

THE  
New Guinea Agricultural Gazette.

Vol. 2.

OCTOBER, 1936.

No. 2.

A SURVEY OF THE COCO-NUT INDUSTRY IN THE  
MANDATED TERRITORY OF NEW GUINEA.

*R. E. P. Dwyer, H.D.A., H.D.P., B.Sc., Agr., Economic Botanist.*

The facts concerning the coco-nut industry in the Mandated Territory of New Guinea are not generally known outside this country, nor is the importance of this aspect of the agricultural development of the Territory realized by the majority of people, even in Australia.

Many of our planters and others closely associated with copra production are, to some extent, ignorant of the fluctuations in acreage, the trends in production and the returns from the industry from year to year. This lack of knowledge may be attributed in some degree to the difficulty in obtaining reliable data and statistics, hence the present author considers that an attempted survey of the development and present position of the industry and a review of its prospects, where possible, should prove illuminating.

The information has been collected from many sources, much of it being found in the statistics compiled yearly by the Department of Customs and the Department of Agriculture, and in various reports and publications by the Director of Agriculture. Many of the opinions expressed are necessarily contentious and open to criticism by individual planters and business men who have had long association with copra production and marketing. It is considered, however, that this article will fulfil a decided function if it does invite discussion, as it is believed that contributions on the copra industry from experienced men would be a welcome and valuable addition to this Gazette.

Importance of the Industry to New Guinea.

Coco-nut production is easily the most important feature of plantation agriculture in this Territory, and copra is by far the most important agricultural export. Until gold production came to the fore in very recent years it was outstandingly the principal product of the Territory. It is impossible to assess the importance of coco-nuts to the internal economy of this Territory as they form such a large proportion of the diet of the native population and are also used in their system of barter.

New Guinea in recent years has furnished about 40 per cent. of the copra exported from all the British South Sea Islands. It also supplies at the present time about one-twentieth of the world's exportable production of copra.

This Territory is easily the largest copra exporter from the South Seas, its exports now exceeding 60,000 tons per annum, and it has shown much more rapid development than the other islands. Since 1924, its exports have increased by approximately 60 per cent. Fiji and the British Solomon Islands generally rank as the second and third largest exporters respectively in this zone.

In 1929, the imports of copra from the South Seas formed 42 per cent. of the total imports of copra into the United Kingdom, and 58 per cent. of the total imports of copra from British possessions.

### World Production.

TABLE No. 1 (14), VOL. II.

SHOWING WORLD'S NET EXPORTS OF COPRA AND COCO-NUT OIL FROM THE PRINCIPAL PRODUCING COUNTRIES IN TERMS OF COPRA IN THOUSANDS OF TONS.

—	1909-13 Average.	1924.	1925.	1926.	1927.	1928.	1929.	1930.
Copra .. ..	550.6	894.7	92.92	1021.5	945.8	1170.2	1148.8	1033.5
Coco-nut oil in copra equivalent ..	57.	227.7	225.8	252.2	291.7	336.3	411.3	311.6
Total ..	607.6	1122.4	1155.0	1273.7	1237.5	1506.5	1560.1	1345.1

The following additional world statistics are available from Bulletin Central Bureau of Statistics (20) Netherlands Indies, showing world exports surplus of copra and coco-nut oil in terms of copra, also including desiccated coco-nut:—

—	1929.	1930.	1931.	1932.
Metric tons .. ..	1,730,871	1,508,554	1,499,319	1,459,073 (1,436,019 Eng. tons)

1 metric ton = .9842 English tons.

In 1932, the figures include the copra equivalent of 46,516 metric tons of desiccated coco-nut, 197,460 metric tons coco-nut oil, and 1,021,323 metric tons copra (calculated on the equivalent 1 metric ton of oil = 1.673 tons of copra x .9 as the specific weight of coco-nut).

The world acreage under coco-nuts is not accurately known, but a fairly reliable estimate in 1930 placed the area at about 7,250,000 acres, as compared with 5,500,000 acres in 1921—representing an increase of about 30 per cent. in ten years.

British Empire countries account for slightly more than half the world's acreage, but only about one-third of the total exports from producing countries, because India, its largest producer, has been an importer since 1914, on account of internal requirements.

The bulk of the world production is in the hands of small holders; large coco-nut estates probably do not account for more than 10 per cent. of the total. This is not true of New Guinea, where the large European-owned estates form the bulk of the planted areas.

The world's production of coco-nuts in terms of copra is estimated at about 3,000,000 tons. In 1920 (a peak year), aggregate exports from producing countries in terms of copra amounted to only 1,700,000 tons, or under 60 per cent. of the estimated total production. It therefore appears that over 40 per cent. of the total production is consumed in the countries of origin. The Philippine Islands are a notable exception as most of their copra is exported as is the coco-nut oil produced there.

Of the total world's supply of copra in 1930, 3.7 per cent. was from the Netherlands Indies, 15.1 per cent. from the British South Sea Islands (approximately 6 per cent. from New Guinea), 16.5 per cent. from the Philippine Islands, 9.8 per cent. from Malaya, 8.7 per cent. from Ceylon, and 11.2 per cent. from various other sources.

There has been a large increase in the world's acreage under coco-nuts since the war, namely, about 65 per cent. It has apparently increased ahead of requirements, but another few years should see a balance restored, for there is little encouragement for new planting at the present time. There has, and will be, more substitution of other crops for coco-nuts.

The *Malayan Agricultural Gazette* in 1932 (38) quoted the following world figures for shipments of copra to 1931:—

Year.	Tons.
1931 .. .. .	803,020
1930 .. .. .	877,869
1928 (a year of heavy shipment) .. .. .	905,732
1927-31 .. .. .	823,392
1922-26 .. .. .	631,432

TABLE NO. 2.

## EXPORTS OF COPRA FROM VARIOUS SOURCES (3 AND 16) DURING THE LAST FIVE YEARS.

Tons (000 omitted).

1929.	D.E. Indies.	Straits.	Ceylon.	Philippines.	British South Sea Islands.	Total Shipments.
1929 .. .. .	443	186	109	176	(168)	851 (1019)
1930 .. .. .	375	181	88	173	(153)	750 (903)
1931 .. .. .	369	173	89	180	(a)	737
1932 .. .. .	480	184	48	135	(a)	762
1933 .. .. .	486	193	63	392	*(150)	924 (1014)

\* Estimated South Sea Island export 151,000 as average export from 1924-1931 was approximately 145,000 tons.

(a) Not available ( ), not included in the original table.

The Straits figures include D.E.I. copra transhipped in the Straits, respectively, 57,032, 65,300, 66,031, 81,514 and 82,012 tons during the five years; the figures for total shipments have been adjusted accordingly.

The shipments from Zanzibar, Mozambique, Cochin China, West Indies, &c., have been estimated as around 50,000 tons in 1933.

The grand total for world exports can therefore be put at about 1,150,000 tons.

TABLE No. 3.  
ESTIMATED AREA UNDER COCO-NUTS IN THE BRITISH SOUTH SEA  
ISLANDS 1929-30.

Territory.	Area under Coco-nuts (in acres).
Mandated Territory of New Guinea .. .. .	(a)198,051
Fiji .. .. .	130,772
British Solomon Islands Protectorate .. .. .	62,309
Tongan Islands Protectorate .. .. .	54,397
Mandated Territory of Western Samoa .. .. .	52,949
Territory of Papua .. .. .	49,072
Gilbert and Ellice Islands .. .. .	20,000
Mandated Territory of Nauru .. .. .	900
Total .. .. .	(b)568,450

(a) Excludes native reserves (probably more than 25,000 acres according to one estimate, but difficult to gain information).

(b) Excluding Cook Islands for which an acreage figure has not been traced.

TABLE No. 4.  
EXPORTS OF COPRA FROM THE MAIN BRITISH SOUTH SEA ISLANDS.  
(In tons.)

—	1911-13 Average.	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.
Mandated Territory of New Guinea(a) ..	11,606	39,151	43,806	47,613	63,285	60,435	63,832	62,303	59,452
Fiji ..	12,859	23,137	24,133	27,133	26,560	27,947	33,226	23,882	16,917
British Solomon Islands Protectorate (c) ..	4,529	16,509	18,224	22,316	21,960	23,525	21,300	23,411	21,209
Tongan Islands Protectorate ..	9,090	14,534	13,759	13,992	11,252	15,671	16,861	14,134	8,929
Mandated Territory of Western Samoa ..	10,191	13,202	14,519	12,250	11,665	15,989	12,942	12,286	11,062
Territory of Papua ..	(b)	7,765	8,619	9,542	9,825	12,480	11,693	9,436	10,011

(a) Post war figures are for twelve months ending 30th June of years following those stated.

(b) Not available.

(c) Twelve months ending 31st March of the years following those stated.

### Habitat of the Coco-nut Palm.

The coco-nut palm is found usually and cultivated within short distances of the sea—often in situations consisting largely of coral sand with a large proportion of common salt in the soil. The best soil is often found in alluvial flats along large streams which are not liable to excessive or prolonged floods. It also grows very well on sandy or gravelly loams. The palm is not very susceptible to disease, but requires a combination of sun, water and warmth, and close to the sea, even in the driest season, a high atmospheric humidity is maintained. The roots are very susceptible to stagnant water and a free-drained soil is essential if the growth is to be healthy.

Owing to the question of transport by sea, lack of roads and general ruggedness of the country, the selection of plantation sites in the Territory has necessarily been confined to the sea coast, and even then in most areas to the best anchorages. There is a general need for good roads in the best coco-nut producing areas, particularly in the Kieta district.



The restriction of transport facilities has been one reason why some unsuitable areas have been planted to coco-nuts, and is likely to prove a decided hindrance to future development.

The coco-nut areas in New Guinea, in common with other countries, are largely confined to the sea coast, and the greatest proportion of the soils on which coco-nuts are found are loose soils derived from coral rock, usually on coral islands or the coral rock fringes of the larger islands which were raised by volcanic activity in the centre, or fringing the mainland.

Bryce (1923, 1924, 1926), in discussing the general geology of these areas stated that "the corallitic soil emerges into soils derived from volcanic rocks or from older geological formations where the landward portions of the plantations run into the hilly country.

The soils next in importance to coral are those derived from volcanic sand, pumice, tuffs, all of which are very porous, and to a lesser extent from lava flows. A few plantations and portions of a large number of plantations are on soils derived from other rocks plutonic or sedimentary (e.g., Syenite porphyrys and Andesites in Kieta, and porphyrites and solificied sedimentary rocks in the Bainings district of New Britain).

The areas of coral soils are level or gently undulating and they exhibit typically a beach portion, usually fertile and of varying width behind which the land falls, and swamps often of considerable extent occur. In a similar way the interior of coral islands tends to be water-logged, and may be occupied by a swamp or lake which in some cases are below sea-level. In some of the plantings in 1918, fields of young coco-nuts were planted in stagnant swamps which could never be of any value."

## NATIVE COCO-NUT CULTIVATION AND COPRA PRODUCTION.

The cultivation of coco-nuts by natives in New Guinea is of fundamental importance to the internal economy of this Territory. Coco-nuts are largely used by the natives as an article for trade and barter, and also form a very large proportion of their staple diet.

It is not possible at present to indicate what proportion of native-grown copra is prepared on European plantations from coco-nuts bought from native groves. Copra dried in this way is sold as plantation copra and statistics are required to find out just how much of the total exports is produced in this manner. It has been stated that many tons of nuts are used in the making of oil, by native methods, for bartering and cooking purposes.

At present a survey is being made to ascertain, as far as possible, the correct acreage of coconuts cultivated by natives in various parts of the Mandated Territory. The produce of the very substantial acreage of coco-nut groves present in this Territory forms a rather extensive hidden reserve for the production of copra, especially when prices are high.

It is a well-known fact that as soon as the price of copra lowers, natives withdraw considerable quantities of copra from native trade, which, together with reduced European trading, has an appreciable effect on the quantity and value of copra exports from this Territory in any particular year.

Licensed copra traders are now established in practically every district and thus, except in certain areas, the native is afforded an easily accessible market for his product. The question of the advisability of allowing natives to dry copra in certain areas has been a much debated matter. The policy of encouraging an increase of native coco-nut groves in certain areas, most of which have been regularly planted according to European methods, has brought its own problems.

Many native coco-nut groves are contiguous to large European plantations, thus regular inspection and close control of these areas are rendered necessary.

The various aspects of native coco-nut and copra production, on account of its special importance, will require elucidation in a future article.

## THE HISTORY OF THE DEVELOPMENT OF THE COPRA INDUSTRY IN NEW GUINEA. (2, 26 and 31.)

The history of German influence in New Guinea may be traced back to the establishment of various trading stations in the Duke of York Group, New Britain and New Ireland.

Protected by an Imperial Charter in 1885, the New Guinea Company laid the foundations for a successful colony which later came under control of the German Government. The early companies were content to trade in various commodities including copra, but in 1883 a plantation was laid out at Ralun, on Blanche Bay, while two years later the first plantation on the mainland was commenced at Finschhafen.

The early plantations extended slowly owing to the difficulties of clearing and the limited transport facilities. As the demand for copra had not developed, many other crops beside coco-nuts were planted, but none of these crops contributed to any extent to the progress of the Protectorate, and the coco-nut became its mainstay to an increasing degree. Cotton and cocoa were successfully interplanted until the coco-nut palms were brought into bearing.

### Military Occupation 1914-1921.

The Territory of New Guinea was captured and came under Australian military control from September, 1914, and during the next seven years its affairs were controlled by military administration which did not, however, interfere to any great extent with the plantations.

As the price of copra was high, the profits of the German companies and planters, which could not be remitted to Germany, were invested in large plantations of coco-nuts. The resident Germans expected that when their properties were taken over they would be paid at a flat rate for palms, old or young, hence extensive new areas were planted, often hurriedly and badly, in the hope of receiving increased compensation.

### Establishment of Civil Government and Expropriation of Properties.

In May, 1921, the period of military administration came to an end, and civil administration was established throughout the Territory. The expropriation of German nationals provided for by the Peace Treaty was entrusted to an Expropriation Board of three members, under the control of the Custodian of Expropriated Property.

The first group of properties was disposed of about March, 1926. These included plantations, trading stations, business premises, &c., situated within easy access of Rabaul.

According to prevailing opinion, the plantations in this group were sold at a reasonable price, considering the ruling price of copra at the time. In view of the high market prices a rush followed to secure the remaining properties, situated in scattered parts of the Territory, in the second, and particularly in the third, group offered for tender purchase. It is certain that the prices offered in many cases were based on estimates worked out when the copra industry was booming, and the future depression in prices was not anticipated. Considering the ruling prices for copra over the past five or six years, numerous properties were greatly over-capitalized, quite apart from the fact that, even with a conservative capitalization, copra prices have not been payable.

The tendering parties usually tendered on the average price of £21 15s. per ton, which ruled for the ten years prior to the sale of the expropriated properties. The rough basis for purchase was £1,000 per ton of monthly production. Thus for a property producing 20 tons per month the tender price was £20,000. The yearly payments amounted to about £80 per £1,000 of purchase money.

According to a booklet issued by the Expropriation Board, (28) 183 plantations were purchased by tender, of which 92.5 per cent. were secured by returned soldiers under special terms, the principal and interest to be repaid in 80 quarterly instalments. It is estimated that about 60 per cent. of the total number of plantations in New Guinea were formerly expropriated. It should be pointed out that the Custodian has allowed considerable sums to those purchasers who have proved to him that there was a shortage of palms, &c., on the properties purchased, and the purchase price has been reduced by that amount.

#### Capitalization of the Industry.

There are at present in the Territory approximately 430 coco-nut plantations of a total capital value of £1,750,000 to £5,000,000. The capitalized value of properties expropriated from German owners is in the vicinity of £3,000,000, which represents the total sale price, although, of course, only a proportion of the total indebtedness has been paid.

It has been estimated that approximately £1,400,000 worth of expropriated properties were sold to resident returned soldier tenderers, while an additional £1,200,000 worth were sold to absentee individuals other than companies, which latter bought properties to the value of £163,000. Owing to various circumstances, mainly associated with the extreme drop in the copra market, companies now hold between them close on £1,000,000 worth of expropriated properties, while it has been stated that further properties to the value of £600,000 are held under a system of financing tenderers.

