economics, it suffices to say only that economics deals with the exercise of choice: i.e. how the wants and desires of people are satisfied (by means of goods and services) through the economic/*efficient* use of scaree resources (such as coconut land). The key word is C H O I C E - whicb has to be also efficient, rational and cost-effective.

The choice devolves upon the inter-cropping approach as a farming system. The inter-cropping pattern is significant because;

i) there would be no reason for replanting if the coconut trees were not senile and producing few crops;

ii) the time span from replanting to maturity is quite long; and

iii) other quick-yielding crops have to be planted in association with the coconuts to enable the farmer subsist during this period.

It follows that the choice of the associated crops is significant in the process of coconut replanting as a simple, albeit practically useful, "ordinary business of life (as Alfred Marshall once defined economics) in the community of the coconut farmers.

Thus the economics of coconut replanting deals with choosing the most rational and efficient/cost-effective approach to the replanting of coconut and associated (inter-) cropping as a farming system. The economic objective of such a choice is to maximise net returns; and this is achieved by making the right choice which enables the coconut farmer to maximise production through avoiding many of the problems, or reducing the constraints and contradicitions clue to the conclitions under which he operates.

c) Net Returns : A Crucial Issue

Certainly the economics of coconut replanting ernabraces not only the choice of the reasonably efficient, cost-effective, approach; but also an evaluation with a view to indicating the potential for resource maximisation. It therefore hinges on enhancing net-returns from coconut lands by adopting a particular farming system. The basic economic issues, then, boil down to matters of costs versus benefits. To be regarded as reasonably efficient and econornically worthwhile, the chosen approach should be capable of yielding reasonable net returns to the farmer.

A useful iflustration here is not amiss.

Suppose

1) We are deciding to choose between the following combinations in Year l and Year 2.

2) The following are taken into account when defining our (economic) resultstincome from sales.

CROP	SALE PRICE
(a) Cassava	20 F$/kg
(b) Yam	30 F$/kg
(c) Yaqona	60 F$/kg
(d) Dalo	30 F$/kg

3) Outgoings (= costs) include

(a) Labour costs (at a rate of 500 F$/man/day),

(b) Hiring of ploughing equipment.

(c) Planting mateirial purchases, etc.

ROTATION 1

Kg/plot REP I & II t/ha	Sale price (F$)	Income (F$)	Cost (F$)	Balance (F$)	
YEAR 1					
Mix Cassava	513	4.0	20	10,260	
Dalo	524	4.1	30	15,720	
Yaqona	321	2.5	60	19,260	
	1,358	10.6		45,240	42,300 + 2,940
YEAR 2					
Dalo	803	6.3	30	24,090	15,000 + 9,090

ROTATION 2

YEAR l					
Dalo	1,105	8.7	30	33,150	23,040 + 10,100
YEAR 2					
Mix Cassava	408	3.2	20	8,160	
Dalo	295	2.3	30	8,850	
Yaqona	601	4.7	60	36,060	
	1,304	10.2		53,070	21,000 + 32,070

Obviously, choice of which of the combinations (or fanning systems) will depend heavily on the net returns (balances); although it might also be determined by factors such as the mix of crops, rotational pattern and the length of time the crops take to grow as well as those relating to a range of other enviromental/climatic conditions.

IV. A TYPOLOGY OF COCONUT BASED FARMING SYSTEMS IN FIJI

A typology of Coconut-based Farming Systems reveals a range of types from small holders, (2.0 - 8.5 Ha) to large holders (6.0 - 200 Ha); the majority (i.e. roughly 69.5%) of these are under traditional (mataqali) family unit system, while the estates make up 22% of the total coconut area.

As far as the farming system practice is concerned, the traditional farmer's survival strategy has always been based on cultivating a mixture of subsistence rootcrops as a means of maintaining his coconut stands, and provide the daily needs of his family. This can be characterised as multi - cropping (or poly-culture - as opposed to mono-culture). Even the estate owners also engage in multi-cropping, although their objective for doing so is different : Le to increase income per unit area and maximise their net returns.

In Fiji multi-cropping (with coconut) is based on Four approaches as follows:

(a) COCONUT - COCOA

Cocoa is grown under coconutsin an estimated area of 176 Ha. This is a recent idea which is fast spreading as cocoa (also an export crop) is being given government emphasis as one of the crops to diversity away from sugar.

(b) COCONUT - YAQONA:

Yaqona (*Piper methpsyticum*) is also grown under coconuts. Indeed, it is the second most important inter-crop after cocoa, with an estimated average of 392 Ha. But it is fast gaining grounds as it becomes more commercially popular. During especially the last five years its popularity has been well tested and proven through the high prices and the increasing local and overseas markets which have accompanied its extension.

