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The Soil Resources of the Fiji Islands

by

I. T. Twyford

formerly Soil Chemist, Department of Agriculture, Fiji

and

A. C. S. Wright

formerly Senior Pedologist, New Zealand Soil Bureau

Edited by I. T. Twyford

Volume I

In two volumes, price £7-7-0 the set
of which Volume II contains the maps
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Chapter 1

Introduction

1 GEOGRAPHICAL BACKGROUND

The Fiji archipelago is situated fairly centrally in the south-western sector of the Pacific Ocean, in a position approximately 1,150 sea miles from Auckland, New Zealand, and 1,710 sea miles from Sydney, Australia. The group thus lies towards the southern margin of the tropic belt, roughly corresponding in south latitude with Tahiti and Rio de Janeiro, or with Jamaica and Hawaii north of the equator. The 180th meridian passes through the Fiji Islands; the westernmost islands are contained by the 176° meridian east of Greenwich and the easternmost by the 178° meridian west of Greenwich. The northernmost island, Rotuma, lies in latitude 12° 28′ S, and the southernmost islands of the Ono-i-Lau cluster lie in latitude 21° 20′ S. The Fiji archipelago comprises well over 300 islands, although only about 100 are permanently inhabited. There is, in addition, a very large number of small islets, some little more than rocks and sand cays, many of which have as yet, only local names.

The aggregate land area of the archipelago is about 7,040 square miles, more than half of which is accounted for by one main island, Viti Levu, with an area of 4,011 square miles. The second largest island, Vanua Levu, has an area of 2,137 square miles: thus the two main islands together account for 87% of the total land area.

The capital and chief port of Fiji is located at Suva, in the south-eastern part of Viti Levu. Lautoka, the second largest port and urban area, is in the north-western sector of the same island. Nadi and Laucala Bay, Suva, the bases for land and seaplanes respectively, are also located on Viti Levu. Labasa is the main town and port of Vanua Levu, while Levuka the old capital, is on Ovalau Island off the east coast of Viti Levu.

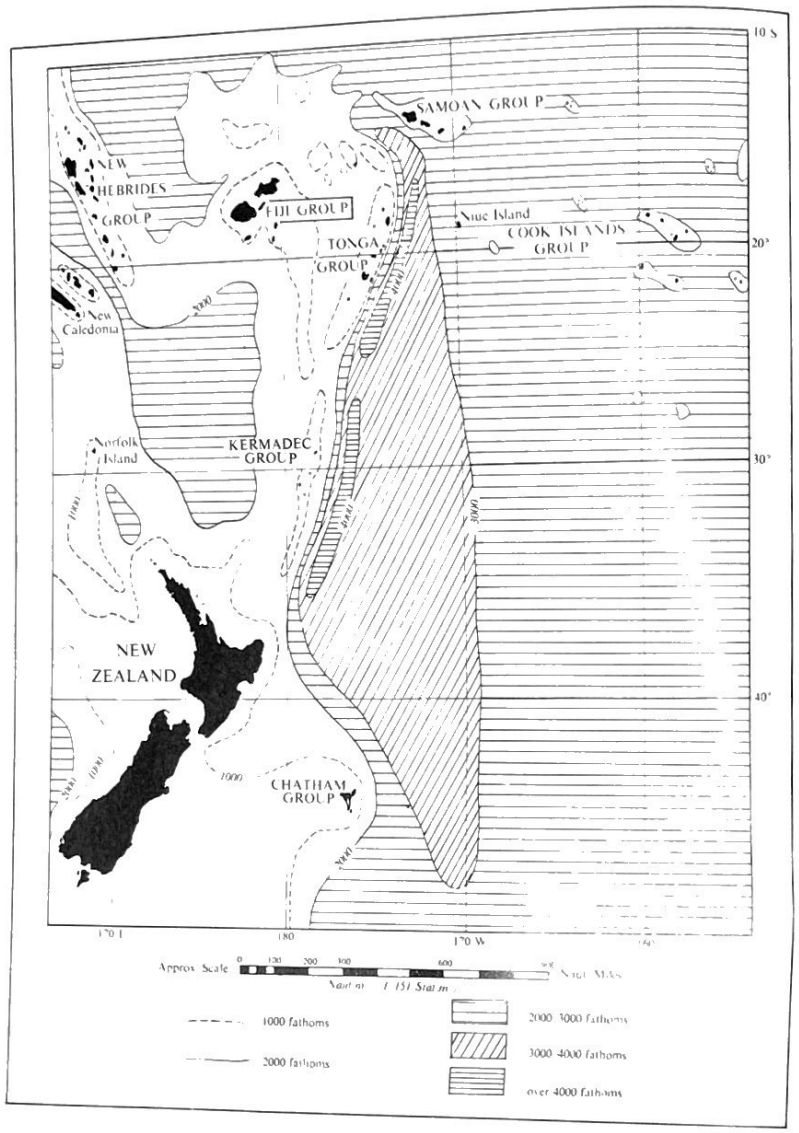
There are frequent and direct shipping and air services connecting Viti Levu with the main centres of the Antipodes, the western hemisphere and the United Kingdom. A few overseas ships and some small Fiji-based cargo vessels ply between Fiji and other Pacific islands. A considerable fleet of these small craft carry produce between Viti Levu and the other Fijian islands.

Internal communication between towns on Viti Levu is mainly by road, although some passengers and freight travel by the internal air service maintained by Fiji Airways. This latter service also connects Viti Levu with Vanua Levu and Taveuni island, although most inter-island freight is carried by sea. Road construction is, as yet, mainly confined to Viti Levu and although road construction on Vanua Levu is now progressing, much of the internal communication on this island is still by sea or by foot tracks.