About 1927, and, to a lesser extent, before that year, there was an influx of private capital for plantation development. At the present time, the value of coco-nut plantations other than expropriated properties has been estimated at £1,940,000.\*

Development has been retarded since the price of copra fell in recent years, but is likely to increase if, at any time, copra prices stabilize at a payable figure.

\* Estimate based on figures supplied by A. Richards, Plantation Inspector, Expropriation Board.

TABLE No. 5.

## SHOWING LABOUR ON ALL PLANTATIONS.—TERRITORY OF NEW GUINEA.

	Total Indentured Labour.
At 31st December, 1911 .. ..	10,984
At 31st December, 1913 .. ..	14,990
At 31st December, 1914 .. ..	17,529
At 30th June, 1922 .. ..	20,155
At 30th June, 1923 .. ..	20,081
At 30th June, 1934 .. ..	17,369
At 30th June, 1935 .. ..	17,269

It is seen from the above table that the number of indentured labourers on all the plantations in New Guinea increased considerably round 1922 and 1923, but had receded to below the 1914 strength at the end of 1935.

Considering the decidedly increased acreage and bearing area of coco-nuts, coffee and cocoa recorded in recent years, the obvious contention is that the amount of maintenance and work carried out on the plantations has decreased considerably per unit acreage. Obviously, maintenance, upkeep and development have been slowed up, which is due largely to the fact that the cost of production had to be reduced to meet the lower incomes from the copra production.

The total enumerated population in New Guinea at 30th June, 1935, was 478,686 natives, of which 259,474 were males; thus the percentage of the enumerated total population working on the plantations is really very small.

At present, approximately 57 per cent. of the total indentured labourers are working on the plantations here.

It appears that unless the labour has become decidedly more efficient than in 1914, the amount of labour working on the plantations at the present time is insufficient for efficient management.

It is pointed out that there has been a great increase in the number of native labourers employed on the gold-fields since 1924.

## DISCUSSION ON TOTAL AREA.—BEARING AND YIELD OF COCO-NUTS.

## GRAPH No. 1.

The statistics concerning total and bearing areas and the total yields obtained are compiled yearly in the Department of Agriculture from returns submitted by individual planters and other sources.

These have been found to be somewhat inaccurate (*see particularly the figures marked*) and can be accepted as approximate only. That the agricultural statistics are unreliable is sufficient argument for asserting that some pressure should be brought into operation to ensure that this state of affairs does not continue.

They do indicate, however, very definite general trends. The yearly figures for copra exported are quite reliable and are included here for comparison, although they are discussed in another graph (No. 2), where they were combined with yearly total values of copra exported.

GRAPH N° 1

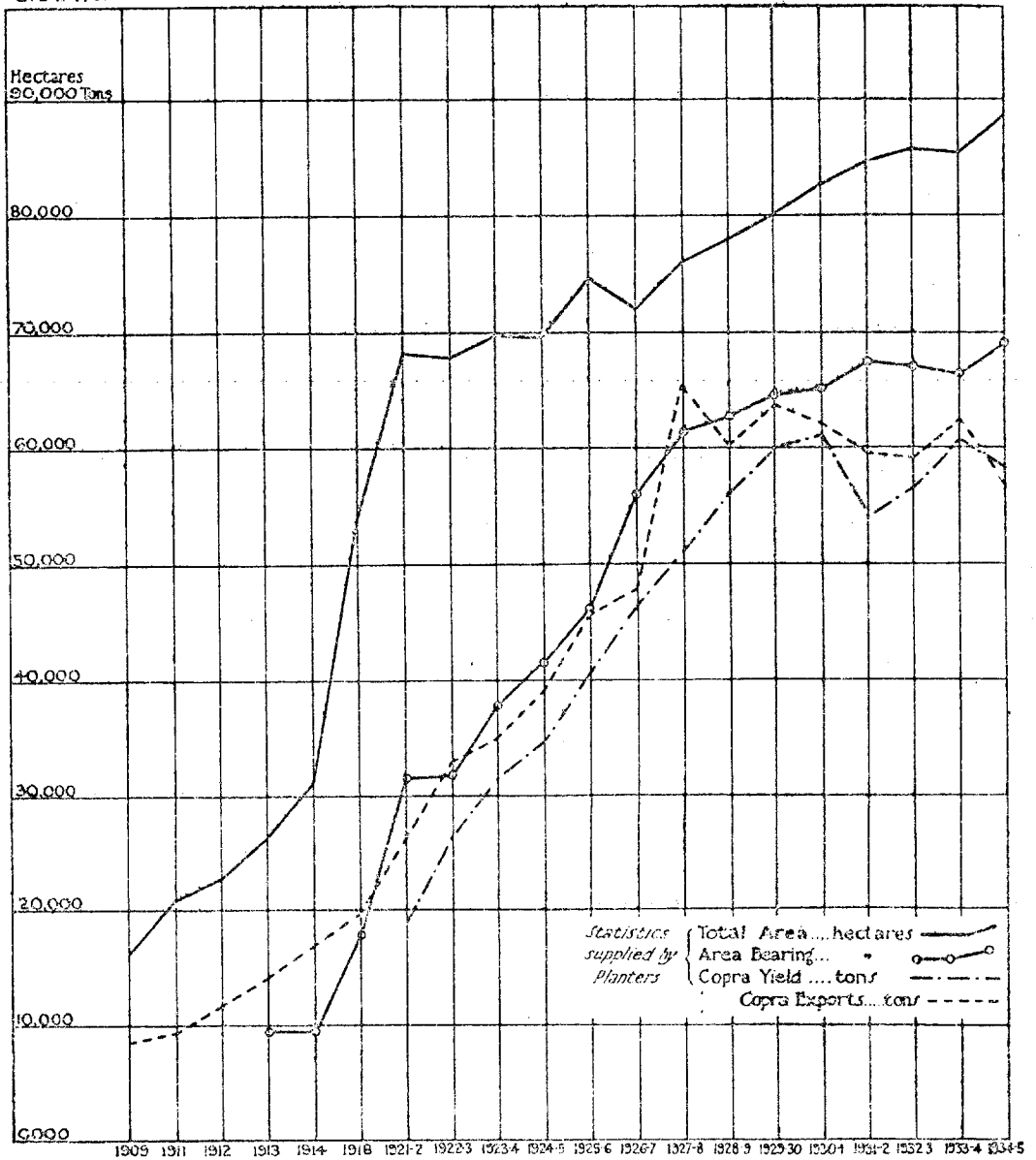


TABLE No. 6.

## AREA OF PLANTATIONS UNDER CULTIVATION (IN HECTARES) IN VARIOUS DISTRICTS.

TERRITORY OF NEW GUINEA.

Compiled from Figures supplied by Plantation Owners.

Year.	AITAPE.			KIETA.			MADANG.			MANUS.		
	Planted.	Bearing.	Yield.	Planted.	Bearing.	Yield.	Planted.	Bearing.	Yield.	Planted.	Bearing.	Yield.
1909	..	..	..	..	..	..	..	..	..	..	..	..
1911	..	..	..	..	..	..	..	..	..	..	..	..
1912	..	..	..	..	..	..	..	..	..	..	..	..
1913	..	..	..	..	..	..	..	..	..	..	..	..
1914	..	..	..	..	..	..	..	..	..	..	..	..
1918	..	..	..	5,411	1,260	..	12,115 <sup>d</sup>	3,096	..	5,264	2,165	..
1922	2,682	768	510	8,648	2,688	1,901	9,421	3,731	2,022	7,495	4,026	3,607
1923 <sup>a</sup>	702 <sup>c</sup>	303	206	8,855	2,994	1,958	10,676	4,588	2,485	7,890 <sup>a</sup>	3,376	3,139
1924	2,434	1,269	659	10,000	4,896	3,297	10,079	4,739	2,677	7,641	4,344	3,948
1925	2,431	1,324	755	9,500	5,237	3,814	10,131	4,823	3,347	7,642	5,017	4,565
1926	2,439	1,531	874	9,588	6,433	4,974	10,225	5,956	4,513	7,756	5,174	4,725
1927	2,461	1,628	1,094	9,663	7,869	5,780	10,375	7,165	5,085	7,929	6,474	5,536
1928	2,578	2,206	1,261	11,572 <sup>b</sup>	9,905	7,100	10,377	8,178	6,136	7,555	6,549	4,539
1929	2,513	1,853	1,343	10,411 <sup>b</sup>	8,780	7,900	10,916	9,016	6,930	8,162	7,211	5,708
1930	2,554	1,945	1,389	10,647 <sup>b</sup>	9,362	8,819	11,734	9,302	7,407	8,392	7,357	5,751
1931	2,612	1,967	1,697	10,525 <sup>b</sup>	9,451	9,377	11,667	9,292	7,761	8,594	6,617	5,513
1932	2,599	2,133	1,513	9,772 <sup>b</sup>	8,866	9,007	11,815	9,546	7,079	8,531 <sup>b</sup>	7,422	5,210
1933	2,533	2,052	1,517	9,936	9,171	8,793	12,478	9,495	6,544	8,340	7,186	5,477
1934	2,486	2,085	1,586	9,914	9,074	9,358	12,290	9,719	8,300	8,447 <sup>b</sup>	7,309	5,417
1935	2,500	2,130	1,244	9,951	9,305	10,269	12,608	10,670	6,996	8,226 <sup>b</sup>	7,139	5,305

Year.	MOROBE.			NEW BRITAIN.			NEW IRELAND.			TOTALS.			Customs Figures, Exports.
	Planted.	Bearing.	Yield.	Planted.	Bearing.	Yield.	Planted.	Bearing.	Yield.	Planted.	Bearing.	Yield.	
1909	..	..	..	..	..	..	..	..	..	16,024	..	..	Tons. 8,518
1911	..	..	..	..	..	..	..	..	..	20,846	..	..	9,397
1912	..	..	..	..	..	..	..	..	..	22,717	..	..	11,428
1913	..	..	..	..	..	..	..	..	..	26,233	9,630	..	14,267
1914	..	..	..	..	..	..	..	..	..	31,099	9,539	..	..
1918	..	..	..	17,340	7,902	..	14,081	3,451	..	54,213	17,875	..	19,708
1922	1,539	402	283	19,218	11,346	10,111	19,008	8,577	7,043	68,014	31,652	19,000	25,894
1923 <sup>a</sup>	841 <sup>c</sup>	412	203	21,919 <sup>d</sup>	12,534 <sup>d</sup>	12,032	16,870	7,623	6,363	67,758	31,834	26,468	32,648
1924	1,450	578	355	18,279	11,695	11,378	19,872	10,520	9,113	69,759	38,045	31,427	34,974
1925	1,392	626	454	19,323	12,966	11,888	18,701	11,612	9,638	69,416	41,608	34,461	39,151
1926	1,418	772	567	19,801	13,725	13,808	19,199	12,633	11,236	70,429	46,227	40,697	45,806
1927	1,455	1,081	602	21,237	16,528	15,340	18,860	15,281	12,764	71,883	56,029	46,201	47,613
1928	1,237	844	788	22,489	17,903	16,631	20,136	15,976	14,533	75,944	61,561	50,988	65,285
1929	1,374	1,094	826	23,579	18,186	17,769	20,899	16,638	15,924	77,854	62,787	56,400	60,435
1930	1,397	1,110	757	24,256	18,537	18,825	21,527	17,139	17,003	80,147	64,752	59,951	63,832
1931	1,422	1,140	733	25,100	19,100	19,167	22,578	17,546	16,941	82,588	65,113	61,189	62,303
1932	1,370	1,083	796	26,482	19,801	15,906	24,184	18,750	14,381	84,753	67,601	53,992	59,452
1933	1,354	1,078	770	26,394	19,426	17,381	24,681	18,592	15,966	85,716	67,000	56,448	59,040
1934	1,369	1,058	841	26,603	19,309	18,684	24,217	17,737	15,893	85,326	66,291	60,079	62,270
1935	1,358	1,058	758	26,825	19,529	17,847	27,067	19,298	15,681	88,535	69,129	58,100	56,251

(a) Areas marked thus in 1923, also appear to be wrongly allocated.

(b) N.B.—Yearly variations in figures submitted obviously incomplete.

(c) Particulars for this District (Plantations under control of the Expropriation Board) included in Madang figures.

(d) Madang figures include those for Mainland as a whole.

(e) Particulars for this District (Plantation under control of the Expropriation Board) included in Rabaul District.

In the above graph, No. 1, it is important to observe that all four lines, with the exception of minor fluctuations, show the same general curve and direction.

The correlations between the bearing area, yearly exports and the total yield returns submitted are very close in most years, as it is reasonable to expect.

It is seen, however, that the total area under coco-nuts had increased very rapidly from 1914 to the year 1921-22, while from here on a distinct and gradual increase is recorded for the next thirteen years, i.e., practically to the present time. The sharp curve indicated for 1925-26 is obviously wrong as the total area could not suddenly slump. The curve for bearing area shows a natural lag of several years, but rises in general conformity with the total area planted. It appears that the steep rise in total area from 1918 to 1921-22 was not felt in the bearing areas until 1926-27, and particularly in the 1927-28 season. The curve for the bearing area after a relatively short ascent from 1914 to 1927-28 assumes a much more gradual slope to 1931-32. According to the figures available, there has been a decrease in the bearing area from 1930-31 to 1933-34, and an increase of over 3,000 acres from that date to June, 1935, which variations appear hardly tenable. The line showing annual yields as furnished by plantations corresponds very closely in its ascent with the line of the bearing areas until 1930-31.

The plantings from 1914 to 1922 did not show their maximum effect on the yields until three or four years after they had come into bearing, a fact which is indicated in the graph.

The yearly tonnage exported, except for 1935, has always considerably exceeded the yields given by the planters, which may be due, to some extent, to inaccuracies in the figures presented, but to a far greater extent to the amount of trade and native-grown copra included in the yearly exports, or to some copra being held in stores at the end of the financial year. Thus in the 1926-27 League of Nations Report (26) it was indicated that 7,000 tons, which were produced during the year under review, were not included in the total exports, as the consignment did not leave the Territory until July, 1927.

The fluctuations in the export curve may be in many cases associated with changes in the amount of native copra gathered.

It is significant that both the yields given and the total exports have fluctuated considerably, and even decreased since 1929-30. The probable causes for this lack of increase have been discussed elsewhere (see Graph No. 2).

It is not possible to indicate there, however, that the increase in bearing area was not so marked as in former years, although still showing continued increase.

In 1909, 39,595 acres (16,024 hectares) were under coco-nuts in New Guinea. This had increased to 76,847 acres (31,099 hectares) including 23,572 acres (9,539 hectares) in bearing by 1914. By December, 1918, the area had increased to 133,960 acres (54,213 hectares) of which 44,169 acres (17,875 hectares) were in bearing. (See Table 7.)

During the period of military occupation from September, 1914, until May, 1921, most of the German planters and large companies carried on their business as usual, and expended a large proportion of their earnings in the Territory in making new plantations. The result was that the area under coco-nuts in 1914 (as indicated above) grew considerably in 1918.

From September, 1920, when the management of the New Guinea plantations was entrusted to the Expropriation Board, development on all German properties absolutely ceased, as did advances to private owners.

A fairly large number of properties, however, were planted up during the days of the Expropriation Board, but there was a considerable reduction in the rate of increase previously experienced.

It is recognized that from 1927 to 1930, when the new purchasers of expropriated properties began to settle down, an increase in new development commenced with the influx of private enterprise, and this was again reflected in the increase in total area under coco-nuts.

After 1930-31, however, the price of copra had fallen so that the area devoted to new plantings was reduced very considerably except in isolated areas. The latest increase in development has been to some extent counterbalanced by the failure of palms on unsuitable areas and the decrease in yield of those past the stage of maximum production.

A study of Table No. 6 and Graph No. 1 shows that a remarkable development in the coco-nut industry has taken place in New Guinea, though this is now slowing up to some extent.

It is seen that nearly 60,000 acres were added to the planted areas between 1914 and 1918, i.e., during the war period, while a further 60,000 acres were brought into bearing in the three years after the war.