(c) COCONUT - CASSAVA

Cassava (*Manhot esculenta*) is a traditionally common crop that is also grown under coconuts. It is therefore the most popular inter-crop under coconuts; nevetheless it is not commercially important, being mainly grown for subsistence requirements, while any surplus is sold in the local market.

(d) COCONUT - DALO

Another crop that is also fast becoming popular as an inter-crop - especially in the coconut estates - is dalo (*Colocasia sp*.). This is because of the high net returns, and the opening of a new export market for Dalo to Australia and New Zealand.

While the above inter-crops provide some of the commonly used approaches that might prove useful in the context of a coconut replanting scheme, it is noteworthy that there are other approaches which either

(a) Make use of crops less important than those mentioned: e.g. bananas (*Musa sp*.) Yams (*Doscora sp*.) Pineapples (*Ananas sp.*), Vanilla (*Vanilla fragrains*), Sweet potatoes (*Ipomea batats*); or

(b) Are based on livestock (e.g. cattle and goats) which are commonly reared in large coconut holdings.

Especially the latter is being encouraged by the Division of Animal Health and Production of the Ministry of Primary Inclustries.

V. WHICH SYSTEM TO CHOOSE?

The question to ask, then, is which of the above typology is the most economic by being efficient and/or cost-effective under the conditions of the coconut planters?

To be sure, the answer to this question is not exactly easy; and the reason for this is because there are many factors to consider. But since the focus of the concern is with the *economics* of coconut replanting and associated cropping, the key issue revolves around the word *cost effectiveness*: i.e. with regards to enabling the coconut (re) planter to choose a relatively efficient/cost-effective approach (or system), so as to minimise his cost or maximise his benefits (or returns) without taking too much risks.

Much therefore depends on the net returns, which are, in turn, a function of such economic variables as production and per unit cost, sale price and market outlets for the products etc.

TABLE 3: COMMODITY: YAQONA

YEAR	PRODUCTION (T)	QUANTITY EXPORTED (T)	FOB VALUE F$'000	FOB PRICE F$/kg	PRODUCERS PRICE F$/T	WORLD PRICE 1/ F$/T
1979						
1980						
1981						
1982						
1983						
1984						
1985						
1986		76.90	438.00	5.696		
1987		71.80	578.50	8.057		
1988		48.70	586.00	12.033		
1989	1,169.00	135.00	947.20	7.016		
1990	2,582.00	145.50	1,138.00	7.821		

SOURCE: MPI Annual Report

A close study of Table 3 reveals an increasing trend not only for Yaqona production, but also of a growing export market for this product. This suggests its potential as a possible inter-crop. If especially the latter continues it means that Yaqona constitute one of the strongest contenders as possible associated crops, more particularly so as its income-generating potential seems relatively quite high.

TABLE 4: COMMODITY: DALO

YEAR	PRODUCTION (T)	QUANTITY EXPORTED (T)	FOB VALUE F$'000	FOB PRICE F$/kg	PRODUCERS PRICE F$/T	WORLD PRICE 1/ F$/T
1979	5,324.00	49.00	23.00	0.469	181.00	-
1980	8,544.00	60.00	91.00	0.517	489.00	-
1981	9,948.00	25.00	19.00	0.731	289.00	-
1982	9,780.00	36.00	39.00	0.083	526.00	-
1983	19,356.00	303.00	129.00	0.426	473.00	-
1984	18,000.00	432.00	330.00	0.764	570.00	-
1985	17,000.00	116.00	106.00	0.914	450.00	-
1986	12,020.00	560.00	460.00	0.821	460.00	-
1987	12,680.00	131.00	117.00	0.893	450.00	-
1988	8,723.00	620.00	558.00	0.900	500.00	-
1989	9,000.00	1,078.00	1,035.00	0.960	550.00	-
1990	11,446.00	2,106.00	2,638.00	1.253	-	-

SOURCE: MPI Annual Report

In the case of dalo as shown in Table 4, there is also a growing trend both in production terms as well as exports. Both crops have a fairly sizeable local market as well. But three things are worth noting in the case of Yaqona.

a) The fact that the exporting of the product is a very recent phenomenon.

b) That there was a downturn in exports immediately after the coup and until 1989; and

c) That the FOB value earned from exports has, somewhat consistently, been increasing in spite of the erratic trend of the quantum of exports.

In the case of Dalo, there is much greater variability in export quantity and value, as there is in production. But particularly with regards to the value of exports, the figures reveal a trend that is significantly erratic, with sporadic huge jumps in the last two years (1989 and 1990).