A more complete account of the geographical background of Fiji is provided by Derrick (1951), but enough has been said to indicate that the geographic location of the Fiji group and the dispersed nature of the component islands within the archipelago is one factor which has to be taken into account when considering the development potential of soil resources.

2 HISTORICAL BACKGROUND

The Dutchman, Abel Tasman, in 1643 secured for Fiji a place in European cognisance at the very dawn of discovery in the Southern Ocean, although the only known representative of the



Fijian archipelago for many years was a humble sand cay, Nukubasaga, in the northern Lau group (Henderson, 1933). James Cook, in 1774, added Vatoa, or Turtle Island, another small island in the Lau group (Cook, 1784), and it was left to Bligh, bound for Batavia, in the long-boat of the captured *Bounty* in 1789, to chart a passage through the centre of the archipelago (McNab, 1908). In 1792 Bligh was back again in a more suitable vessel and on this visit charted the position of 39 islands in the eastern and central sectors of the group. The first published chart

of the Fiji archipelago, usually referred to in England at this time as Bligh's Islands, was issued from the House of Arrowsmith in London, in 1814; this map was based mainly on the work of Bligh and a Captain James Wilson of the London Missionary Society who had passed through the north-eastern sector of the group in 1797 (Wilson, 1799).

The Southern Ocean gradually became alive with European vessels. First came whalers, and then sandalwood and bêche-de-mer traders. From about the year 1800 an ever-increasing number of Fijians were making their first contact with Europeans: in time some of the latter, through force of circumstances or from choice, came to reside in the Fijian villages.

One aspect of European culture greatly admired by the Fijian was undoubtedly the musket, an invention admirably suited to certain aspects of the Fijian way of life, and by whose help the pattern of many small tribal units became changed into one of large militant tribal confederacies. With the approval of Europeans resident in the Group, power gradually became concentrated in the hands of one confederacy and its leader, Tui Cakobau. Meanwhile an influx of European settlers, many of them from the nearby colony of New South Wales, arrived before the Fijians had adjusted themselves fully to the musket era. It is not unlikely that the Fijian leaders of this time were, by their own standards, men of far greater worth and stature than the majority of the Europeans who set themselves up as Fijian advisers, and early attempts at organised government foundered because the art and artifice of a cash economy were scarcely comprehended. Eventually, to protect their investment in Fiji, the local Europeans sought to persuade both the Fijian leaders and the Colonial Office in London that Colonial status for the territory was desirable. In view of the fluid situation at either end of a long and tenuous channel of communication, it was no mean achievement when, after at least one abortive attempt, the Fijian leaders agreed to cede the territory to the Queen of Great Britain on the 10th October, 1874. The Fijian point of view was well expressed by the King of Fiji (Gordon-Cumming, 1881, quoted by Derrick, 1946): 'If matters remain as they are, Fiji will become like a piece of driftwood on the sea, and be picked up by the first passer-by. The whites who have come to Fiji are a bad lot. They are mere stalkers on the beach . . . of one thing I am assured, that if we do not cede Fiji, the white stalkers on the beach, cormorants, will open their maws and swallow us. By annexation, the two races, white and black, will be bound together, and it will be impossible to sever them'. The European point of view is expressed succinctly in the prologue to the Deed of Cession: ' . . . whereas divers of the subjects of Her Majesty the Queen of Great Britain and Ireland have from time to time settled in the Fijian group of islands and have acquired property or certain pecuniary interests therein . . .' (Derrick, 1946).

Since 1874 Fiji has been a possession and dependency of the British Crown, administered as a Crown Colony, and was also for some considerable time the headquarters of the Western Pacific High Commission which is the administrative centre for other British territories in the Western Pacific. The Deed of Cession is an unusually brief document with remarkably few conditions specified by the donors, a feature which greatly reinforced its moral strength and which has been respected with integrity by most of the 20 Colonial Governors supplied by Britain since the date of Cession.

In considering the potential development of Fiji's soil resources, due recognition must be given to the historic background. Progressive development will need the enthusiastic support of the Fijian race if it is to make permanent gains.

3 ECONOMIC BACKGROUND

The economy of the Colony of Fiji is founded primarily on agricultural products. A list of exports during any year last century shows the scope of tropical and sub-tropical products that can be produced. Take, for instance, the list compiled for the year 1879–1880 by Stonehewer Cooper (1888), which includes candlenuts, rattan cane, coffee, copra, cotton, cotton-seed, coir fibre, dried fruit, bananas, fungus, ginger, angora goat hair, hides, ivory nuts, lime juice,

maize, molasses, coconut oil, pepper, rum, tapa cloth, tobacco, beeswax, yams, *yaqona* (*kava*), arrowroot, peanuts and beans. Most of these were available for export, however, only in small quantities, and on the London market Fiji was often referred to as 'the land of samples' (Harvey, 1946).

Since about 1890 sugar has headed the list of exports and today a large part of the agricultural industry of the Colony is bound up with sugar production. Sugar exports now exceed the value of all other exports added together. Copra (and its by-products) and bananas are the other main agricultural export produce. The volume and value of these three main agricultural export crops is shown in Table I.

TABLE I

AGRICULTURAL EXPORTS, 10-YEAR AVERAGE AND FIGURES FOR THE YEAR 1958

	1958	10-yr. average (1948–1958)	1958	10-yr. average (1948–1958)
	volume	volume	value £ (F	value £ (F
Sugar	191,838 tons	138,813 tons	7,252,431	5,477,456
Copra and copra products	37,000 tons	36,297 tons	2,439,959	2,390,096
Bananas	148,604 cases	234,402 cases	163,192	217,903
All other agricultural products	1,128 tons	1,781 tons	26,520	83,009

Agricultural industry in Fiji is largely concerned with maintaining the export of the above products, but a considerable section of the community is engaged in growing meat, dairy produce, vegetables, rice and spices needed largely for home consumption. This effort, however, is not entirely successful in meeting the Colony's needs, as is shown in Table II.