Between 1925-26, when the area was at 172,305 acres (69,759 hectares) and 1930, the total area had increased to over 200,000 acres and stands at 225,681 acres (88,535 hectares) in 1935, according to figures submitted.

Survey Office,  
Rabaul.

TABLE No. 7.

## ESTIMATED AREA OF LAND IN BEARING IN THE POSSESSIONS, DECEMBER, 1918.

	Hectares.
New Guinea Company .. .. .	5,150
Hamburgische Suisce Gess .. .. .	2,984
Hernsheim and Company .. .. .	1,117
Nord Deutscher Lloyd Company .. .. .	43
Rheinische Mission .. .. .	33
Methodist Mission .. .. .	124
Marist Mission .. .. .	69
Neuendettelsau Mission .. .. .	118
Catholic Mission Von Holigon .. .. .	430
Catholic Mission of the most Sacred Heart .. .. .	1,000
<i>Other than Large Companies.</i>	
	Hectares.
Rabaul District .. .. .	2,688
Kavieng District .. .. .	1,273
Aitape District .. .. .	42
Kieta District .. .. .	249
Namatanai District .. .. .	582
Madang District .. .. .	115
Morobe District .. .. .	—
Manus District .. .. .	1,682
Government plantations at various stations .. .. .	176
Total .. .. .	17,875
Estimated area of land bearing owned by natives .. .. .	20,000
Grand total .. .. .	37,875



## FLUCTUATIONS IN COPRA TONNAGE AND VALUE OF EXPORTS.

*See GRAPH No. 2. TABLE No. 8.*

It is seen that 1927-28 was the peak year for production and value of exports. The increased production is a reflex of the palms coming into bearing which were planted by the German Nationals in 1917-18, when they were unable to remit their money to Germany. It is pointed out, however, that 7,000 tons of copra produced the previous year were exported in July, 1927, and thus included in the 1927-28 figures.

The lowest returns for copra exported since the occupation of New Guinea by the Australian soldiers was in 1915-16, where low values apparently coincided with a period of low production, or war-time difficulties affected the export.

The greatest returns in value in proportion with tonnage exported were in 1918-19, and a high level was still maintained in 1919-20. After a sharp decline in 1921-22, the values increased and continued high until 1925-26, and after a small decline in 1926-27 reached the outstanding peak year of 1927-28 mentioned above.

The value of total exports of copra from New Guinea twice exceeded £1,000,000, viz., in 1925-26 and in 1927-28.

In 1925-26, however, a much lower tonnage was exported (45,806 tons) compared with 65,285 tons in 1927-28, thus the prices obtained per ton were much higher in the former period.

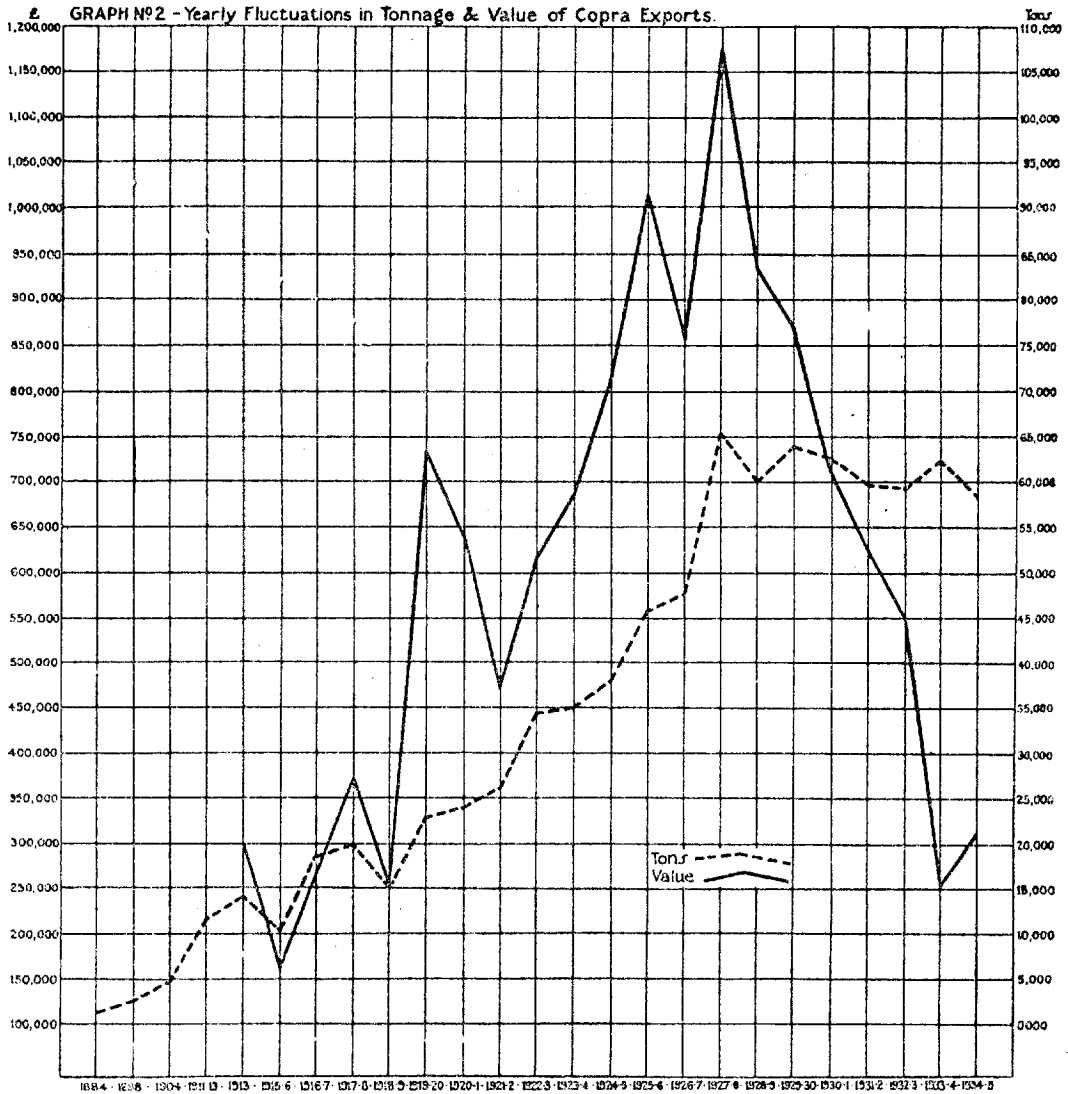
From 1928 to 1933-34 the values slumped badly, which fact is shown by a surprisingly steep decline on the graph, and in 1932-33 and 1933-34, the bottom had fallen out of the copra market. A slight but positive improvement is shown during the year ending June, 1935, and the graph does not indicate the decided improvement which has occurred during the year ended June, 1936.

There is a progressive increase in the tonnage exported from 1884 to 1927-28, i.e., if the years 1915-16 and 1918-19 are excluded when decrease in the tonnage exported occurred, largely due to war-time conditions.

It is seen that the tonnage increase is represented by an almost direct ascent on this graph.

The total value of copra exported shows much greater fluctuations over this period, but exhibits a progressive and very marked upward trend which largely corresponds with the increase in tonnage.

There has been, however, a decided and unexpected decline in the tonnage exported since 1927-28, which, considering the increase in acreage and areas coming into bearing, should cause some concern (on the part of those interested in the progress of New Guinea) for the present position of copra production (*see Graphs Nos. 1 and 2*).



The fact that this decrease apparently has been progressive over the past eight years, with the exception of a relatively slight decrease in 1929-30, reaching in 1934-35 the lowest tonnage exported since 1926-27, indicates that conditions other than climatic are responsible.

Undoubtedly the relatively dry years would affect the production in particular areas, e.g., in both New Britain and New Ireland the average rainfall was decidedly below normal in the years 1933 and 1934. See Table No. 9 showing yearly rainfall and averages.

This would be counteracted to some extent, however, over a period of eight years by correspondingly wet periods in other districts (e.g., the rainfall for the years 1933 and 1934 in the Kieta district was above average).

It is also feasible that the effects of a relatively dry season may be felt in the next season's crop.

Apparently the causes for this decline in tonnage exported over the period indicated are due to several interacting causes which are deeper rooted than fluctuating climatological conditions, although these warrant due consideration.

It is almost impossible to estimate the yearly fluctuations in the proportion of native-grown copra (usually dried on the plantation) included in the plantation yields and shown in the total exports of copra, especially as the planters are not bound to supply such statistics.

The fluctuations in supply of such native-grown copra must be considerable as it is certain that when prices of copra are low natives show a decided disinclination to collect the nuts, or cut their copra, as the case may be, for disposal to planters. The planters also, when low prices prevail, have less incentive to trade in native copra.

Another important consideration which is discussed elsewhere is that the older planted areas in most parts of this Territory are definitely beyond their stage of maximum production, with the result that their output is rapidly decreasing.

In many areas where copra has been produced for a considerable number of years there is also decided evidence of soil exhaustion.

Another reason for the decline in production, even on some of the more recently planted areas, is that the palms are planted on soils and in positions quite unsuitable for coco-nuts, e.g., badly drained clay soils or poor, sandy areas.

In an effort to economize on the cost of production during the slump period, and often on account of lack of funds, the labour lines and general maintenance on many plantations were reduced to such an extent that the properties have suffered considerably.

Assuming that there has been an actual increase in the total acreage and bearing area, the perceptible decrease in production in spite of this indicates a tendency to decline in the industry at the present time.

TABLE No. 8.—PARTICULARS COPRA EXPORTS NEW GUINEA.

Year.	Exports.	Value Exports.	Average Price per ton f.o.b., N.G.	Percentage Value over Total Exports.
	Tons.	£	£ s. d.	
1884 .. .. .	1,300	..	..	..
1898 .. .. .	2,500	..	..	..
1904 .. .. .	4,400	..	..	..
1909 .. .. .	8,518	106,326	12 9 6	..
1910 .. .. .	9,099	148,758	16 7 0	..
1911 .. .. .	9,397	163,090	17 6 11	..
1912 .. .. .	11,428	198,338	17 7 1	..
1913 .. .. .	14,299	302,186	21 11 8	..
1914 .. .. .	..	..	..	..
1915-16 .. .. .	11,062	161,119	14 11 3	..
1916-17 .. .. .	18,582	267,277	14 7 8	..
1917-18 .. .. .	19,708	369,837	18 15 4	91
1918-19 .. .. .	14,886	244,314	16 8 3	90
1919-20 .. .. .	22,708	745,057	32 16 3	88
1920-21 .. .. .	23,735	644,045	27 0 2	96
1921-22 .. .. .	25,894	474,110	18 6 2	95
1922-23 .. .. .	34,648	619,715	18 19 8	98
1923-24 .. .. .	34,974	686,519	19 12 2	98
1924-25 .. .. .	39,151	815,938	20 19 10	95
1925-26 .. .. .	45,806	1,016,930	22 3 6	92
1926-27 .. .. .	47,613	849,852	18 4 0	79
1927-28 .. .. .	65,285	1,176,040	18 2 6	80
1928-29 .. .. .	60,435	933,769	15 9 0	81
1929-30 .. .. .	63,832	864,358	13 10 10	87
1930-31 .. .. .	62,303	716,543	11 10 0	78
1931-32 .. .. .	59,452	618,298	10 8 0	56
1932-33 .. .. .	59,040	543,906	9 4 3	34
1933-34 .. .. .	62,270	283,329	4 11 0	16
1934-35 .. .. .	56,251	361,413	6 8 6	15

TABLE No. 9.—YEARLY RAINFALL AND AVERAGES FOR VARIOUS DISTRICTS. TERRITORY OF NEW GUINEA, SINCE 1928, COMPARED WITH YEARLY AVERAGE.

District.	1928.	1929.	1930.	1931.	1932.	1933.	1934.	Years.	Yearly Average.
NEW BRITAIN.									
Gasmata ..	23,434	31,376	13,399	24,629	27,998	17,193	18,956	17	241.96
Keravat ..	..	..	9,352	9,557	10,187	9,938	11,063	5	99.98
Kokopo ..	5,985	12,774	15,215	9,250	6,681	6,766	5,801	8	86.03
Pondo ..	17,009	28,524	12,496	11,725	19,307	17,405	11,863	9	174.13
Rabaul ..	7,250	10,975	8,997	5,801	10,442	8,349	8,118	21	86.29
Talasca ..	15,962	23,333	15,157	14,853	17,948	17,609	11,288	17	171.98
NEW IRELAND.									
Kallli ..	19,126	21,414	17,865	22,210	25,261	12,383*	7,760*	10	192.73
Kavieng ..	10,326*	19,160	11,903	12,497	10,842	9,268	9,638	17	117.09
Namutani ..	12,855	21,491	19,233	16,355	17,649	15,499	10,885	17	140.22
AITAPE.									
Aitape ..	10,054*	12,080	9,982	9,854	9,717	12,294	10,230	14	99.44
KIETA.									
Kieta ..	14,695	9,575*	8,918	12,463	9,997	13,248	11,781	18	127.27
Rugen ..	..	..	..	..	9,427	10,899	10,081	3	101.34
MANUS.									
Manus ..	7,361*	16,838	16,256	16,339	18,711	12,665	15,508	17	151.98
MADANG.									
Madang ..	14,816	14,106	24,936	11,357	11,779	14,844	10,114	17	139.80

\* Incomplete.

Years Below Average Italicized.

Years 1931-1933-1934. Below average in New Britain.

Years 1933-1934. Below average in New Ireland.

Year 1932. Below average in Kieta and Madang.

## IMPORTANCE OF THE COPRA INDUSTRY AS AFFECTED BY THE RISE IN GOLD PRODUCTION.

*See GRAPH No. 3.—REPRESENTING THE PERCENTAGE COPRA EXPORTS COMPARED WITH THE TOTAL EXPORTS AND THE PERCENTAGE OF GOLD EXPORTS COMPARED WITH THE TOTAL EXPORTS.*

It is seen that copra was easily the preponderating and most valuable item of the total exports of this Territory from pre-war days until 1930-31.

In 1913, there were over £60,000 worth of paradise feathers despatched from German New Guinea, and that was the only time that the copra exports fell under 80 per cent. of the total exports during the period under review until some time after gold production had commenced somewhere about 1923-24.

From 1925-26 to 1934-35, the curve of the percentage of gold production is surprisingly close to an inverse curve to the percentage of copra production over total exports, and they vary in opposite directions. This means that the rise in the value of gold exported is largely responsible for the drop in percentage of copra value compared with total exports.

In 1931-32, the value of gold production took a sudden sharp rise, but it was not until 1932-33 that the percentage value exceeded that of copra production by a relatively small margin. The following year, however, there was a sharp rise in value of gold production which continued also in 1934-35.

The value of copra production slumped badly in 1933-34, and in 1934-35 represented only 15 per cent. of the value of total exports (*see Graph No. 3*). With copra at present prices this percentage is likely to increase during the current year.

It should be remembered that the unit value (i.e., value per ounce) of gold has been much greater than is usual under normal conditions on the world's market, and that the unit value of copra (i.e., value per ton) has been very much lower than the average price for the last 25 years. Despite this, gold has not reached the same pride of place which copra held in comparison with total exports for about 45 years prior to 1931.

The present position of the coco-nut industry and its tendency to decline has not been given the attention it deserves, possibly because the increased production of gold and the prevailing low prices have over-shadowed its fundamental importance to the continued welfare of this Territory.

This comparison of the relative importance of the gold and copra industry to the Territory of New Guinea is not a true reflex of the position. It is impossible to estimate from the figures available what are the actual returns from the copra industry in terms of freightage, harbour dues, indirect taxation, import duties, wages returns from labour engaged in handling the produce and numerous other items.

It is also certain that as a long-term security it is only the broad acres actually planted which form the basis for secure investment (i.e., over a period of years) in this Territory.

The position must be faced that unless new gold-fields are discovered or those already in existence prove richer than any found in Australia, the value of gold production will gradually decrease. It is only necessary to conjecture what would happen to the present revenue if gold were reduced to say £4 per ounce.

These statements do not belittle the fact that gold production in this Territory has been an absolute boon over the depression years, and is likely to be for some time to come.

### PRODUCTION OF SHREDDED AND DESICCATED COCO-NUT.

The use of these products in the production of confectionery, cakes, and food, is too well known to require elaboration.