Comparing the two products the tendency would seem to be to opt for yaqona instead of dalo because of the relatively better trend, and the prospect of a sustainable export market. On the other hand, dalo takes relatively shorter time to grow; and even though the figures indicate variations over the years, they certainly also show quite huge export earnings as well as reasonable production quantity and exports.

All in all, there seems to be little to choose between the two, although one might be tempted to opt for dalo because it is also easier to cultivate, and it takes a shorter time to grow. But there is no reason why both cannot be used as intercrops, and presurnably alter the components in combinations with other crops.

VI. A RANGE OF OTHER FACTORS

Influencing the choice of crops and animal species of a farming system are a host of other non-economic as well as economic factors. These factors range from those constraints/problems due to either soil or climate; to those relating to either the age of the coconut crop and moisture available; or the topography and layout of the plantation; postharvest technology problems' and socio-economic background of the farmers, and so on.

It follows that while the problems or constraints of one area or country may be different from another, the particular intercropping pattern, or associated cropping system, will also vary according to the combinations of crops adopted. Thus, the choice of the farming system components depents as much on the special conditions or problems they impose, as on the country/area and the existing constraints.

TABLE 5:
COPRA PRODUCTION BY REGION & YEAR (1981-1990)

Year	Viti Levu (Western & Central)	Lomaiviti	Vanual Levu & Taveuni (Northen)	Lau, Kadavu Rotuma	Other
1981	1,007	1,977	12,048	5,270	69
1982	874	2,229	13,039	5,845	69
1983	989	2,261	14,053	6,220	43
1984	1,831	2,403	14,249	6,022	40
1985	1,910	1,924	12,368	4,991	37
Total	**6,611**	**10,794**	**65,757**	**28,348**	**250**
1986	969	1,839	14,442	5,201	24
1987	596	1,520	8,062	2,911	5
1988	237	1,299	6,788	2,385	4
1989	344	1,166	7,955	2,901	3
1990	486	1,472	11,939	5,108	
Total	**2,605**	**7,296**	**49,186**	**18,506**	**36**

Source Derived from Copra Board Annual Reports

Presurnably, in Fiji, Table 5 reflects differences which perhaps may be due to some of such factors. Easily noticeable is the fact that the Northem region (Vanua Levu and Taveuni) produces the largest quantity of copra; and that this predominant position is also maintained and reflected in the trends for the different regions inspite of the erratic patterns as indicated in the production figures of each one of them during the period (1981-1990).

Internationally, in Malaysia coffee and vegetables may be more suitable to soils with lower acidity, while pineapples can come up well in highly acidic soil. By contrast, in Sri Lanka, pineapple growing is almost wholly coconut-based; while in Jamaica the inter-cropping combination of banana and coconut was so successful that it, saved the farmers from economic disaster when *lethal yellowing* almost wiped out the coconut crop.

Further, some work based on feasibility studies under rainfed coconut gardens, and involving different crop species and varieties as inter-crops, revealed that the tubers and rhizornatous crops were relatively more renumerative components in the systems than cereals, pulses and oilseeds.

Also, as far as efficient production is concerned, nutrient cycling and biological complimentarity resulting from associated cropping are said to be two important contributing factors to better pertormance of the farming system. While this may be true, other criteria than those of biological efficiency or performance determine the small-holder's choice of crops and systems. These include socio-economic conditions and constraints often unrelated.

Conceivably, the orientations of coconut replanting researeh should be focussed on on-farm testing based on out-reach programmes and extension-related activities. And this should also provide the main planks for tailoring technologies, and for national/regional planning or policy making.

VII. THE WAY FORWARD: SUGGESTIONS AND CONCLUSION

Choice of the relevant planting and associated cropping system is a function of existing conditions and constraints of the particular area or country. Some crops grow better under certain topographical, climatic or soil conditions than in others; and such differences may reflect on the problems, constraints and contradictions of particular countries or areas within a country. This implies the need to know not only *what* choice of inter-crops to adopt in association with coconuts, but also *why* the particular combinations have been choosen as a farming system, and how best to, achieve the revival and development of the coconut industry on a sustainable and economically viable basis.

1) Concrete suggestions :

A number of suggestions can be derived from this implication as follows :

(a) The first deals with the overall strategy and policy thrust as far as development of the industry as a whole is concerned; and while the aim and rationale behind coconut replanting is to revive and develop the industry, the policy objective should encompass strategies to improve the industry as a whole. Particularly in view of the domestic and external marketing demands there is also need for diversification of the coconuts products. Instead of relying on a few export markets - for one/two products (e.g. coconut oil), efforts should also be devoted to exploring the possibility of producing other coconut by-produts. Otherwise concentration on expansion of production alone would not solve the chronic problems of the declining industry.