TABLE II

IMPORTED FOOD PRODUCTS WHICH ARE ALSO TO SOME EXTENT PRODUCED IN THE COLONY OF FIJI IN 1956*

	Quantity in Tons	Value in £ (F
Dairy products	1,216	362,973
Meat (fresh and preserved)	1,311	350,491
Eggs and Poultry	(not known)	29,014
Fish (preserved)	1,452	259,672
Pulses	1,785	121,678
Rice	2,990	221,065
Spices	320	51,552
Coffee	26	23,986
Edible oils	778	153,871
Potatoes	2,837	187,101
Total		1,770,426

*Figures quoted from the Annual Report of the Fiji Dept. of Agric. 1956

A total of about £F.1¾ million is thus spent on imported products which can be produced locally.

The balance of trade, i.e. value of exports against the value of imports, is fairly close; in some years there is a small excess and in other years a small deficit. The direction of trade with the Antipodes is strongly in favour of Australia to the detriment of New Zealand; although the latter draws much of her tropical and sub-tropical imports from Fiji, she sells to Fiji only a relatively small quantity of temperate zone agricultural products and manufactured goods.

The main market for Fijian exports and the main source of imports has always been, however, the United Kingdom.

The overall situation would be fairly satisfactory for Fiji were it not for the fact that the rising return from the agricultural exports is due largely to the rise in world prices for these products; the actual volume of production has remained almost static for about fifteen years despite an expansion of population of over 50% (Clay, 1954).

Briefly, the economic background of the Colony is weak and calls for immediate strong support from the soil resources of the territory. Moreover, the weakness has been present for more than a quarter of a century, perhaps from the outset of Colonial development, and there is as yet no adequate reserve of local finance to underwrite the fairly high cost of developing 'new' agricultural land nor the very high cost of rehabilitating much of the 'old' agricultural land.

4 POPULATION

The population of the Fiji Group is made up of the following components*:

Indigenous	
Fijian	148,134
Rotuman	4,422
Non-indigenous	
Indian	169,403
Part-European	7,810
European	6,402
Other Pacific Islanders	5,320
Chinese and part-Chinese	4,155
Other than above	91
A total population of	345,737 persons

Of the non-indigenous components, the European settlers arrived from about 1830 onwards, and the Indians appeared in numbers between 1880 and 1916. The latter group were brought in as indentured labourers, initially to provide assistance on European-owned sugar plantations.

The overall density of population is 49.0 persons per square mile; thus Fiji ranks as a moderately populated area on world maps. However, this population is very unevenly distributed within the group. Viti Levu (and adjacent islands) contains 72% of the total population. Since it is 4,113 square miles in area, this gives a mean population density of 60.6 persons per square mile. Within Viti Levu the heaviest concentration of population is in Suva city with 4,748.5 per square mile, and the contribution of the Indian component to this is more than double that of any other group. Almost half of the population of Viti Levu is distributed in the two sugar cane growing provinces of Ba and Ra, where they are mainly confined to the lowland plains and lower foothill slopes. Since these have a total extent of only 288 square miles, this portion of Viti Levu has a population density of about 380 persons per square mile, of which the Indian component alone contributes about 260 persons per square mile. The least densely populated provinces of Viti Levu are the mountainous and relatively inaccessible Namosi (10.7 persons per square mile) and Serua (20.3 persons per square mile).

The islands of Vanua Levu and Taveuni, together comprising the three provinces of Bua, Macuata and Cakaudrove, have a population of only 60,769, i.e. only 18% of the total population. With a land area of 2,393 square miles, this gives a mean population density of only 25.3 persons per square mile, less than half that for Viti Levu. Of these three provinces, the sugar cane producing Macuata has the highest total population (29,808) to which the Indian

*Population figures quoted are from the 1956 Population Census carried out under the direction of Norma McArthur (1958).

component contributes 21,831 or 73%. Its population density (38.5 persons per square mile) is also highest, comparing with Cakaudrove, 21.5 persons per square mile and Bua 14.3 persons per square mile, which latter is among the least densely populated provinces in Fiji.

The recent census shows a strong drift in the main islands towards towns and to coastal areas with facilities for crushing sugar cane. No less than 36% of the population of Fiji is concentrated in and around these two types of foci. Comparison with earlier records* shows that there has been a drift away from villages in the interior of Viti Levu and from Vanua Levu to Viti Levu. Out of 471 villages in Viti Levu, 284 showed a decline in population between 1946 and 1956. In general, in all provinces where emigration exceeded immigration, there is a deficiency of males in the working age group between 15 and 44 years. To some extent this is also true of females. There is then, evidence of a considerable drift to centres where employment is available.

In contradistinction to that of the two main islands, Kadavu's population is almost entirely composed of Fijians. In 1956 the population amounted to 7,450 all told, this being, however, hardly any increase over the 1946 figure of 7,229. Furthermore, the population density in 1956 (40.37 persons per square mile) was below the Colony average, whereas in 1946 it had been above it. These facts, considered with the further information that 42% of people claiming origin in Kadavu were living in other parts of Fiji at the time of the 1956 census, strongly suggest that a very considerable emigration is taking place. This is borne out by the numbers of Kadavu Fijians commonly encountered working in Suva, or in other parts of Viti Levu and Vanua Levu, or on copra plantations in Lomaiviti, Taveuni and Lau.