The production of desiccated coco-nut has become a small but established industry in this Territory, and the Mandated Territory of New Guinea and Papua combined can provide about 98 per cent. of Australia's requirements.

The first sample shipment from this Territory was made in May, 1928, the product being of fine quality and artistically packed for export.

During 1928, two plants for the manufacture of desiccated coco-nut were erected, and despite difficulties with the unskilled labour employed, a rapid improvement in the quality of the output soon became manifest. The three plants now working are at Lindendafen, South Coast New Britain, Alexishafen Mission, Madang, Mainland of New Guinea, and Pondo, North Coast of New Britain.

Reference to Table (10) which is self-explanatory, shows that the production of desiccated coco-nut has kept on increasing in quantity, but varying in value. The greatest yield in value was where 1,463 tons brought £81,562 in 1933-34, while in the 1934-35 season 1,611 tons valued at £45,080 were exported. Any great expansion in this industry cannot be anticipated until payable markets outside Australia are available.

Ceylon and the Philippine Islands are the principal sources of supply of shredded and desiccated coco-nut, and their combined exports since 1924 have remained fairly stable and average about 50,000 tons per annum (14). The United States of America and the United Kingdom are the principal importers.

TABLE No. 10.  
SHOWING DESICCATED COCO-NUT PRODUCTION.

Year.				Tons.	Value.
					£
1928-29	..	..	..	26	1,458
1929-30	..	..	..	192	8,640
1930-31	..	..	..	941	37,640
1931-32	..	..	..	1,282	64,100
1932-33	..	..	..	1,335	73,452
1933-34	..	..	..	1,463	81,562
1934-35	..	..	..	1,611	45,080

1934-35—107 tons of husked coco-nuts to the value of £321 were exported to Australia.

GRAPH N°3 - Percentage Values of Copra and Gold Exports compared with Total Exports.



## FACTORS INFLUENCING THE FLUCTUATING PRICES OF COPRA AND OTHER VEGETABLE OILS.

It is believed that the situation leading to the lowering of copra prices which culminated in the very low prices current in 1934, and to a lesser extent in 1935, is due to several well-defined factors. These factors affect a number of related industries and cover a wide range of geographical, climatic and political circumstances.

1. The world-wide depression and reduced purchasing power leading to a very limited competition in buying.

2. Economic nationalism—a number of countries wishing to become self-contained imposed quotas, tariff barriers and legislative protection to encourage internal production.

The intention of the governments was to foster the production of such fats and oils as could be produced in their own countries, while particular attention was given to the protection of dairying interests.

Examples of such protection are—

- (a) German control of fat and oil, March, 1933;
- (b) Dutch control of the dairy industry, 1933;
- (c) French quota system, January, 1934. Duties on copra were also increased in May, 1935;
- (d) United States excise tax on oils, fats and oil seeds included in the *Revenue Bill* 1934. Followed by the American processing tax instituted by the powers delegated under the Agricultural Act. These two taxes led to a total impost of 5 cents per lb. (equivalent to £22 to £24 per ton), on coco-nut oil other than Philippines production which remained at 3 cents per lb., copra being taxed proportionately to its oil content. It is difficult to understand why palm kernel oil remained at 3 cents per lb., which, according to the American Bureau of Raw Materials, (1) would defeat the objects of the levy;
- (e) Spain quota system, 1935, which fixes the imports of copra at 75 per cent. of the basic year 1931-32;
- (f) Switzerland—a levy and special tax was imposed on edible oils and oil seeds in July, 1935, the proceeds of these taxes to be used to bring about a reduction in the retail price of butter.

Numerous other foreign countries such as Greece, Egypt, Palestine, and Empire countries such as Canada, Irish Free State and Bahamas, have either imposed quotas or import duties on coco-nut products.

3. Changes in the international situation led to some countries going off the gold standard, while other countries still retained it. Thus the position of the French franc, the Dutch guilder, and fluctuations in the German mark, all played a big part and led to difficulties in standardized buying.

The depreciation of the American dollar, together with the processing and excise tax, led to the diversion of the Philippine copra—usually absorbed by the United States—to European countries in order to obtain the benefit of the exchange premium.



### Over-production of Copra and other Vegetable Oils.

4. During the copra crisis the world market was over-supplied with coco-nut and other vegetable oils.

The high prices prevailing in the years preceding and for some time after the war, led to the diversion of much capital to all branches of the vegetable and edible oil industries, as exemplified by the increase in the whale, soya bean, and palm oil production.

It is to be remembered that copra prices were regulated and stabilized at a high price during the war period owing to the demand for glycerine, used in the manufacture of explosives.

Coco-nut-growing received added impetus from the uses found for this and other vegetable oils during the last twenty years.

There is danger of future potential increase in bearing areas, also there are large areas of immature palms in the Philippines due to come into bearing in the near future.

### Decreased Consumption.

5. The world purchasing power was so much reduced that there was a steady decline in the amount of soap and confectionery used. The consumption of margarine, of which coco-nut oil is an important component, also decreased when greatly increased supplies of butter were forthcoming at decidedly lower prices.

There was a reduced demand in Europe and other countries for oil cake as cattle feed owing to the abundance of pasturage and fodder crops, the very low prices ruling for cereals and lessened purchasing power.

### Competition with other Fats and Oils.

6. The following oils and fats enter into competition with coco-nut oil, viz., palm oil, whale oil, cotton seed oil, soya bean oil, linseed oil, groundnut oil, lard, tallow and a number of other oils of lesser importance, and until recently increased supplies of all these were available.

It is stated that in 1934 United States of America used 80,000 bushels of maize in the manufacture of maizola oil.

Most of the oils mentioned above are extensively used in the manufacture of margarine, lard substitutes, cooking and edible oils, and are also employed in the manufacture of soap of which glycerine is an important by-product, and on the condition of these industries the market for them depends.

Soya bean competition has seriously prejudiced the market for copra, and the following table showing the imports of soya beans from Manchuria to Europe shows to what extent this industry has grown:—

TABLE No. 11.  
SHOWING IMPORTS OF MANCHURIAN SOYA BEANS INTO EUROPE DURING  
RECENT YEARS.

—				1931.	1932.	1933.	1934.*
				Tons.	Tons.	Tons.	Tons.
Britain	..	..	..	110,300	160,569	157,428	177,194
Germany	..	..	..	1,014,573	1,186,992	1,170,900	913,740
Holland	..	..	..	31,218	40,435	38,067	126,602
Denmark	..	..	..	235,524	225,481	231,215	268,753

\* N.B.—Effects on reduced crop.

The soya bean industry in the United States of America has increased its production from 166,000 tons in 1926 to 400,000 tons in 1931 (22) which product, as a result of new processes, is a direct competitor with coco-nut oil.

7. The substitution of oils previously thought to be unsuitable for margarine manufacture in place of coco-nut oil has been brought about by the chemical processes of hydrogenation, hardening, deodorization and neutralization, particularly of the coarser vegetable and animal oils.

It is now possible, in some cases, to substitute one oil for another in the manufacturing process, and manufacturers are thus able to take advantage of any marked lowering in price of any of the more important oils or fats, by changing their formulae. Japan, by using new processes, is now adapting huge quantities of fish oils, rape seed oil, &c., for food stuffs, soap and other uses.

### **Monopolized Buying.**

8. Monopolized buying by Unilevers and other large firms has been stated to be an important factor in the control of prices. This cause of the lowering of prices is not believed to be so important as is generally considered, because certain Dutch and German firms are quite outside this combine.

It appears that Unilevers have been unable to pay high prices for the raw material, as the selling price was driven down by the low price and surplus supply of butter.

9. Freightage on some products, e.g., soya beans from Manchuria and ground-nuts from the East have for certain reasons been carried at rates cheaper than those prevailing for copra, thus the cost of shipping on the Japanese lines was cheaper than on the English lines.

## **REASONS ADVANCED FOR PROBABLE RECOVERY OR STABILIZATION OF COPRA PRICES.**

### **1.—Consensus of Opinion in the Trade.**

In recent reports the prominent firms in the trade have consistently maintained that the low-price levels prevailing for fats and oils in recent years is a thing of the past, and that prices should stabilize at a higher plane for some time to come. Examples of such firms are Messrs. Frank Fehr and Company (16, 17), Faure Blattman and Company (15), Laboucheres (32), L. M. Fischel and Company (32), and Harrops, Sydney (32), and several reasons have been advanced for this contention.

### **2.—General Economic Recovery.**

The general economic position appears to be slowly improving, and with it confidence is increasing, while there is a clearer recognition of the greater development of international trade.

### **3.—No Excessive Stocks on Hand.**

There is a general shortage of fats and oils in some of the principal consuming countries, apparently brought about by several independent causes which apply to all principal oil producing materials. It is the prevailing opinion that this position cannot be remedied for some time to come.

It has been stated that the whale oil stocks which often amounted to 300,000 or 400,000 tons are practically all consumed, and that practically the total 1935-36 production has already been passed on to the consumers.

It must not be overlooked that there is always a hidden reserve for export in the quantity consumed locally, and that higher prices will draw upon what is usually domestic supply.

#### 4.—Restriction Owing to Policy and Difficulties in Exchange.

It is stated that until recently countries in Europe, such as Germany and Italy, only bought limited supplies of fats and oils, and that supplies are very light where there has been stringent financial control.

This is taken to indicate that several refineries and soap factories have been rendered idle. Germany is said to have previously made large purchases of whale oil, and because of her policy to reduce exports her supplies of vegetable oils are now reduced below minimum. It is concluded that at some time this shortage must be remedied.

#### 5.—Natural Causes.

(a) Drought in America. This led to a general shortage in hogs and lard. The numbers of hogs on hand are the lowest for 30 years (17) representing in the spring season of 1935 a reduction of 19.6 per cent. over 1934, and a 40 per cent. reduction over the 1933 season. The drought, together with a restriction of crops (which are said to be 30 per cent. below normal), has led to a shortage of cotton seed oil. It has also led to a shortage of oil cakes for cattle-feeding. Canadian soap manufacturers have been drawing on the limited supplies in the United States of America during this period, and this should lead to increased buying from outside sources. North America is now making urgent inquiries for vegetable oils in bulk, but shippers are unable to supply important quantities.

(b) Butter supplies have been reduced, and on account of small arrivals in England prices of New Zealand and Australian butter have risen. According to Frank Fehr (17) the price of spot New Zealand butter in October, 1935, was 127s. per cwt., compared with 112s. a month previously, and 72s. at about the same time in the previous year.

(c) Typhoons in the Philippines at the end of 1934 are reported to have seriously damaged the palms and young nuts.

(d) Shortage of groundnut supplies. This is said to be in the vicinity of 40 per cent. in India (15, 16, 33), and there is also a heavy reduction in the newly developed West African supplies.

(e) Soya bean crop. This is reported to be below average for the last two years, mainly owing to adverse weather conditions which have led to a shortage of 1,000,000 tons.

(f) A malaria epidemic in Ceylon. This occurred in the coco-nut producing areas, and considerably interfered with harvesting, copra-drying, &c. There was also an abnormal drought in Ceylon in 1934, and shipments in August, 1934, were 36.6 per cent. below the shipments of 1935, in combined value in terms of nuts of all copra produce.

(g) A considerable reduction occurred in the Argentine linseed crop and the production of olive oil was also reduced owing to unfavorable conditions. This has led to the formation of the Argentine Grain Regulating Board to protect farmers, which has resulted in a decided advance of prices of wheat, linseed and linseed oil.

### 6.—Margarine Manufacture Increased.

Owing to reduced supplies of butter at higher prices and other obvious causes such as the reduction in the amounts of other suitable oils forthcoming, according to *The Weekly Dairy Produce Notes* (quoted 17), margarine manufacture has increased in the United Kingdom 15 per cent. over the corresponding period of last year. This is also reflected in the increased imports of oils and fats, other than butter and lard, into England. According to Board of Trade returns (17) the imports January to September, 1935, were 640,370 tons, as against 553,388 tons for the same period 1934. At the same time, imports of butter and lard decreased by over 15,000 and 45,000 tons respectively.

### 7.—Reduced Exports.

Reduced exports from the Netherlands Indies, the largest exporting country, have occurred.

### 8.—Regulation of Whaling.

Regulation of whaling by the Norwegian Government and related interests. The period of catch has been reduced to the shortest on record; the seamen have been granted higher wages, and it is thought that the whalers may not have time to fulfil the reduced quota allowed. Reports from the Antarctic indicate that the whale catches are only very moderate.

### 9.—Reduction in Planting Coco-nuts.

It is anticipated that world planting of coco-nuts will be practically discontinued for a considerable time. Low prices during the last few years have necessitated economies on the plantations, hence a cut down on capitalization duties and charges which affect the coco-nut industry can be expected.

### 10.—Indian Position. (6)

India, the largest coco-nut producer in the world, is using all her own supplies, and the quantities used for internal consumption are continually on the increase. This has led to the gradual absorption of Ceylon supplies, and it is practically certain that eventually India will need all the Ceylon copra, and at the present time Ceylon copra is unavailable on the world's market, even at a premium of £4 per ton over all other copra. This contention is borne out by the fact that Singapore has now an increasing export of coco-nut oil to India which is causing a premium for Malayan F.M.S. copra.

Commencing from the 1st January, 1932, there was reduction in the Indian import duties on Ceylon copra of £1 10s. per ton, and on Ceylon coco-nut oil of £2 per ton. India during the past fifteen years has found it increasingly difficult to maintain her independence of outside sources of supply.

At one time Malabar copra was superior even to that of Ceylon. Her exportable surplus between 1909 and 1916 was about 28,000 tons per annum, but for the last ten years the exports from that source have ceased entirely.

The Director of Agriculture, in the course of his recent tour, was informed that the development of an intense national spirit in India has greatly influenced the local milling of copra which it is impossible for the local supplies to meet. It is intended to increase the local production as much as possible to try and meet this demand.

The possibilities for expansion of the planted areas in India are not known here, but it is believed that any increase from this source will not approach the increasing demand. In any case the effects of such plantings will not be felt for another eight or ten years.

The increased Indian demand for Ceylon and Straits copra is due chiefly to the high prices ruling for Malabar copra. The *Ceylon Trade Journal* (6) states that rightly or wrongly the opinion is gaining ground in India that Indian oil mills should be exclusively fed by Indian-grown copra. The result is a persistent cry against Ceylon copra, and the root of the trouble is evidently a mixture of protectionist and economic nationalism. It is shown in another place, however, that the Ceylon copra absorbed by India exceeded over 80 per cent., which was an increase of 21 per cent. compared with a year ago.

### 11.—Philippine Supplies.

Frank Fehr, in their 1933 annual report (16) stated "that Philippine exports to Europe had increased 125 per cent. over the year 1932", a fact which led to much consternation on the market. Since then, it appears that these supplies were not sold in Europe as readily as was anticipated. One reason was the greater tendency to discriminate in favour of higher quality copra in periods of low prices.

### 12.—Glycerine as a War Commodity.

Copra is the best source of the by-product glycerine from soap manufacture. The use of glycerine in explosives led to increased imports into Italy at the commencement of the Abyssinian war. Owing to war circumstances, Italy is having difficulty in obtaining direct supplies, although a heavy import through France is reported.

On the 18th November, 1935, sanctionist countries, such as France and the British Empire, prohibited exports to Italy.

## PERMANENCY OR OTHERWISE OF HIGHER PRICES AND NECESSITY FOR CAUTION.

The present partial recovery in the copra market may, or may not, be permanent, as a number of causes could influence the trend of prices in the future.

Mr. James Burns (5), in reporting on the year's operations of Burns Philp and Company Limited, stated, "That the outlook for the ensuing year is much brighter, but everything will depend on whether the improvement in the market can be maintained". It is not possible to forecast whether the improvement in prices is permanent or not, but despite the reasons tabulated as to why the copra market should improve, there are several potent reasons why people interested should not be over-optimistic. The immediate future is reassuring, but one cannot vouch for the prospects in the distant future.

Our present director, in a memorandum dated 16th April, 1934, referred to a communication from the Director of Agriculture in Ceylon, who stated, "it is feared that the restricted potential production of whale oil is a big shadow overhanging the industry, because if prices of vegetable oils rise, animal oil will then come forth as a counter-balancing influence".