(b) The second focuses on the senility of the cocanut trees, and deals with the reluctance of (especially small holder) farmers to cut down their old trees. For many of them, these trees constitute a symbol of their *roots* and even holds a socio-psychological significance. Only

strong economic reasons would convince them to chop the trees down and engage in replanting. In this case, perhaps the strongest persuasion is an alternative economic use of the chopped down logs; and one that may offer alternative economic attraction as compensation and should be emphasized, is the saw-miling and logging of the felled trees presurnably on a subsidized/cooperatives basis.

(c) The third is essentially economic and relates to the marketing possibilities which exist for the inter-crops themselves, and which should serve as a guide to choosing these crops. It therefore impinges upon the main economic objective of coconut replanting and intercropping; so that selection of the intercrops should be based at two levels:

i) Whether the associated crop to be planted with coconuts has its markets abroad (e.g. cocoa), and the size of the available export market i.e. if it is economically viable; and

ii) If the crop has an essentially local market (e.g. cassava).

It turns out that some of the possible crops may not have a viable export market. The market for some crops may be domestic, while others may be export-oriented, and still others may be both: i.e. the crops may be marketable both locally and internationally.

These are factors which are worth considering in deciding upon the particular type(s) of farming system, along with the soil, climate, weather and other environmental conditions favourable to the crops.

It is therefore necessary for policy dealing with coconut replanting and intercropping to consider the marketing possibilities carefully in deciding upon the particular type(s) of intercropping farming system.

(d) The fourth relates to the development of High Yielding Varieties (H.Y.V.) of both coconuts and the particular intercrops. In this context there is need for researeh activities to be expanded to include work relating to hybrids which would flourish under conditions of farins in Fiji.

A closely related area is concerned with researeh also on the relevant combinations and pattern of inter-cropping which leads to high yields - i.e. what particular mix of crops and rotational pattern will yield the best production and/or result in highest net returns (see the calculations on page 10).

(e) The fifth, while also impinging on researeh, deals with the crop/soil/climate/weather interaction. It is well known that these variables react within a performance system in which they impact on productivity and production. There is need not only to know and recognise the interaction of these variables and their effect on particular intercrops as well as coconuts, but also - more important to generate the relevant knowledge and communicate this as simply as possible to the farmers.

And while it is the function of researeh to determine the nature, form and extent of such interaction or effect, it is that of Extension to ensure that the knowledge is simply and properly communicaded to the farmer.

2) CONCLUSION : From Lab to Farm

To be sure, it is not enough to simply generate researeh knowledge in the Lab or researeh site; it is even more important to disseminate the researeh findings and knowledge to farmers as end-users. It is the task and responsibility of the Extension Officers to ascertain that the researeh

knowledge and findings generated in the Lab (or site) are transmitted to the farmer who must also be encouraged to use them.

There is a sense in which the Extension officer is a useful link between the Lab or Researeh site and the farm; between the Researchers and the Farmers; and between innovative ideas and farming practice. In this sense, his role and responsibility is as important as that of the Researcher. Both the researehers and Extension Officers should engage in effective co-ordination of efforts so as to maximise the benefits and effective use of researeh-generated new ideas.

Thus, *From Lab to Farm* is a useful work-a-day motto which underlines the needed cooperation as a basis for effective collaboration of efforts between Researeh and Extension. As such, it should serve as a practical guide in ensuring that the relevant researeh findings, ideas and knowledge reach, and are used by, the farmers.

Lab and farm *should* meet.

NOTES AND REFERENCES

1. For detailed discussion on this see P.A. Muma, the Therapy of Distance : The Human Face of Economics, Paper delivered at the Development Studies Association Conference, University of Oxford, Queen Elizabeth House, Oxford, Vol. 14, England, September 1981; See also Patrick A. Muma, Economics and Development : A Third World View, in Journal of Pacific Studies U.S.P. 1988; and Dudley Seers, The Limitations of the Special Case, Bulletin of Oxford University Institute of Statistics, 1968.

2. Michael Lipton Theory of the Optimising Peasant, Occasional Paper Series, Institute of Development Studies, University of Sussex, 1968.

3. Maria Paulo: Coconut based Farming Systems in Fiji, Sumith de Silva (ed.), Coconut based Farming Systems: Proceedings of the XXVII Cocotech Meeting, 1990.

4. Maria Paulo, op.cit. p. 137.

5. K. V. A Bavappa, Management of Coconut based Farming Systems, in Sumith de Silva (ed.) op. ct p. 493

6. Prafulla K. Das, Economics of Coconut based Farming Systems, in. Sumith de Silva (ed.) pp.cit, p. 539.

7. P. K. Das, op. cit.