The total population of the chief groups of the outer islands, Lomaiviti, Lau, Yasawas, and Rotuma amounts to no less than 39,335, being just over 11% of the total for the whole Colony. This number too is very largely made up of indigenous people, there being hardly any Indians in these areas except for a few in Lomaiviti. The land areas of these islands are small, and thus their population densities are considerably higher than average: (Rotuma 177.9, Yasawa was 77.3, Lau 71.7, Lomaiviti 70.9 persons per square mile). In certain cases the density reaches surprising heights, for example the remote island of Viwa, west of the Yasawa Group, records 633.6 persons per square mile. Comparison of the population figures for 1956 with those of 1946 shows that Rotuma, the Yasawas, and to some extent Lomaiviti, did not increase their numbers at the normal rate and it is likely that emigration, especially to Viti Levu, is taking place from these areas as well. Nevertheless, if Suva and its environs are excluded, these small islands still support the greatest concentrations of Fijians (and Rotumans).

The rate of increase of the population in Fiji is very high. In recent years its values are shown in Table III.

TABLE III

RATE OF GROWTH OF POPULATION IN % PER ANNUM

Period	Fijian component	Indian component	Whole population
1921–36 ..	0.98	2.27	1.56
1936–46 ..	1.92	3.55	2.74
1946–56 ..	2.29	3.46	2.91

The rate of increase of the Fijian component has been steadily rising for the last 35 years; that of the Indian component has remained at the same high level for the last 20 years. Thus the Fijians have gradually been contributing more and more to the rate of increase of population even though their proportion of the total population has dropped. (In 1936 Fijians were 49.25% of the total, in 1946 45.25%, and in 1956 42.85%).

*1946 Population Census records.

If the whole population continues to increase at its present high rate however, it will reach about 465,000 in ten years, and will double itself in less than 25. This is a matter which bears heavily on the problem of developing the soil resources of the territory since a high proportion of the total is actively engaged in agriculture.

Nearly 60% of all persons classified as economically active are engaged in agricultural (including pastoral) pursuits. This section of the population is made up almost wholly (97%) of Fijians, Indians, Rotumans and Part-Europeans.

Almost 64% of adult male Fijians are in agricultural occupations and 56.5% are engaged in village agriculture, i.e. production of subsistence crops by the traditional methods of shifting cultivation. Thus, despite nearly 80 years of contact with alternative methods of using the land, less than 8% of Fijian men have chosen to do so, they have either remained in the villages or left agriculture altogether. However, the village agriculturalists have often incorporated cash crop sidelines into their traditional system; 35% of them now grow copra for sale, nearly 19% grow vegetables and 14% bananas, but as much as 25% of them still have no cash crop of any kind at the present time.

49% of adult male Indians are agriculturalists; the proportion has, however, been falling. 75% of these are actively engaged in the sugar cane industry and 11% in growing maize or rice. The others produce copra, vegetables, milk, etc. Thus the Indian farming population is predominantly cane growing.

McArthur concludes (*op. cit.* p. 49) that only about 7,000 adult males will be retiring from active participation in industry in the next ten years and nearly 50,000 persons will be entering the work force. If the pattern of industry in Fiji continues as at present, the bulk of these new workers will need to be employed in agricultural industry. It has been estimated that in the next ten years 30,000 Indian people alone will be looking to the soil resources to support them.

5 LAND TENURE

Until 1840 the land of Fiji belonged almost entirely to the people of the Fijian race. The Fijians had no concept of individual ownership and hence were not fully able to appreciate the situation which arose when Europeans, in exchange for relatively trifling numbers of muskets or dollars, or for personal services to a Fijian leader, sought in exchange a parcel of land. It probably did not occur to the Fijians that the land would not revert to the Fijian people on the death of the European in question (Foster, 1958). By the time of the Deed of Cession in 1874, non-Fijian residents were laying claim to no less than a million and a half acres. Some 450,000 acres of this was claimed on behalf of the British Crown, the greater part being claimed on the grounds of conquest during the Ba military campaign of 1873.

Legislation brought in soon after Cession prohibited further alienation of land to non-Fijians, other than to the Crown, and this law remained in force until 1904 when, for a period of five years (until 1909) arrangements could be made to convert leaseholdings into freehold.

A Land Commission set up in 1875 examined the validity of the freeholdings arranged prior to Cession and of the 1½ million acres claimed, only half a million acres were allowed, and for these land titles were drawn up. There was also a number of pre-Cession leases to be scrutinized and the Commission dealt with these. Many of these early leases were given by Ma'afu, the Tongan leader in Lau, who refused to grant freehold for services rendered but was agreeable to leasing parcels of land.

Six years later, in 1880, a further commission began the task of sorting out the area of land claimed by each of the *mataqali* (roughly equivalent to clan), the basis for the claims being customary land use and traditional rights. This great task occupied a long time and was not brought to completion until early in the new century.

Meanwhile, in 1880, a Native Land Ordinance was published whereby non-Fijians were enabled to make arrangements with Fijian leaders for the leasing of land. Such leases were

granted for periods not greater than 25 years, except in the case of the Crown, which could arrange longer leases. From this date many Europeans secured leasehold rights, either for short periods directly from the Fijians or for periods longer than 25 years by applying for leases of Crown land. In a few cases, where it could be shown that arrangements for securing a freehold parcel were almost completed but suspended by the Deed of Cession, 999 year leases were granted in lieu of freehold.

The early leaseholdings and freeholdings tended to be large, since they were intended for plantation agriculture, and to a large extent they covered areas of the better class lands. The earliest non-European leases appeared in the late 1880's, the first being granted to an Indian at Deuba for three acres in 1888. There was a big increase in applications for small leasehold parcels when the Colonial Sugar Refining Company decided to change its agricultural policy in favour of small holdings worked by individual farmers, largely composed of sugar estate labourers who had served their indenture period. The pattern of new leases was centred about the sugar cane mills and around the periphery of the older freeholdings and leaseholdings, and mainly consisted of pockets of good soil that the earlier planters had been unable to include. In time these small lessees took up most of the best land not already pre-empted.