There is no reason why this should not also be true of the restriction operating on cotton production in the United States of America.

Under present circumstances there is no danger of the lifting of such restrictions affecting the prices in the near future.

It must be recognized that apparently a very unusual set of circumstances, all of which occurred about the same time, was responsible for the present shortage of fats and oils followed by a rise in prices.

### THE COCO-NUT INDUSTRY AND THE EXCISE TAX. (36)

During the first quarter of the year 1934, and prior to the passage of the tax, both copra and oil markets were dull with prices subnormal as a result of purely natural causes. When the processing tax became law the market price of copra started to decline quite steadily, and late in June reached a record low price on the Pacific Coast.

In retrospect, it now seems that this price, which was either near, or, in some cases, actually below the cost of production, was largely a psychological product of the tax, and owing to the fear of American operators who refused to buy, their market was artificially depressed below the world market.

In May, that is after the real drop in the post tax market had occurred, Europe realized that Philippine copra was 10 to 15 per cent. cheaper than any other on the world market, and commenced buying on a large scale. This movement continued through to September, but particularly during the months of May, June and July, the American market took a relatively insignificant quantity of Philippine copra, while Europe continued to buy on a hitherto unprecedented scale. This flow of copra from a lower to a higher market caused the first step in recovery from fear and maladjustment, and thus by the end of July prices commenced to climb. In August, the market was simultaneously boosted by the phenomenal drought in the Middle West and the combined effect of the agricultural adjustment administration (A.A.A.) crop destruction and acreage restriction schemes.

Hogs were slaughtered, live-stock perished, and grains, cereals and cotton were either destroyed by the drought or reduced under the A.A.A. Meantime, Europe continued buying Philippine copra, and these forces, powerful individually, were quite irresistible when combined and supplied the market with a powerful lift so that it definitely recovered.

In September, American buyers finally awoke to the realization that they must recover their requirements in the Philippines or pay a penalty of \$.02 gold per pound (on oil), and as the supply of Philippine copra was not inexhaustible, and Europe had already made tremendous inroads on the 1934 production, they would have to enter the market or see part of their supplies move to Europe. This paved the way for a marked rise in the market, although other causes are now operating to the same effect.

The article continues by stating that it would be easy to jump to the superficial conclusion that a complete recovery from the effects of the excise tax had been consummated. Such a view overlooks the fact that the rapid recovery has been made possible by an extraordinary chain of events (*see* causes mentioned above) which the future is unlikely to duplicate.

The present condition being largely artificial, prices will not be artificially maintained for ever. When the price-raising policy is abandoned, sooner or later prices will be left to natural laws.

The effect of the processing tax was to compel the American buyers to substitute Philippine oil and copra with tallow from Australia, and fatty acids from Europe and other fats and oils which were cheaper, duty included, than copra, plus the tax.

The fatty acids exported from Europe were in large part derived from Philippine copra.

Philippine exports of copra to America fell from 203,493 metric tons in 1933 to 120,194 tons for the first ten months of 1934. Philippine exports to Europe simultaneously jumped from 88,663 metric tons in 1933 to 138,620 metric tons for the first ten months 1934.

While it must be recognized that the present improvement in the copra position is due, not only to natural causes, the following abstracts from the *Straits Budgets*, of Malaya, dated 8th and 15th August, 1933 (24) are worth quoting:

W. A. Stanton, a member of the Agricultural Advisory Committee in an address at the Malayan Agricultural Horticultural Exhibition, stated (24) "at the end of last year (1934) the industry recovered materially owing to a number of factors culminating to bring about a condition of temporary shortage of supplies". (See under discussion on Natural Causes, page 25.)

His Excellency Sir Shenton Thomas, opening the same exhibition (24) stated that "the coco-nut and oil palm industry, more especially the former, must prepare for severe competition in the future. A year ago these industries were passing through the most difficult period in their history, but to-day the position is slightly better. It is feared that the improvement has been brought about mainly by natural causes which may not recur (see above).

There has been up to the present, no alteration in the more fundamental factors influencing the situation which were set out in the report of the Vegetable Oils Committee (22).

An important question is that of producing a high grade product in sufficient quantity to attract the attention of the market and command an improved price".

The *Straits Budget* has in the same issue a leading article on copra which states, "It is folly to ignore hard facts, however artificial and transitory, and all the evidence points to the need for continued patience and caution on the part of the coco-nut producers".

In an article on "The Outlook for Ceylon Trade" (6) published in November, 1935, the following comments occur:—

"World developments do not seem to be very favorable to coco-nut products. The growth of rival oil seeds like soya bean has darkened the outlook considerably. An attempt is being made by research and propaganda to improve the market, but so far the situation has improved but little."

The report of the Vegetable Oil Committee in Malaya (22, 23) in September, 1934, indicated that the position of all coco-nut producers was extremely difficult and precarious. It was also stated that in a situation so complex, the possibilities of recovery and of expansion in the consumption of certain by-products must not be overlooked, and that any such recovery is more likely to take place by the elimination or reduction of certain sources of supply.

There is always the possibility of finding increased uses for coco-nut oil, e.g. in Malaya experiments are being conducted by mixing it with other vegetable oils such as Arachis oils for edible purposes.

There is the question of how long the genuine shortage of fats and oils will take to adjust, but it is believed that the position cannot be remedied for many months to come, hence there is no liability of accumulation of supplies.

A great deal depends on whether the improvement in the world conditions is permanent which, however, on present indications does appear probable; while opinions persist that prices will improve as world conditions improve.

Any appreciation of the dollar in America where there is increasing confidence or stabilization of the international exchange should assist copra prices.

The United States Supreme Court very recently ruled that the entire agricultural administration programme which includes the processing taxes was unconstitutional. This removal of the processing taxes quota agreements, &c., should affect the position for a long time to come.

The adjustment of the political and international situation which is uncertain at the moment, will play a big part in the future of the vegetable oil industry. There are, however, sufficient favorable circumstances to warrant the promise that the present increase in copra prices will be maintained for some time to come.

An important consideration is to what extent the substitution of coco-nut oil with other fats and oils has been responsible for the lowering of prices and whether this is likely to continue. It appears that only the manufacturers could assess that possibility.

The following table No. 12 indicates the world increases in planted acreage of coco-nuts.

The acreage planted in 1917 is compared with that planted in 1934, using round figures only, and the approximate percentage increase is indicated.

The very material increase shown supports the suggestion for caution in not forming over-optimistic opinions about the future of the coco-nut industry, especially when taken in conjunction with the vast increase of oils and fats supplied from other sources.

Some part of the world's new acreage has not yet begun to bear coco-nuts and but little of this increase can yet be in full bearing, hence the supply of copra should increase for some years to come, unless low prices cause a reduction in planted area. Increased consumption of coco-nuts and coco-nut oil can be expected, but it is still doubtful whether this will exhaust the potential increase in production.

TABLE No. 12.

COMPARISON OF WORLD COCO-NUT ACREAGE IN 1917 (24) WITH THAT IN 1934, AND SHOWING PERCENTAGE INCREASE.

(In round figures.) (Thousands of acres.)

Country.	1917.	1934.	Approximate Percentage Increase.
Netherlands Indies .. ..	950	2,000	105
Philippines .. ..	700	1,500	114
India .. ..	1,200	1,400	17
Ceylon .. ..	800	1,100	37
Malaya .. ..	400	600	50
Fiji .. ..	70	130	86
New Guinea .. ..	130	220	60



The Vegetable Oil Committee (22, 23) made certain recommendations for the temporary relief and stabilization of the coco-nut industry; the most important of the recommendations were—

- (1) The prohibition of further planting of coco-nuts.
- (2) Empire preference and protection. (N.B.—This was inquired into and found impracticable, although the Imperial Government did press for concessions with certain countries. Practically the only copra now entering the United Kingdom is from the Colonial Empire.)
- (3) The Committee considered restriction of production impossible to apply and, although urging the curtailment of planting new areas, considered that this may be brought about to some extent through capital being unlikely to be attracted to the coco-nut industry.

An important suggestion from the *Straits Budget* suggests that as several countries are greatly interested in the problems now being faced by the coco-nut industry, the time is now ripe for an international conference to discuss the position in all its aspects. It was also believed opportune to launch co-operative world propaganda to popularize coco-nut products, especially as recent world propaganda had produced a marked effect on tea consumption.

There is obvious scope for a substantial increase of consumption of coco-nut products in both Europe and America. Coco-nut foodstuffs provide material for very effective publicity and it is easy to conjecture what advertising experts could do in this regard.

#### ADVISABILITY OF PLANTING NEW AREAS.

The question as to whether coco-nut planting should be commenced now, with the prospect of the palms coming into bearing ten years ahead, is something which one cannot judge without a knowledge of the world's bearing areas.

India, Ceylon and Java, which are very important copra producers, are unlikely to expand their acreage.

In the Philippines, certain parts of Malaya, the outer possessions of the Dutch East Indies, and in the South Sea Islands, there is still much room for expansion; many palms are not yet at the bearing age and there is a great deal of land that can still be developed. According to Snodgrass (34), there is much territory in South America and Africa that is suitable for coco-nut cultivation and not yet opened up in any way.

The condition of the bearing areas in New Guinea does not allow of generalization. It must be argued that although there has been such an increase in the world's acreage (see Table No. 12) a large proportion of the coco-nuts in bearing must be at least approaching their period of maximum production, and in this Territory a number of palms planted in the earlier days have passed that stage.

Against this is the fact that the natives in almost all tropical countries are continuously planting for food supplies which constitutes a large hidden reserve. This is apparently counterbalanced by the fact that greatly increasing quantities are being used for local consumption, e.g., in India, Ceylon, Malaya and Java. There has also been a decided increase in the use of fresh coco-nuts in Burma and China, but it is not known what prospects there are for expansion in this trade.

There are several important factors which make the coco-nut of such value to the plantation agriculture in New Guinea, such as—

- (a) The comparative simplicity of cultivation.
- (b) It suits the labour available in New Guinea.
- (c) No large outlay in machinery required such as in tea, coffee, &c.
- (d) Transport difficulties tend towards coastal development.
- (e) The comparatively large expanses of coast line in this country in proportion with the total area.

The coco-nut and oil palms are permanent crops which are not so subject to drought fluctuations, nor do they react so quickly to lapses in cultivation as do the annual crops; hence the coco-nut planter usually should be able to take advantage of any serious causes which affect the annual oil crops.

It must be remembered that this inelasticity of supply can be a decided disadvantage in periods of over-production. In individual years vegetable oils such as cotton seed oil may be unusually plentiful and consequently cheaper in certain markets. In the long run, however, there seems good reason to believe that the tropical nut oils can be produced and marketed for less than the vegetable oils of the temperate zone.

The increase of bearing areas in the Philippines may not be so serious if America continues to take increasing supplies as was the decided tendency before the depression.

Where existing plantations have suitable virgin land available it should be wise to plant new land to increase the bearing areas, and this is especially true where very old planted areas are commencing to deteriorate.

Land is cheap in New Guinea and there are still plenty of areas available which are suited to coco-nuts. It also appears that no greater uncertainty exists for the future of coco-nuts than for the majority of oil-producing crops.

If only with the intention of maintaining existing production in the future there is still room for a good deal of new planting here.

The ideal should be to obtain suitable coco-nut land at low capitalization and bring it into bearing as cheaply as possible. There are several alternatives available such as the use of short-term subsidiary crops, e.g. cocoa and tobacco, to return some income while the coco-nuts are coming into bearing. The question as to whether this should be best done by planting out separate areas or by interplanting is dealt with elsewhere.

The important aim for the planter should be to reduce costs of production on all sides, and this can be best done by adopting modern plantation methods.

It appears unlikely that the high prices ruling during the years prior to 1909 will return, but at this stage the indications are that copra should stabilize at payable prices, and there should be a good living for the careful planter, who is prepared to get the most out of his property.

### QUALITY OF NEW GUINEA COPRA.

It is seen by reference to Table No. 13 that South Sea Island copra has an oil and moisture content similar to general trade samples of copra from other parts of the world, but that the content of free fatty acids is decidedly higher (4.5 per cent.).

An analysis of a sample of New Guinea copra, obtained from a plantation in New Ireland, and representing no better copra than is available from numerous plantations in this Territory, is given for comparison. The free fatty acid content is decidedly low and if the great proportion of copra exported from this country was of this standard, overseas buyers would have no cause for complaint.

It has been stated (32) that buyers in Europe as a regular practice use free fatty acid content as a means to get copra for a lower price, and that U.S.A. buyers seldom, if ever, make any claim on this account.

Free fatty acids, according to expert modern chemists, is not the trouble that some manufacturers say it is, although it is an indication of quality, because with present-day methods neutralization and deodorization are fairly simple matters.

European manufacturers, in the refining of coco-nut oil to condition this product for edible purposes, obtain a by-product which, after further processing, results in the relatively pure fatty acids from this oil being released. The European method of refining (not used to any extent in U.S.A.) produces an exceptionally high quality fatty acid. This in many cases can completely replace coco-nut and other oils in the manufacture of soap, and imparts to it the same essential characteristics.

It must be pointed out that if copra contains more than a certain percentage of free fatty acids it does not pay to refine it for producing higher quality coco-nut oils, also the colour and odour can be too far changed for profitable deodorization, hence such coco-nut oil must be used for soap-making.

South Sea Islands copra is recognized generally in the trade as being of low quality compared with that of other copra-producing countries, and one of the main reasons given is that the method of preparation falls below standard. Analysis shows it to be chemically inferior to Dutch East Indies, Malayan, or Ceylon copra, usually due to the high percentage of free fatty acids which is stated to be correlated with a lower oil content (about 3 per cent.) and buyers offer less for it.

In any case there must be definite reasons for this inferiority, which are not based on geographical considerations with the exception that it takes some weeks longer to collect the copra and tranship it to the European markets.

According to the Malayan report (22, 23) the order for merit of copra produced by various countries is as follows:—

The first ten places 1934, are for F.M.S. grade from Malabar, Ceylon, Seychelles, Mauritius, West Africa, Java, Straits, Dutch Indies, Samoa Plantation. Ceylon, F.M.S. commands a premium of 5 per cent. over Straits F.M.S., 15 per cent. over South Seas F.M.S., and 17 per cent. over Philippines F.M.S. It appears that Ceylon copra now commands a higher premium over Straits copra which, on the average, only commands a 2 per cent. premium over Rabaul hot air though ranging to 4 per cent.

There is no recognized inherent inferiority in South Sea Islands copra, which until 1929 included the New Guinea grades.

Copra dried in proper hot-air driers is generally of good quality as is sun-dried copra if prepared with care.

Smoke dried copra is frequently burnt (charred) or insufficiently dried, though this latter fault is frequently found in kiln or sun-dried copra.

Well dried copra should not contain more than 5 per cent. moisture to prevent its deterioration during shipment overseas, as excessive moisture allows of the development of harmful fermentation, fungus growth and increased free fatty acid content.

Snodgrass (34) states "that business men, with an intimate knowledge of the matter, declare that mechanically dried copra is very superior to both the smoke-dried and the sun-dried product, and is more dependable as regards moisture content."

A prominent copra broker of Rotterdam, in course of correspondence, stated the position as follows:—

"The copra from the South Sea Islands has the reputation of being badly cured. The natives are lazy and indifferent as regards their drying, so that sometimes the copra is dried too much and at other times not enough. The natural result is that this copra arrives in Holland in bad condition, and cannot in any way be compared to Java copra, hence the difference in market quotations in comparison with Straits F.M.S. (Fair Marketable Sundried) and Java copra.

The Rabaul plantation grade from New Guinea, South Sea Islands, is cured by Europeans and is therefore much better, which fact is expressed in the price.

Prices vary according to the quality, and copra is most sensitive to curing and handling, so the greatest care must be used in order to give the highest return."

The quality of copra also varies considerably according to the degree of care exercised in its preparation.

Well prepared copra is white, of low moisture content and hard. It should be free of dirt, moulds, and smoke, and contain from 4-6 per cent. moisture and not less than 65 per cent. of oil.

Generally copra is classified according to its country of origin and it is graded into two or more grades.