At this date (1916–1920) a lessee was permitted to select his own prospective property and fix his own boundaries. The official survey of these boundaries lagged far behind the granting of new leases, a situation that is not unknown at the present time. The present leasehold pattern in Fiji, a seemingly haphazard jumble of peculiar-shaped small parcels of land dates from this period.

Meanwhile the land retained by Fijians for their own use was gradually being sorted out and the rights of various *mataqali* (or smaller groups) surveyed and recorded on maps. These finally began to take shape in 1905 and since then there has been a steady growth in the machinery for administering Fijian land, culminating in the creation in 1940 of the semi-autonomous Native Land Trust Board. This organisation has full control over all Fijian land but is not allowed to lease any of it to non-Fijians unless it is agreed by the Fijians that such land is not required for the support of the indigenous people.

To define the present and future requirements of the Fijian people, a survey of Fijian Reserve lands was commenced by the Native Lands Commission and is still in progress. On the advice of the Commissioner, the Native Land Trust Board may set aside and proclaim any part of the Fijian lands as Native Reserve, and such land may not be leased or otherwise disposed of except to Fijians, and then only with the consent of the Board. Demarcation of Native Reserve land is about half finished. In regions where this survey has been completed, land not required for the support of the Fijian people may be leased by the Board to non-Fijians, subject to certain restrictions. Native land leases had been granted and surveyed for 184,622 acres up to December 31st, 1956. Revenues from these leases are collected by the Board which is a self-financing body retaining 25% of the proceeds for its own support, the remainder being passed to the owners of the land. Within the Native Reserves title to the land remains vested in the owning *mataqali*.

Land unclaimed by any Fijian group at the time of the Land Commission in 1880 was vested in the Crown and became known as Crown Schedule 'B' land. Land owned by a *mataqali* all of whose members die out also reverts to Crown ownership and is known as Crown Schedule 'A' land. The Crown also holds title to all foreshore and mangrove lands, most of which are unsurveyed as yet.

Thus the land of Fiji is divided into *Native Land, Crown Land* (Schedules A and B) and *Crown Mangrove Land*, and *alienated land other than Crown land* (mostly freehold).

It is calculated that in 1956 Native Land (including Native Leases) amounted to 84·5% of the total land area of Fiji, 4·5% was Crown land (excluding mangrove and foreshore) and about 11% was alienated land other than Crown land. The Fijian lands are parcelled out among some 5,000 *mataqali* and smaller family groups, in lots ranging in size from one-eighth acre to 16,000 acres.

The situation at the present time shows a total of at least 694,414 acres (or 17·4% of the total

land area of the Colony) made available for farming by non-Fijians. This total is made up as follows:

Freehold	486,817 acres
Leased from Fijians	184,622 acres
Leased from Crown	22,975 acres
Total	694,414 acres

The actual total may very well be considerably higher than this since some lands have been leased by the Native Land Trust Board as holdings whose boundaries have not yet been surveyed. The figure under 'leased from Fijians' refers only to land actually leased and surveyed as at December 31st, 1956, the delay is due to a severe shortage of staff trained in surveying methods.

Table IV has been included to show the relative acreages held by the different racial groups under the respective land tenure categories.

TABLE IV

ACREAGE IN VARIOUS TENURE CATEGORIES OF NON-FIJIAN LANDS

Category	Crown	European and part European	Indian	Chinese and part Chinese	C.S.R. Company	All Others
Freehold	73,967	295,377	69,686	5,000	75,105	3,682
Leasehold from Fijians	27,311	44,853	78,508	1,561	31,301	1,088
,, from Crown	26	4,470	14,484	110	579	3,332
Total ..	101,304	344,700	162,678	6,671	106,985	8,102
% of alienated land ..	14·5	44·5	23·4	0·9	15·4	1·2

This table is of considerable interest since it emphasises (1) the small area administered directly through the Crown, smaller even that than administered by the Colonial Sugar Refining Company, and (2) the relatively large area under the control of Europeans and part-Europeans. It must also be remembered that some 200,000 acres of land of the latter tenure category represents holdings selected before the Deed of Cession and thus comprise some of the most valuable lands in the Colony.

Forest reserves total some 154,277 acres, part of which represent land leased from the Native Land Trust Board and dedicated to the forest estate, and part is Crown land. There is also an additional area proclaimed as Protected Forest, although remaining within the Native Reserve lands.

If some allowance is made for the unknown area of land in the category 'leased but not yet surveyed', and for the land dedicated to the forest estate or retained by the Crown for urban development, it would appear that not more than 25% of the total land area of the Colony has passed out of Fijian control at the present time, and that much of this land is on rotating leases which periodically bring the land back into Fijian hands. Britain has clearly respected her trusteeship on behalf of the Fijian race. This is another factor which is deeply and delicately involved in the issue of the potential development of Fiji's soil resources.

6 AGRICULTURAL PRODUCTION

The primary producers of Fiji fall into four groups: Indian, Fijian, European (including part-European) and others (mainly Chinese and other small groups).

Unfortunately there seems to be no simple way of calculating the economic contribution made by each of these groups. Figures and statistics are, to some extent, available for export production, but the contribution in respect of produce consumed locally is largely conjectural.

The Fijians produce 99.8% of the banana crop and about half of the copra. Fijians also produce the major proportion of local Fijian food crops, although Indians and Chinese contribute somewhat.

TABLE V

CROP CULTIVATION IN FIJI, 1957

Crops grown for Local Consumption

Crop	Total Area Cultivated (acres)	Area cultivated by : (acres)			
		Fijians	Indians	Eur. and part Eur.	Others
Dalo	14,500	13,000	750	—	750
Tapioca	17,500	15,000	2,000	—	500
Kumala	1,200	1,000	100	—	100
Yams	2,500	2,500	—	—	—
Potatoes	37	—	27	—	10
Maize	250	25	200	—	25
Rice	34,750	500	33,500	250	500
Sorghum	15	—	15	—	—
Pulses	1,800	—	1,600	—	200
Oil Seeds	95	—	70	—	25
Turmeric	12	—	12	—	—
Carraway, Coriander	10	—	10	—	—
Mustard	170	—	150	—	20
Ginger	50	—	40	—	10
Tobacco	250	50	150	—	50
Yaqona	4,300	3,300	500	—	500
Coffee	30	15	15	—	—
Cocoa	1,200	1,000	100	100	—
Cabbage	120	10	60	—	50
Lettuce	100	—	50	—	50
Tomatoes	120	—	60	—	60
Other vegetables	500	—	250	—	250
Pineapples	230	50	150	—	30
Cattle, etc. Beef, Dairying	161,350	2,000	9,350	150,000	—
TOTAL	241,089	38,450	49,159	150,350	3,130

Indians produce most of the sugar crop, but there is a small contribution by Fijian and Chinese farmers. Indians produce most of the rice, a little copra and a very small proportion of the bananas. They also grow small areas of vegetables for the market and for their own subsistence.

Europeans largely dominate in the pastoral and dairying industries, but some Indian farmers contribute. Europeans also grow about half of the coconut crop.

Chinese and others produce a little copra, but are mainly engaged in growing market garden produce and raise some livestock.

Whilst agricultural statistics are kept by the Department of Agriculture, these only give totals, so that the relative areas under individual crops grown by the various farming groups are seriously incomplete. The following table has been compiled from all available figures for 1957, and where no statistics exist, estimates have been made from observations during the field work of the soil survey. It shows that about 130,000 acres were cultivated by Fijians, 170,000 by Indians and 225,000 by the small group Europeans.

TABLE Va

CROP CULTIVATION IN FIJI, 1957

Export Crops

Crop	Total Area Cultivated (acres)	Area cultivated by: (acres)			
		Fijians	Indians	Eur. and part Eur.	Others
Sugar Cane	123,986	6,000	117,986	—	—
Coconuts	168,000	84,000	5,000	76,000	3,000
Bananas	6,000	5,500	480	20	—
Total	297,986	95,500	123,466	76,020	3,000
Grand Total for all crops	539,075	133,950	172,625	226,370	6,130

If these figures can be accepted, they may be used to give a rough idea of the contribution to Fiji's economy made by the individual farming groups. First, however, an estimate of land available to these groups is needed and this is given in Table VI.

This table shows that the Fijians, of course, have land use rights over the vast majority of the country (3,300,000 acres), Indians over about 275,000 acres and Europeans over about 324,000 acres.

The cash value of export crops produced is given in Table VII in which the proportions due to each racial group are estimated from Table V.

Against the cash value of agricultural exports should be set the value of foods imported into Fiji to support the farmers. Here again, only total figures are available and the percentages of the various foods consumed by the various racial groups are mere estimates. In Table VIII percentages of some imported foods estimated to have been consumed by the various racial groups, along with their cost, are given.

If the proportion of farmers in the actively working population may be taken as indicative of the proportion of the farming communities to the total population components, and if farmers eat roughly as many imported foods as non-farmers, then 65.9%, 52.8%, 11.96% and 27.5% of food import values for the various races respectively must be set against the Fijian, Indian, European and other farmers' contributions to Fiji's exports. Thus Fijian farmers and their families may be estimated to consume £101,500 worth of imported foods, Indians

TABLE VI

LAND AVAILABILITY IN FIJI

Total area acres	Land Title Held By					
	Fijians	Indians	C.S.R. Co.	Crown	Eur. and part Eur.	Others
3,991,980	3,305,000	163,000	107,000	101,000	309,000	15,000
			nearly all worked by Indians often as tenants	about 25% agricultural. Assume divided among races according to ratio of lands held as above		
			107,000 ac.	8,500 ac.	15,500 ac.	1,000 ac.
	LAND USE RIGHTS OVER TOTAL OF					
	Fijians	Indians			Eur. etc.	Others
	3,305,000	278,500			324,500	16,000

TABLE VII

CASH VALUE OF EXPORT CROPS, 1957

Crop	Total £	Fijians £	Indians £	Europeans etc. £	Others £
Sugar cane products	7,849,647	379,923	7,469,724	—	—
Coconut products	2,792,689	1,396,344	82,082	1,264,693	49,570
Bananas	339,434	311,148	27,155	1,131	—
TOTAL	10,981,770	2,088,415	7,958,844	1,265,824	49,570

£360,000, Europeans £58,000 and others £36,500. Fijians obviously need relatively fewer imports than the other groups.

Some idea of the relative contributions may then be gained as shown in Table IX.

This table shows that the European farmer, as an individual gives by far the most towards the Colony's exports, with the Indian a poor second, and the Fijian a very poor third. On the other hand, considering the amount of land used to grow export crops the Indian farmer clearly produces almost four times as much per acre as either the Fijian or the European, and considering all farmed land under control of the various racial groups, the Indian produces about eight times as much as the Fijian or the European, measured in export crop values.