New Guinea copra is submitted to a compulsory system of copra inspection (which compares more than favorably with that carried out in any part of the world) and is sold on the London market as "Hot Air Dried," "Plantation Sun Dried" and "Common or Smoke Dried"; the term "Trade copra" is not recognized there, while the term "Kiln Dried" is often confused with "Smoke Dried".

A large proportion of the so-called Rabaul trade copra goes to Marseilles, France, and a certain quantity at times to Spain.

The weekly market quotations for Rabaul hot air copra are always higher than South Seas, which indicates a recognition by continental buyers of its superior quality, and it should be possible to improve this copra further, and create a wider favorable margin.

According to a statement of the Director of Agriculture in 1932 (26) "the increase of 5s. per ton over South Sea Islands copra in that year, added approximately £15,000 to the value of our main agricultural export. If the standard had been raised to equal that of Ceylon copra it would have given an increase of £120,000."

In the Malayan report on the vegetable oils industry (22) it was stated—"Where price grouping of copra according to country of origin occurs, it is difficult for any improvement in market quality by producers to meet with the immediate response of an enhanced price; this is said to be due to the fact that little interest is taken by buyers in individual consignments. Nevertheless, some estates have established a steady reputation for turning out high-quality copra and can command a steady premium for their produce. A general upgrading of copra shipped from any country seems likely, in the long run, to meet with a better market demand".

This problem indicates a definite sphere for research for the New Guinea authorities. Analytical data is wanted as a check to the present method of inspection and improvement of driers, and this can be carried out continuously at the seaboard without any interference with existing system of inspection, providing the subject is approached scientifically, with proper equipment and by using proper methods to correlate appearance with chemical control. It is felt, providing this work were backed up by the Government, that much greater progress could be made in improving the standard of all New Guinea copra than has been found possible by empirical standards, as it still ranks below Ceylon and slightly inferior to Straits and Dutch East Indies F.M.S. copra. The premium obtained for Straits and Dutch East Indies copra over Rabaul hot air now ranges from nothing to 12s. 6d. per ton with an average of about 5s. per ton.

It is known that, for a relatively limited cost, it would be possible to control the existing standards by chemical means, and also test the validity or usefulness of this method of control. It is thought that New Guinea copra, the curing of which is supervised by Europeans in this country, is definitely superior to a very large proportion of the native-grown copra from other parts of the world, and that chemical analysis would support this view, notwithstanding the fact that curing methods here leave much to be desired. It is regrettable that European-treated copra from this Territory was so long classed with native-grown copra in the South Sea Islands, which is grown and cured under entirely different conditions. The driers here on many estates represent the latest development in artificial hot air driers and, although there is not yet sufficient standardization of the product, our planters who produce the best products receive insufficient premium to encourage them to improve their efforts.

It appears that in the large bulk of world copra there has been sufficient good copra to satisfy the demands for high-class refining and sufficiently low-quality copra, all at approximately an average price, to satisfy the specified needs of the buyers, such as is seen in the f.a.q. wheat standards in Australia.

TABLE NO. 13.  
AVERAGE QUALITY OF F.M.S. COPRA FROM VARIOUS PRODUCING AREAS. (a).

Origin.	Oil.	Percentage Moisture.	Free Fatty Acid.
Dutch East Indies .. .. .	66.0	4.0	.8
Demerara .. .. .	69.0	5.0	1.25
Straits .. .. .	66.0	4.0	1.0
Jamaica .. .. .	69.5	4.0	1.25
Mauritius .. .. .	68.0	3.5	1.25
Mozambique .. .. .	67.0	3.75	1.25
*South Seas .. .. .	67.0	3.5	4.5
Ceylon .. .. .	68.0	..	1.0
*Territory of New Guinea—New Ireland ..	66.36	4.18	0.51
(Good sun-dried sample)			

\* Compare fatty acid content.

#### COUNTRIES OF DESTINATION OF NEW GUINEA COPRA.

Reference to Table No. 14, which is practically self explanatory, shows the distribution and value of exports from New Guinea to various countries since the year ending 30th June, 1930, to the 30th June, 1935, inclusive.

The most remarkable feature is that the United States, which imported 12 per cent. of New Guinea production valued at over £100,000 in 1929-30, have entirely ceased importing from here since 1933, while they imported very little copra from this Territory in 1931-32 and 1932-33. The reasons for this decline in American buying are associated with such legislation as the Agricultural Adjustment Act, precessing taxes, &c.

The United Kingdom, apparently in accordance with the policy of assisting Empire production, has almost trebled her imports from New Guinea since 1929, and in 1934-35 was easily the largest importer of New Guinea copra, with Italy ranking next and Germany and Australia ranking together, in third place. France, probably owing to her quota system, decreased her imports of New Guinea copra to 8 per cent. only last financial season. Until recently she was easily the largest importer of this copra, taking approximately one-third of the total exports in 1929 and about one-quarter of all New Guinea exports in 1933-34.

The effect of war requirements on Italy's consumption of copra is seen readily in the financial year of 1934-35, when she imported 22 per cent. of the copra from this Territory as against 1 per cent. in 1929.

In the 1933-34 season France was our best copra customer, taking over 14,000 tons of the total production. Germany ranked next when it is allowed that about 40 per cent. of the Netherlands imports were re-exported to Germany.

Italy was also a good customer in 1934, as she bought about £42,000 worth of the copra from this country.

TABLE No. 14.  
DISTRIBUTION AND VALUE OF COPRA EXPORTS FROM THE TERRITORY OF NEW GUINEA FOR THE YEARS  
ENDING 30TH JUNE, 1930-1935, INCLUSIVE.  
Export in tons and value in pounds (Australian).

	1929-30.		1930-31.		1931-32.		1932-33.		1933-34.		1934-35.		Percentage Distribution.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	1934-35.	1929-30 (com- pared).
		£		£		£		£		£		£		
France ..	18,224	247,327	16,318	187,714	17,691	183,986	14,913	137,386	14,076	64,046	4,377	28,122	8	30
United States of America ..	7,826	100,813	12,577	144,635	4,255	44,247	311*	2,865	..	..	..	..	0	12
United Kingdom ..	7,775	103,810	12,422	142,854	13,912	144,685	6,005	55,321	6,764	30,776	18,083	116,183	32	12
Australia ..	9,614	130,289	10,738	123,487	11,146	115,920	11,187	103,060	7,947	36,159	7,094	50,783	12	14
Netherlands (a)	14,216	196,550	5,711	65,676	2,938	30,555	Not given	..	3,992	18,164	1,710	10,987	3	22
Germany ..	3,529	48,175	3,349	38,515	4,260	44,304	3,577	32,453	11,139	50,682	7,133	45,830	13	6
Spain ..	1,325	18,550	900	10,350	3,134	32,594	3,279	30,208	..	..	2,444	15,703	5	2
Italy ..	500	6,500	..	..	537	5,585	5,262	48,476	9,252	42,097	12,456†	80,608	22	1
Sweden ..	..	..	..	..	..	..	..	..	2,557	11,634	..	..	..	..
Norway ..	..	..	..	..	100	1,040	..	..	50	228	..	..	..	..
Mexico ..	..	..	..	..	..	..	1,712	15,772	1,870	8,508	931	5,982	2	0
Other Countries	823	12,345	288	3,302	1,479	15,382	12,794	117,863	4,623	21,035	1,123	7,215	2	1
			(236) Japan				E'pean. Ports							
Total ..	63,832	864,358	62,303	716,543	59,452	618,298	59,040	543,906	62,270	283,329	56,251	361,483	100	100

\* Effect of processing taxes, &c.

† Increase due to war requirements.

(a) About 40 per cent. of Dutch imports are re-exported mainly to Germany.

### NEW GUINEA COPRA.—VARIOUS GRADES.

The proportion of the various grades of copra exported from this territory is not available in the statistics, but figures may be obtained from the copra inspectors' monthly statements and summaries.

Rabaul is the largest transshipping port and particulars of the various grades shipped from here are largely representative of what is occurring in all districts, especially as the figures given were derived from about one-third of the total exports of the territory for the years considered.

The percentage of the various grades exported during the years 1931 and 1932 are compared with those exported in 1935, and necessarily are only approximate.

				Hot Air.	Sun Pltn.	Sun Trade.	Smoke.
				Per cent.	Per cent.	Per cent.	Per cent.
1931-32	..	..	..	46	11	4	38
1935 ..	..	..	..	75	8	4	13

In 1936, some figures counted in a full copra store, Rabaul harbour, were as follow:—63 per cent. hot air, 15 per cent. sun trade and 22 per cent. smoke copra.

It is seen that there has been nearly a 30 per cent. increase in the percentage of hot air copra exported, while the smoke copra has decreased almost proportionately. The fluctuations in the proportion of other grades produced have been relatively unimportant, although there is undoubtedly a slight decrease in the percentage of sun dried copra produced.

This change over to the higher quality hot air copra and, of course, the greatly increased use of hot air driers, represents a very decided advance and it is encouraging to realize that this movement is still progressing. The increased production of hot air copra shows a clear recognition, on the part of the planters and firms interested, of the necessity for producing a higher grade product to obtain the higher prices for this grade.

It is also a tribute to the beneficial effects of copra inspection and to the continued efforts of the planters.

### COPRA PRICES.—FLUCTUATIONS IN AVERAGE VALUES IN NEW GUINEA COPRA.

The average prices of all New Guinea copra f.o.b. Rabaul were calculated in the various League of Nations Reports (26) from the prices obtained for all copra exported divided by the tonnage exported.

The average price obtained for the eight years preceding the war was £16 per ton, the lowest yearly average being £12 4s. per ton, and the highest yearly average £21 2s. For the ten years 1915-1926, the average price obtained



for New Guinea copra was approximately £21 15s. per ton, which means that this was the price ruling for the ten years prior to the sale of expropriated properties.

In 1926 the average price obtained was £22 3s. 6d. per ton and this had dropped to £15 9s. in the fiscal year of 1928-29. The average price kept on decreasing as indicated in Table No. 15, and by 1930-31 was only £10 8s. per ton. In 1933-34 season the average ruling price of £4 11s. per ton was the lowest on record, being £17 4s. per ton lower than the average price ruling from 1915-26.

The average price received from 1926 (i.e., the year the expropriated properties were sold) until the Moratorium Act was applied in 1930 remained at £16 11s. 6d. per ton, and from 1931-1935, the average price obtained was only £7 12s. 11d. per ton.

It must be remembered that the producers of good quality copra received an average price of approximately £6 per ton locally (*see* prices for Rabaul hot air copra), when the average price for the New Guinea copra was £4 11s. per ton. A simple calculation will show that a margin of £2 per ton when copra is valued at £4, represents a far greater percentage increase, namely, 50 per cent., than the same premium or marginal increase over £16 per ton (i.e., 12.5 per cent.), while it is still much less when copra is at £30 per ton (6.6 per cent.). This clearly emphasizes the desirability of producing high class copra under any circumstances but particularly in depression periods.

#### COURSES OF PRICES OF SINGAPORE COPRA AND COCO-NUT OIL.

(*See* 13, 14.)

These are given as showing comparable price trends with those of Rabaul or South Seas copra.

Between January, 1911, and July, 1914, the average monthly price c.i.f. London, for fair merchantable sun-dried Singapore copra lay between £21 2s. 6d. and £31 2s. 9d. per ton.

The prices rose from £22 15s. in June, 1915, to £45 15s. per ton in November, 1917, a rise of over 100 per cent. No further rise in price occurred until after the war, as the price was regulated from December, 1917, until 17th March, 1919, when the maximum price was fixed at £45 10s. per ton. Even prior to the removal of price control the price commenced to fall, being only at £33 10s. when the control was lifted, i.e., 25 per cent. below the controlled maximum price. Prices again rapidly rose, the peak being reached in February, 1920, with an average of £69 10s. per ton, or more than double the post-war low point recorded up to this time.

Between December, 1920, and thereafter until the end of 1928, copra fluctuated about the pre-war level. The price then sagged until a record low level of about £7 15s. per ton was recorded in 1934.

In June, 1932, the average c.i.f. price of F.M.S. Singapore copra in London was £13 15s. per ton, or about £7 per ton below the lowest point reached in the immediate pre-war period, while in 1933 copra averaged over £2 per ton less than in 1932, having in December receded to £10 per ton.

The pre-war and early post-war movement of coco-nut oil prices was very similar to that of copra, and it was shown by graph in the Empire Marketing Board's survey (14) that both copra and coco-nut oil followed very closely the curve for general commodity prices.

Coco-nut oil is classed as one of the cheapest oils and fats, and considering its manifold uses the relative prices compared with other oils and fats are believed to be lower than are warranted.

According to Snodgrass (34), "before the war there was no market for coco-nut oil in America, although in 1926 the U.S.A. had become the dominant market."

There was an upward trend of pre-war prices in London. Although record prices of up to £115 per ton were recorded in 1919 and 1920, during 1921-22 the market weakened until the end of that year, when prices increased rapidly and remained high until 1928. The prices from 1921-26 were below the five years' pre-war average, but from 1923 to the beginning of 1928 they were somewhat above average. In 1929 prices commenced to fall rapidly and even in that year reached a lower level than any experienced since 1911. A continuous decline in prices set in until Ceylon coco-nut oil was worth only £12 per ton in the middle of 1934. During 1935 prices have risen to somewhere about 1932 prices, but are still far below the average from 1911-30.

---

TABLE No. 15.  
UNITED KINGDOM—PRICE OF OILS AND FATS.  
Comparison of values of copra per ton between various countries.

Grade.	Mid September, 1935.			Mid October, 1935.			Mid November, 1935.			Mid December, 1935.		
	Present Values.	Month ago.	Year ago.	Present Values.	Month ago.	Year ago.	Present Values.	Month ago.	Year ago.	Present Values.	Month ago.	Year ago.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Ceylon F.M.S. ..	14 0 0	13 0 0	9 15 0	Nominal	14 0 0	10 5 0	Nominal	Nominal	10 10 0	N.A.	N.A.	N.A.
Java F.M.S. ..	11 12 6	11 5 0	9 5 0	13 13 9	11 12 6	9 12 6	14 1 3	13 13 9	9 7 6	N.A.	N.A.	N.A.
Dutch East Indies												
D.E.I., F.M.S. ..	11 10 0	11 2 6	9 2 6	13 12 6	11 10 0	9 10 0	14 0 0	13 12 6	9 5 0	14 7 6	14 13 9	9 10 0
D.E.I. Mixed ..	10 10 0	10 0 0	7 12 6	12 12 6	10 10 0	8 10 0	13 0 0	12 12 6	8 15 0	13 7 6	13 6 3	9 2 6
Straits F.M.S. ..	11 10 0	11 2 6	9 2 6	13 12 6	11 10 0	9 10 0	14 0 0	13 12 6	9 5 0	14 18 9	14 5 0	9 12 6
Straits F.M. ..	10 10 0	10 0 0	7 12 6	12 12 6	10 10 0	8 10 0	13 0 0	12 12 6	8 15 0	13 13 9	13 0 0	9 5 0
Rabaul Plantation Hot Air ..	11 7 6	10 17 6	8 17 6	13 5 0	11 7 6	9 0 0	13 15 0	13 5 0	9 2 6	14 7 6	13 15 0	9 7 6
									to	to	to	
									8 12 6	14 12 3		9 10 0
South Sea F.M.S. ..	10 10 0	9 17 6	7 15 0	12 12 6	10 10 0	8 15 0	12 16 3	12 12 6	8 15 0	12 16 3	12 12 6	8 15 0
										to		
										13 5 0		
South Sea F.M. Kilm dried (Marseilles) ..	10 5 0	9 15 0	6 17 6	12 7 6	10 5 0	8 0 0	12 11 3	12 7 6	8 17 6	12 11 3	12 7 6	8 17 6

N.A.—Not available.

GRAPH Nº4 - Value per Ton of Copra (London Prices).

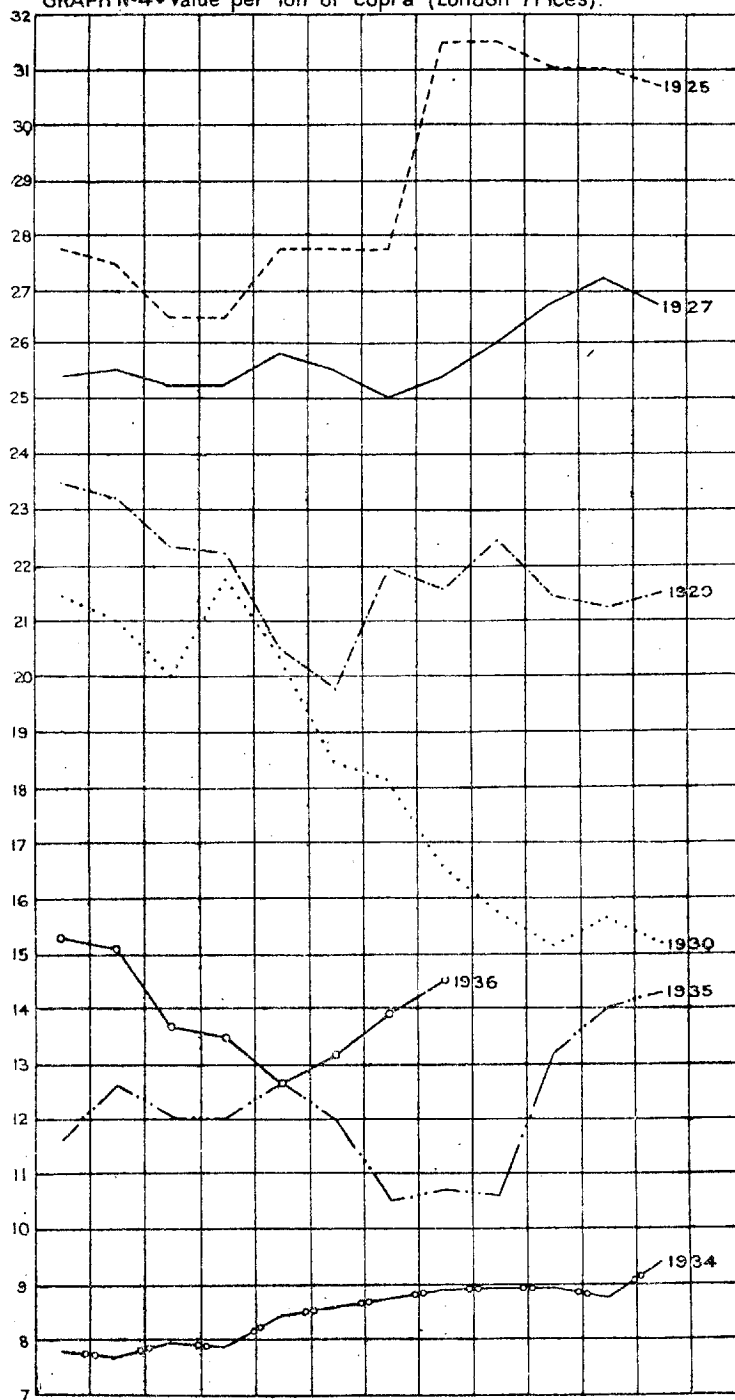


TABLE No.16

VALUE PER TON (in £sd.)

LONDON PRICES.

Year	Jan	Feb	Mar	Apr	May	Jun	Jly	Aug	Sep	Oct	Nov	Dec	Aver. Price for yr.
1923	25-0-0	26-5-0	29-0-0	25-5-0	27-5-0	26-5-0	24-5-0	25-0-0	26-15-0	26-15-0	26-15-0	26-10-0	26-6-8
1924	28-0-0	26-15-0	27-0-0	25-15-0	25-0-0	25-5-0	26-15-0	26-15-0	27-10-0	27-10-0	28-15-0	28-15-0	26-19-7
1925	27-15-0	27-10-0	26-10-0	26-10-0	27-15-0	27-15-0	27-15-0	30-10-0	30-10-0	30-0-0	30-0-0	29-15-0	28-10-5
1926	27-15-0	27-5-0	28-5-0	28-0-0	27-10-0	28-0-0	26-15-0	27-5-0	27-5-0	25-15-0	26-0-0	24-15-0	27-1-0
1927	25-7-6	25-10-0	25-5-0	25-5-0	25-15-0	25-10-0	25-0-0	25-7-6	26-0-0	26-15-0	27-5-0	26-15-0	25-16-3
1928	27-10-0	26-15-0	26-15-0	27-0-0	26-15-0	26-7-6	26-0-0	25-0-0	24-15-0	24-15-0	24-15-0	24-0-0	25-17-3
1929	23-10-0	23-5-0	22-7-6	22-5-0	20-10-0	19-15-0	22-0-0	21-12-6	22-10-0	21-10-0	21-5-0	21-10-0	21-16-8
1930	21-10-0	21-0-0	20-0-0	21-15-0	20-7-6	18-10-0	18-3-0	16-12-0	15-15-6	15-3-0	15-13-0	15-4-0	18-2-9
1931	14-4-6	14-7-6	14-13-0	14-2-6	12-13-9	10-19-6	12-2-6	11-4-4	10-18-6	12-3-3	13-4-0	14-1-3	12-16-3
1932	14-8-9	16-1-0	16-5-0	14-6-10	14-0-6	12-18-2	13-8-9	13-14-6	14-2-6	14-3-0	14-5-0	14-2-0	14-5-10
1933	13-7-0	12-1-3	11-10-0	10-11-0	10-11-6	11-2-0	10-16-6	10-10-0	9-14-6	9-2-0	9-3-0	8-6-3	10-11-8
1934	7-16-6	7-14-0	7-18-9	7-18-6	8-9-4	8-13-9	8-15-7	8-18-2	8-18-6	9-0-0	8-15-7	9-9-0	8-10-8
1935	11-11-3	12-12-6	12-0-0	12-0-0	12-13-9	11-19-4	10-18-6	10-13-9	10-11-6	13-3-9	14-0-7	14-6-3	12-3-7
1936	15-6-3	15-1-10	13-14-0	13-10-7	12-12-4	13-2-6	13-13-2	14-10-6					

### RABAUl HOT AIR COPRA.—LONDON PRICES 1923-1935.

The c.i.f. London monthly prices prevailing since 1923 for Rabaul hot air copra (which also may be classified as comparable with fair marketable quality from other countries) are presented in Table No. 16 and Graph No. 4. These prices maintained a continuously high level of above £24 per ton for the years 1923 to 1928 inclusive.

For some reason in 1925 there was a very sharp rise in the value towards the end of the year, reaching about £30 10s. per ton, while the average for the whole year was £28 10s. in London.

The year 1929, which was the turning period in copra prices, showed decided fluctuations ranging from £23 to £19 10s. per ton. In 1930 the average price commenced at £21 10s. but showed a steep decline to £15 per ton at the end of the year.

Except for a steep rise in price at the beginning of 1932, which had something to do with sterling prices being affected by the suspension of the gold standard and which made the average ruling price for the year greater than 1931, there has been a continued decline in prices. This decline became especially marked in 1933, showing a specially steep drop until the bottom had fallen out of the market after August of that year.

It touched rock bottom at the beginning of 1934 and in February dropped to £7 14s. per ton, the lowest price ever recorded in London for Rabaul hot air copra. There was a slight rise towards the end of the year, but the average price for the year (£8 10s. c.i.f. London) is the lowest on record despite the improved quality of Rabaul copra since about 1930.

By the middle of January, 1935, prices had commenced to improve, and although for some inexplicable reason (probably political tendencies) the prices dropped from the month of May to the beginning of September, a sharp rise towards the end of the year brought the prices to a level comparing very favourably with the 1931-32 prices.

In January, 1935, the prices commenced at £10 5s. per ton, and until December the price did not once touch a lower level, the quotes being in the vicinity of £15 per ton, while the tendency for prices to improve further being at £15 7s. 6d. on 20th January, 1936, and increasing to £15 15s. on 27th January, 1936.

The market remained relatively firm but showed a slight drop to £13 17s. 6d. on the 30th March, 1936. Since then in only a little over one month the prices have declined rather more steeply to between £12 to £13 London. Whether this decline is seasonal or due to political influences is not known.

### PRICE DIFFERENCES BETWEEN THE VARIOUS GRADES OF COPRA F.O.B. RABAUl.

The marginal difference in prices between Rabaul hot air and smoke copra has been calculated for the weekly periods from April, 1933, until January, 1936, and has averaged in the vicinity of 24s. per ton.

The average difference from April to December, 1933, was approximately 25s. per ton, while from January, 1934, to December, 1934, it approximated 32s. per ton.

From December, 1934, until July, 1935, smoke copra approached very closely to Rabaul hot air in price, the average marginal price being about 16s. 6d. per ton; the lowest margin was 11s. 10d. per ton in April, 1935.

The reasons for this relative increase in the value of smoke copra as compared with the hot air copra are difficult to determine.

It appears that there was a decidedly increased demand at Marseilles, where practically all the New Guinea smoked copra was sold. Later events have shown that this was only a temporary position as the average difference in price recorded from August, 1935, to January, 1936, was 35s. and now stands around £2 6s. Thus it is seen that the tendency is for the marginal difference to increase considerably over the past six months.

#### **Comparison of Prices Rabaul Hot Air Copra and Sun Plantation Copra.**

The average difference in price between these grades has varied approximately between 2s. 6d. and 3s. 6d. from April, 1933, to December, 1935.

#### **Price Difference between Sun Trade and Hot Air Copra F.O.B. Rabaul.**

The average difference in price between sun trade and Rabaul hot air copra has averaged around 18s. since April, 1933. The difference has varied from 11s. 2d. to £1 8s. 9d. and the general tendency has been for the difference in price between the grades to become more pronounced in recent months. In 1933 the average difference was around 12s. while the average difference for 1934 approximated 17s. per ton. Apparently in sympathy with the relative increase in value of smoke copra and superior grades, the difference in price lessened from December, 1934, to July, 1935. Despite this fact the average difference in price for the year 1935 was approximately 19s. 6d.

#### **The Price Difference between Trade and Sun Plantation Copra F.O.B. Rabaul.**

This has averaged about 14s. since April, 1933.

The average marginal difference in price until February, 1934, was about 8s. 6d. Since that time the difference in price between the two grades has been very fluctuating and has varied from 10s. 6d. to £1 5s. 9d.

#### **The Price Difference between Smoke and Trade Copra F.O.B. Rabaul.**

The average difference in price between the two grades since April, 1933, to January, 1935, has averaged 11s. per ton. The fluctuations in the marginal difference are very interesting.

In 1933 the difference in price averaged around 13s. and in 1934, 16s. In November, 1934, however, the price difference became very narrow until in January, 1935, smoke copra brought exactly the same price as trade, which state of affairs existed for six months. In fact the difference in price from January, 1935, to September, 1935, averaged only 7d. In October the difference in price again commenced to widen and averaged 16s. 3d. up to and including January, 1936.

## THE EFFECT OF COPRA INSPECTION ON THE PREMIUM OBTAINED FOR RABAUL HOT AIR OVER SOUTH SEAS SUN-DRIED COPRA.

From January, 1931, until December, 1933, the highest premium obtained according to London prices was 5s. per ton, while most of the time it ranged around 2s. 6d. per ton. Since that time the premium or difference between prices for Rabaul Hot Air and South Sea Sun-dried has fluctuated widely and ranged from 7s. 6d. to 25s. per ton.

In January, 1933, the premium stood at 7s. 6d. per ton.

In February, 1934, the premium stood at 12s. 6d. per ton.

The following figures indicate the wide fluctuations in the premium obtained for 1935:—

	s.	d.
March 1st .. .. .	10	2
March 29th .. .. .	17	6
April 5th to June 14th .. .. .	22	6
May 17th .. .. .	12	6
June 26th .. .. .	20	0
August .. .. .	25	0
November 1st .. .. .	22	6

The average premium from January to November, 1935, was 16s. 3d., and on the 29th December quote, the difference in price stood at £1 7s. 6d. and varied around £1 2s. 6d. for a considerable period. In May this marginal difference had dropped to between 12s. 6d. and 15s.

Despite the marked fluctuations shown in the price differences between Rabaul Hot Air and South Seas Sun-dried, it is readily seen that the former is accepted on the market as a superior product and that the buyers on the average are ready to pay almost £1 per ton more for this copra. This can be accepted as the tangible result of the system of copra inspection in vogue and to the efforts of the planters to improve their copra.

## THE SO-CALLED PARITY BETWEEN RABAUL AND LONDON COPRA PRICES.

According to Webster's Dictionary "parity" is defined as (1) Equality or equivalence; close correspondence, (2) Equality in purchasing power between different kinds of money at a given ratio, (3) Equivalence in a foreign currency.

In Australia "parity" is commonly referred to the ratio of sterling with Australian currency at particular times.

This is a term much misused by planters and others in the copra industry. The interpretation in New Guinea appears to be that "parity" denotes the basis on which the firms offer a price for copra in New Guinea compared with the ruling prices in London for the New Guinea grades of copra. In some cases this comparison is made on a basis including all deductions from the original price, thus the net price obtainable anywhere in the Territory is often compared with the London prices and termed "parity." In this connexion the weekly London prices for copra usually accepted are those quoted in the *Sydney Morning Herald* every Monday morning.



There is apparently no true parity basis between London and Rabaul prices even at any particular time and it is not possible for persons, other than the buyers interested, to obtain anything but an approximate basis for the calculations of the price offered in Rabaul by the various firms. Obviously, supply and demand, the price outlook, the element of speculation, the amount of competition and other factors all affect the ultimate price offered. The quantity offered by a seller at a particular shipment, which is affected by the size of the plantation, the indebtedness of the planter (e.g., the Mortgagors' Relief Ordinance ties him to sell in particular channels); whether he is a large and consistent shipper or not and distance for transshipment all affect the net price offered.

Numerous individual planters were enabled to purchase their properties from the Expropriation Board and other sources by augmenting their private capital with loans from the firms operating here, at certain rates of interest and under certain specified conditions which meant they could only sell through certain channels. The arrangement suited the tenderer as a means of acquiring the property and was regarded as a business investment by the firms concerned. Thus a "charging agreement" was usually drawn up to fit the circumstances.

It was mentioned in a recent letter in the *Rabaul Times* (27) that such an agreement provides in general terms that, in consideration of certain cash and for good advances made, the "carried planter" shall purchase all his requirements and shall sell all his produce to the financing firm. In addition he shall pay to the firm interest at the rate of 8 per cent. on the monthly balance owing to the firm.

Two years ago, at the height of the depression in the copra market, the government statutorily reduced the rate of interest to 6 per cent.

The fact that copra may be held on a brokerage basis (e.g., Hamburg markets) and sold as futures may affect the price offered by a particular buyer at a particular time.

If a planter is established in a big way and is in a position to send a consignment of copra on his own account, he may take the risk of speculating on the future price. Whatever price is realized at the sale can be paid into the London office of any bank and, except for the cost of telegraphing, the bank rate will be 25 per cent. in his favour in Rabaul when c.i.f., &c., is subtracted.

One method of selling on futures is that the agent of a particular firm, e.g., operating in Hamburg, buys the copra at a particular price but at a bank usance of 90 days. In that case the bank at Rabaul will pay 23½ per cent. exchange immediately the copra is shipped, and the funds are made immediately available to the grower.

The firms to which the copra is shipped, however, can sell at any opportune time within the period of 90 days as the payment has not to be met in the English or foreign bank until that time has elapsed. Thus the grower may lose the advantage of any rise in price, while the firm speculates on the chance of copra rising.

It is feasible that a firm may offer increased prices over a period to eliminate competition.

It has been stated by planters and others that the total deductions were as high as £8 10s. to £9 on some plantations in 1928-30, being later reduced to £8 5s., then to £7 10s. immediately after greater shipping competition became evident. The deductions at that time were said to be in the vicinity of 10s. more for smoke copra.

In a recent Legislative Council meeting (25) it was stated that the "parity" had varied from £7 to £4 18s. at the present time, leaving a difference of £2 2s., but the basis for this calculation is not given.

The Planters' Association, in a recent published letter addressed to the Prime Minister (27) stated "that the local price of copra has increased at least £2 10s. per ton on a London market basis of £15 per ton within three years, and £3 per ton within four years as a direct result of competitive buying and freighting".