TABLE VIII

FOOD IMPORTS INTO FIJI, 1957 (ROUND FIGURES)

Commodity	Total Value	for Fijians	for Indians	for Europeans	for Others
Butter, ghee, etc.	120,000	(10%) 12,000	(50%) 60,000	(30%) 36,000	(10%) 12,000
Milk, cream	180,000	(20%) 36,000	(30%) 54,000	(40%) 72,000	(10%) 18,000
Meats	410,000	(10%) 41,000	(40%) 164,000	(40%) 164,000	(10%) 41,000
Eggs, poultry	8,000	—	(10%) 800	(80%) 6,400	(10%) 800
Fish	200,000	(25%) 50,000	(35%) 70,000	(30%) 60,000	(10%) 20,000
Pulses	110,000	—	(80%) 88,000	(10%) 11,000	(10%) 11,000
Rice	150,000	(10%) 15,000	(75%) 112,500	(5%) 7,500	(10%) 15,000
Spices	30,000	—	(85%) 25,500	(5%) 1,500	(10%) 3,000
Edible Oils	110,000	—	(85%) 93,500	(5%) 5,500	(10%) 11,000
Coffee	20,000	—	(10%) 2,000	(85%) 17,000	(5%) 1,000
Potatoes	120,000	—	(10%) 12,000	(90%) 108,000	—
TOTAL	£1,458,000	£154,000	£681,800	£488,900	£132,800

Of course this is not the whole picture since firstly it must be remembered that much of the land under Fijian control is mountainous and inaccessible and quite unsuited to the production of export crops, so that from this point of view the Fijian farmer is at a considerable disadvantage. This to some extent explains his low export productivity.

On the other hand, the European farmers hold much of the best lands of the Colony and have therefore an advantage particularly over the Fijians (who produce about the same export value per acre of farmed land). Thirdly, although the Indian farmers use a fair proportion of good land, they also farm a considerable amount of poor land to produce their export crops and the latter is often further impoverished and eroded in so doing. Therefore against Indian productivity might be set the cost of rehabilitation of considerable areas of worn out, eroded lands. Nevertheless the probable order of productivity of the main groups of farmers, measured by exports, is Indians, Fijians, Europeans.

It will be seen that the value of the various groups of farmers to the internal economy has largely been left out of the above calculations, and this of course is also of considerable importance. However, the table does suggest that European plantation type agriculture is much less important to the country's economy than the Indian and Fijian types of agriculture, and this trend may be expected to develop in view of the rapid increase of population of both these latter groups, with the introduction of new crops, e.g. cocoa, and with the increasing appreciation by the Fijians of a cash economy.

TABLE IX

CONTRIBUTIONS TO FIJI'S ECONOMY, 1957

	Total	Fijians	Indians	Europeans etc.	Others
Export Crop Value ..	£10,981,770	£2,088,415	£7,958,844	£1,265,824	£40,570
Food imports for farmers ..	£556,000	£101,500	£360,000	£58,000	£36,500
Total real contribution to exports	£10,425,770	£1,986,915	£7,598,884	£1,207,824	£13,070
No. of farmers	51,470	27,431	22,550	557	93
Contribution per farmer ..	£202	£72 10s. 0d.	£337	£2,169	£140
Acres used for export crops(1)	333,986	131,500	123,466	76,020	3,000
Contribution per acre used for export crops	£31 4s. 0d.	£15	£61 10s. 0d.	£15 18s. 0d.	£4 7s. 0d
Total acres used(2) ..	784,755	379,630	172,625	226,370	6,130
Contribution per acre of used land	£13 6s. 0d.	£5 4s. 0d.	£44	£5 6s. 0d.	£2 2s. 0d.
Total area available ..	3,911,980	3,305,000	278,500	324,000	16,000
Contribution per acre available	£2 12s. 0d.	12s. 0d.	£27 6s. 0d.	£3 15s. 0d.	16s. 0d.

N.B.—(1) For Fijians, area computed by multiplying banana land by 7 (as on the average, bush fallow will occupy six years out of seven), then adding sugar cane and coconut land.

(2) For Fijians, area computed by multiplying all land by 7 (see note 1) except that for coffee, cocoa, cattle, etc. sugar cane and copra which latter is then added in as it stands.

The average acreages per class of land title are shown in Table X.

TABLE X

AVERAGE ACREAGES PER CLASS OF LAND TITLE

Class of tenure non-indigenous population component		Freehold	Leased from Fijians	Leased from Crown
		acres	acres	acres
Indian		54·05	38·35	38·0
Chinese and part Chinese		17·09	14·00	0·54
European and part European	(Viti Levu)	78·65		
	(Vanua Levu)	462·20		
	(Taveuni)	290·60	443	231
	(Ovalau)	34·86		
	(Kadavu)	64·95		
	(Other Islands)	372·00		

From this it is seen that lands under European and part-European control are in much larger parcels than those controlled by the other non-indigenous groups. As for the Fijians, export production up to now has been from small widely scattered plots usually in the most suitable pockets of land picked out of large areas of relatively unsuitable land.

It thus emerges that the problem of developing a stable and diversified pattern of agricultural production is largely one of evolving agricultural systems suitable for small holders, and to some extent, for co-operatives.

7 PROBLEMS FOR WHICH BASIC SOIL INFORMATION IS NEEDED

The foremost problem in Fiji today is one of agricultural production. Sir Geoffrey Clay (1954) considered that the volume of production of export crops had remained static during the previous decade and a half, despite an expansion in population of over 50% and an increase in adult males of at least 25% during this period. Fiji is also in the dangerous position of being a country largely dependent on only one stable export crop – sugar. Clearly the Colony needs to develop a more varied range of export crops. To achieve this the Colony needs to know more about its soils; to learn which soils are suited to potential new export crops and which are capable of high and *sustained* production of existing export crops. It is necessary to know something of their area and something of the manner in which they are being used at present.

The next urgent problem concerns the accommodation of at least part of the rapidly increasing population on suitable farm land. In the case of the Fijian component, there is adequate land available for subsistence farming. If it is a true generalisation that the Europeans and part-Europeans hold the best of the alienated land, then it is also true that the Indians are in the main farming some of the poorest land in the Colony. It is generally agreed that the best of these Indian farmers are farming indifferent land with care and with considerable success, yet a very high proportion are causing serious and perhaps permanent damage to the soil resources of the Colony by bad farming. In some cases the economic situation of the family is sometimes so serious that they can do but little else, although in other cases damage is caused simply by careless farming. At the time of the recruitment of Indians for Fiji they were assured of equal opportunities in their new domicile (Furnas, 1950) and there are thus strong political, as well as humane, reasons for trying to find better land for their farming efforts, if such can be found without prejudicing the future needs of the Fijian people. It is not within the scope of this report to show in detail how this might be achieved, but the soil survey can at least draw attention to present areas of unproductive land, which by the application of techniques pioneered and perfected for similar soils in other countries, might be developed successfully by Indian farmers.

The third problem concerns the level of production from lands under Fijian control. It is clearly important to know the nature of the soils on these lands before the agricultural efforts of the Fijian population can be correctly evaluated. Traditional agricultural methods seem, so far, to be successful in meeting the basic food requirements of the growing Fijian population, and with but little modification in technique, in producing the whole of the export banana crop and a large share of the copra. The soil survey can give an indication as to how the soils under Fijian stewardship are standing up under new stresses arising from a gradual trend towards acceptance of a cash economy, supported largely by the traditional method of shifting cultivation.

The fourth problem concerns the very restricted area of land under the direct control of the Crown, as represented by its agent, the Lands and Survey Department. Owing to the intense competition amongst Indians and other non-indigenous races to get a stake in the land, speculation and exaggerated land values are rife in Fiji today. The total area of land at the disposal of the Crown, which could be used to hold down land values to something near to the actual productive worth of the soil, is clearly quite inadequate for this purpose. Much of the

poorest land in Fiji regularly changes hands at prices which force a buyer, even though a sincere farmer, to adopt the worst possible management practices in an effort to meet his financial obligations. There is urgent need for legislation to control this: a legal valuation based on an official assessment of the productive worth of soils and some judicial body resembling a Land Sales Court. There is also urgent need to find ways of creating new areas of Crown Land, if unwanted and unused areas suitable for reclamation can be found. The soil survey can provide essential data towards both these objectives.

Finally, and here probably lies the most important potential contribution of the soil survey, there is a great need to correlate farming experience within the Colony so that techniques worked out successfully by one farmer can be applied with greater confidence to another farmer's land. This is basically the job of the extension service of the Department of Agriculture and similarity of soil is the only sound basis for correlation work of this type. The soil survey of Fiji must thus indicate clearly which are the soils on which agricultural development consists mainly in the vigorous application of normal agricultural extension work, and which are the real problem soils of the Colony. For these latter, soil survey data often provide a safe basis for planning fertiliser experimental programmes, and other research projects of a like nature.

Fiji clearly needs an intensification of primary production, expansion of the area under crops and some diversification of products, but where, how and by whom cannot be easily decided until the soil resources of the Colony are far more widely understood.

8 PRESENTATION OF INFORMATION

The foregoing introductory remarks are intended to provide the reader with background information against which he can measure the findings of the survey.

The next chapter deals broadly with the natural environment of Fiji and stresses factors which have played a major part in determining the soil pattern and which will undoubtedly continue to influence agricultural and sylvicultural developments in the future.

The third chapter contains an account of the general soil pattern and the relationships between the component parts of the pattern which become the basis of the soil classification. It also contains a general description of the properties of the main sets of soils, their fertility as determined by analyses, pot trials and field experiments, and an indication of the way in which all these data can be combined to produce land classification maps and estimates of potential land use.

The fourth chapter is devoted to land use. An account of the history of land use has considerable bearing on the present day pattern of land use and the obstacles which lie ahead mitigating against the achievement of the full land use potential of the soil. There is also some pertinent discussion on permanent and shifting techniques of agricultural land use and other matters closely affecting primary production.

The fifth chapter describes the soil pattern and land use potential of each of the main islands, as well as of most of the larger of the outer islands.

Most of the more technical type of information has been relegated to appendices. These also include an account of soil and cane farming in Fiji by N. Monteith, Chief Agronomist of the Colonial Sugar Refining Co. Ltd., to illustrate the manner in which the soil survey results may be utilised in practical agriculture.

9 THE USE OF FIJIAN SPELLING

Throughout this report and on the accompanying maps, the spelling of the Fijian words used is that officially and generally accepted as correct. In this respect, the maps differ from those published by the Fiji Lands Department which employ the so-called phonetic system, considered

to be easier for persons overseas to understand. However, in the present case the report is intended mainly for use in Fiji by people normally spelling Fijian words in the accepted manner; hence Fijian spelling is adopted.

For anyone not familiar with Fijian spelling conventions who may read the report, the following guide notes are given.

All letters are sounded as in English with the following exceptions:

'b' is pronounced 'mb'
'c' is pronounced 'th' (as in '*this*')
'd' is pronounced 'nd'
'g' is pronounced 'ng' (as in '*singer*')
'j' is pronounced 'tch' (as in '*catch*')
'q' is pronounced 'ng-g' (as in '*finger*')

Thus 'Beqa' is pronounced 'Mbeng-ga', 'Kadavu' as 'Kandavu', 'Cikobia' as 'Thikombia', 'Lomaji' as 'Lomatchi'.

Normally, the penultimate syllable of polysyllabic words is accented in the Fijian language.