There are certain deductions from the price of copra which are known to be relatively constant although even these vary from time to time. The T.T. rate of exchange between Australian and sterling currency is based on bank rates from day to day. This varies around 25 per cent. and is now at 25 per cent., being based on the T.T. selling and buying rate.

Commission, insurance and sundry charges are stated to range at about 8 per cent., although they have in earlier years varied around 10 per cent. The sundry charges usually include the item "shrinkage" which is said to average about 3 to 3½ per cent., plus handling charges, which are also fairly constant. The firms which do not quote shrinkage make the deduction under the heading c.i.f., &c., as 5-6 per cent. and allow for the shrinkage separately.

Shrinkage in weight of copra on shipment is greater for smoke than for hot air and, when the dried copra is bagged in the half nut, may be as low as 2 per cent.

The differences between the prices quoted c.i.f. London and those offered f.o.b. Rabaul do not present a true picture, as the rate of exchange, and other charges such as inter-island freight may not be represented.

According to figures derived from a copra price list of one large firm operating in New Guinea, the average difference between the price of Rabaul hot air f.o.b. Rabaul, and the same grade c.i.f. London, was approximately £2 15s. in 1933, when the last nine months only were considered. The differences were £2 11s. 5d. in 1934, and £1 17s. 4d. in 1935, for the same grade when the individual monthly average prices were compared.

In 1933 the price of copra was roughly £2 15s. under London when the London price was £10, but in 1935 it was usually £2 under London when the London price was £10.

To calculate the true differences between the average prices in terms of Australian money for the years considered, the following calculations are submitted but are approximate only:—

TABLE No. 17.  
RABAU HOT AIR COPRA.

	1933 (9 months).	1934 (12 months).	1935 (12 months).
	£ s. d.	£ s. d.	£ s. d.
Average London price .. .. .	9 19 10	8 10 1	12 4 2
Exchange .. .. .	2 9 4	2 2 6	3 1 4
Total in Australian currency .. .. .	12 9 2	10 12 7	15 5 6
Less average Rabaul price .. .. .	7 4 10	5 18 8	10 6 10
Difference, allowing for exchange .. .. .	5 4 4	4 13 11	4 18 8
Difference between Rabaul and London price, exchange not considered .. .. .	2 15 0	2 11 5	1 17 4

All other things being equal, as the price rises so the margin between the price offered in Rabaul and that available in London decreases, until the rate of exchange is taken into account.

The following calculation is based on the experience of one planter in this Territory and is, of course, only true for his dealings and can only be taken as approximate.

The assumption is used that copra is at £20 in both instances for purpose of comparison so that the position at the present time is compared with 1929, also allowing that, in both cases with copra at £20, duty is £1.

					£	s.	d.
Deductions 1929	1929 price	..	..	..	20	0	0
	Less deductions	..	..	..	8	5	0
	On the beach	..	..	..	11	15	0
					<hr/>		
					£	s.	d.
Deductions 1935	1935 price	..	..	..	20	0	0
	Less freight	..	..	..	3	5	0
	8 per cent. commission	..	..	..	1	12	0
					<hr/>		
					4	17	0
					<hr/>		
					15	3	0
Exchange at 23½ per cent. =(90 days' usance)					3	12	9
					<hr/>		
					18	15	9
Less duty £1					1	0	0
					<hr/>		
					17	15	9 = Australian
Convert result to sterling for comparison at old exchange rates					14	7	2
Subtract price 1929					11	15	0
					<hr/>		
Difference					2	12	2

On 1933 it was given out that one basis for the calculation of the price of copra obtainable in Rabaul at that time was as follows:—

London price—less 8 per cent. stg.  
less 2 per cent. stg.

Less £3 5s. freight stg.

Plus £24 2s. 6d. per cent. exchange

Less duty payable equals Rabaul price.

Thus copra worth £10 London (£12 10s. Australian) would be valued at £7 4s. 2d. Rabaul, calculating at 25 per cent. exchange equivalent to £2 5s. 10d. difference. This was stated to be changed later to the following basis for some calculations. The price of Rabaul hot air copra in London is taken and £3 5s. sterling (£4 1s. 6d. Australian) is subtracted as are commission, shrinkage, &c., which were usually calculated at 8 per cent., also in sterling (approximately 10 per cent. Australian). Twenty-five per cent. is added after these charges are taken off and then customs duty, which is on a sliding scale, is subtracted before the price offered at Rabaul is obtained.

It appears probable from calculations made that the above basis for deductions is not used at this time. Another common formula said to be adopted is £2 under London, when the London price is £10, fluctuating at the rate of 3s. in the £1 less export duty in either direction. This means that for each additional £1 over £10 quoted in London, 3s. is subtracted, and where the price is lower than £10 add 3s. for each £1 by which the price is less than £10 on the same market.

It is interesting to note that on this basis copra at £25 per ton would be expected to bring £25 5s. in Rabaul less export duty.

The London prices and Rabaul prices offered by one firm for the week ending 21st March, 1936, are compared on this basis.

Grade.	Rabaul.	London.	Difference.
	£ s. d.	£ s. d.	£ s. d.
Hot Air .. .. .	12 4 0	13 15 0	1 11 0
Sun Trade .. .. .	11 6 6	13 0 0	1 13 6 (= add 2s. 6d.)
Smoke .. .. .	10 6 6	12 2 6	1 16 0 (= add 2s. 6d.)

The difference of £1 11s. shown appears, at first glance, not to fit in with the above formula, but it is correct where the odd shillings are not considered. If the odd 15s. were considered the difference on the above basis would be £1 8s. 9d. It appears that approximately 2s. 6d. to 5s. extra is subtracted from the London prices of the lower grades, which may be a safeguard against reclamation or arbitrage and shrinkage.

Cases have been quoted where the difference between Rabaul and London prices on a basis of £14 was only £1 1s. 2d., but 25 per cent. of £14 is £3 10s., which with £1 1s. 2d. added equals £4 11s. 2d., and if only 10s. per ton is added for speculation on a future sale the difference is £5 1s. 2d., which compares very favorably with the price list quoted.

Other bases for calculation of deductions of which another example is given are believed to be used:—

Price Europe, less freight calculated as £4 1s. 6d. Australian, less 5 per cent. or 6 per cent., less export duty plus 25 per cent. exchange equals the price offered in Rabaul.

Regardless of the method of calculating deductions, it is certain that the deductions claimed on copra shipped from Rabaul to London have shrunk considerably in recent years. Apparently the bases for computing deductions when they stood at £7 to £8 5s. per ton are best known to the buyers responsible.

There are various reasons which are not usually considered which appear to be responsible for the shrinkage in the so-called parity deductions from copra prices in New Guinea. The increased competition for the product, cheaper charter rates and the fact that reclamation rates have been reduced from 7s. 6d. per ton to from about nothing to 9d., except in the case of lower grades, may be cited, although there are other causes. It is probable that when prices were high, extra profits were, to some extent, fair for all concerned.

The decrease in the reclamation rates is the direct result of copra inspection, and the better quality of copra now being produced. This saving on reclamation rates, a charge for reconditioning inferior copra, when only 5s. per ton is allowed for this charge, means that on 60,000 tons of copra exported an extra £15,000 is saved to this Territory, and if 7s. 6d. per ton was allowed, this would amount to £22,500. This illustrates forcibly the advisability of reducing what are normally considered incidental costs to the industry.

### COPRA FREIGHTS.

To illustrate the ratio of tonnage exported to value received in 1928, compared with 1934, the following figures are presented:—

In 1925, 39,151 tons of copra brought £815,938, while in 1934, 62,270 tons of copra brought £283,329.

The ratio of tonnage 1925 to 1934 is 1:6:1.

The ratio of tonnage 1934 to 1935 is 1:2:88.

In other words, twice as much copra brought only one-third as much money. These figures do not represent the maximum comparison which could be made during the period under review.

It is easy to calculate that the ratio of c.i.f. charges to the total value was much greater where the larger tonnage was worth approximately one-third as much money.

If it is assumed that the freight charges to Europe have remained relatively constant at 65s. per ton and that all the copra was shipped that distance, it would take £127,240 to convey 39,151 tons to London and £202,377 to convey 62,270 tons.

Of course, it would take less to transfer the small percentage (12 per cent.) which goes to Australia, but this is counterbalanced by the fact that freightage charges are calculated in pounds sterling and not pounds Australian, which at the present time is at a discount of 25 per cent.

According to Bryce the freight on copra in 1925, Rabaul to London, by chartered vessel, ranged from £2 15s. to £3 10s., and at that price the cost of freighting 39,151 tons would be £107,664 10s. to £137,027 15s. Owing to the large proportion shipped in chartered vessels it is certain that it does not cost as much as indicated above to freight New Guinea copra overseas.

### Particulars of Freights.

Inter-island freights for copra range from 10s. to 25s. and in two cases where the islands are a long distance away 40s. to 50s. is the charge.

The cost of overseas freight either to the United Kingdom or the Continent is usually quoted as £3 5s. sterling or £4 1s. 6d. Australian, which is the freight charged by the N.D.L. Line to Europe (Hamburg, Marseilles or Genoa).

The larger firms here either have their own ships, or work on a system of charter rates for the whole ship and thus by shipping in large bulk cheaper rates should prevail. In some cases the following additional charges fall due at Rabaul:—

Wharfage and handling, usually about 2s. 6d. per ton.

Where copra is received and stacked in the Customs shed, 6d. per ton per week is the charge. Stevedoring to vessels 3s. 6d. per ton plus 1s. per ton wharfage payable to the Customs Department. Owing to the fact that the companies usually quote an inclusive price on which commission, handling, storage charges, &c., are computed and deducted, it is difficult to get proper itemized figures regarding the various charges which are payable in the handling of copra.

In 1925 it was stated that the freight on copra from Rabaul to Sydney was £3 per ton, but that this was later reduced to £1 15s. per ton; the rates at present obtaining are not known in the Department.

On some of the larger plantations, copra, which is being exported direct to Australia, is loaded into the ocean-going vessels, which thus saves the cost of transshipping. The N.D.L. ships usually load direct from the plantations for shipment overseas, which cost is no doubt covered by the freights charged.

The plantations near the main ports of Rabaul and Kavieng often shift their copra by motor lorries or bullock carts to the wharf for shipment.

The fact that ships call infrequently at many of the Islands often necessitates the storing of copra for considerable periods of time during which the product deteriorates. Any means which would reduce the cost of inter-island freights and time of storage should be explored.

#### MANUFACTURERS' REQUIREMENTS (29, 37, 38).

The following points are said to be taken into consideration by dealers in allotting the prices to be paid for copra required by oil mills:—

- (1) Dryness.
- (2) Absence of immature pieces of copra.
- (3) Absence of smoke or colour.
- (4) Large pieces required with little dust.
- (5) Absence of foreign matter of any kind.

Copra with from 6–20 per cent. moisture content has to be sun dried on concrete before milling, and it is dried to 5 per cent. moisture content, otherwise it would clog the machinery. The copra is then crisp, emits a characteristic squeal when pressed and shows absence of opacity.

Originally wet, white copra will generally arrive at the mills in a deteriorated condition, while the excessive moisture is often allowed for by a graded system of discounts depending on the moisture content.

According to Passmore (29) manufacturers in England generally buy on the basis of quantity and quality of the copra as received, so that the material losses resulting from deterioration and the expense of refining to eliminate free fatty acids, smell and discolouration, are borne by others.

British manufacturers of edible coco-nut oil require copra that is clean and dry with a high oil content and a low acidity.

Passmore also states that the manufacturing firms are largely indifferent to the causes which depreciate cured copra for the following reasons:—

- (1) There is sufficient good quality copra produced to meet their requirements.

- (2) No large stocks which might deteriorate after purchase are kept in England.
- (3) Manufacturers pay for delivered weight only.
- (4) If copra is not up to the standard an allowance is claimed by arbitration, whereas should it be above standard no more than the agreed price can be demanded by the seller.

Only firms of oil crushers who buy South Sea copra exclusively were in favour of investigations on the causes for depreciation of cured copra. It was also stated that this class of produce is generally of low standard and that the expressed oil must often be subjected to refining processes to eliminate free fatty acids, smell and discolouration, in order to render the oil fit for edible purposes.

Oil from top grade copra needs less refining than low grade oil, and whether the higher costs of refining low grade oil are balanced by the lower price is problematical. Refining costs are difficult to determine owing to the time and trouble involved in the process.

Representatives of shipping firms engaged in the copra trade of the South Seas would welcome any investigations which might lead to the betterment of this produce; the premium for good copra is comparatively small but the price of all copra is rather low, so that it is felt that efforts to improve the lower grades are worth while providing no great expense is entailed.

Cases of inferior quality can always be traced to causes in the country of origin except in such instances as sea damaged, which is also of too frequent occurrence in New Guinea owing to insufficient care in transshipping.

The price of different grades of copra is based upon the average standard exported from each country of origin, as is shown by the order of the relative market value of each grade of copra from the various exporting countries at any particular time.

Owing to recent co-operative effort on the part of the local producers; Samoan and Rabaul copra is quoted separately and above South Seas copra, while the bulk of South Seas copra is still recognized on the English market as being of the lowest quality.

According to Passmore (29) and Ward and Cooke (38), the main causes of the depreciation of cured copra are—

- (1) Storage of the coco-nut and meat before preparation, when it is vulnerable to the action of micro-organisms, chiefly bacteria.
- (2) Insufficient drying during preparation, leaving a moisture content capable of sustaining mould growth.
- (3) Insufficient country storage after drying when copra is unprotected from rain.
- (4) Careless methods of preparation, insufficient drying, the practice of blending poor with good copra before shipment (but not the climatic conditions) are other factors responsible.

Investigations in Malaya and Ceylon indicate that wet coco-nut meat and partially dried copra are always liable to serious bacterial attack, which causes at first a pale yellow, gummy slime to which dirt and pieces of husk readily

adhere and smoke depositions occur during drying. The resultant copra when dried has a pale yellow to dark reddish brown discolouration according to the degree of bacterial action; such discolouration is often seen in New Guinea copra. De Fremery (11) concludes that all degeneration by bacteria causing deteriorated and softened copra is a factor of great importance as regards the susceptibility of copra to insect attack.

Prevention of bacterial attack on copra is possible by making the time between splitting the nuts open and applying the heat as short as possible, not overloading the drier and giving free circulation of air.

In practice the time between splitting and drying can be lessened by numbering the copra bags given to the copra cutters; it is thus possible to check which are the first bags brought in and these must be dried first. Walker (37) concluded from his investigations that rancidity of coco-nut oil is mainly due to fungi and that, owing to insufficient moisture, bacterial action is not important in this respect, and that copra containing less than 20 per cent. of water is practically free from bacterial action. Malayan investigators say that he has not placed sufficient emphasis on bacterial action (see above). He also concluded "that if copra is properly prepared in the first place, that is if it is dried out to 6 or 7 per cent. moisture content, it is safe from mould attack as long as it is kept dry." According to Corbett, Malaya (10) and other investigators, a low moisture content is also corrected with practical freedom from insect attack under storage conditions and well-prepared copra rarely deteriorates owing to this cause.

Observations in Malaya indicate that serious attack by mites usually commences when the moulds are no longer active. They destroy the web, break down small, irregular pieces of copra and so are largely responsible for the production of dust.

Cooke (8) shows that in one year's storage good copra lost 8 per cent. of its dry weight and commercial copra about 30 per cent. mainly through insect attack.

### **The Condition in which Copra arrives in England. (29)**

Since cargoes loaded in damp and mouldy condition have dried out sufficiently before reaching Europe to render the moulds inactive, it is extremely difficult to determine the relative proportion in which different moulds attack copra, by an examination of the product on arrival. Subsequent insect and mite infestation destroys a large amount of the dried mycelium while sweating, drying out and rough handling of the product reduce mould colonies to a mere discolouration of the produce.

Judging from the hordes of insects seen on infested shipments, the loss of copra by actual consumption must be considerable, and the production of "dust" by these insects is a common cause of arbitration for adjustment of price.

Passmore (29) records the following observations on some consignments of South Sea, Rabaul plantation and Papuan plantation copra. Singapore F.M.S. copra is included here for comparison.



## ABRIDGED INFORMATION.

Sample No.	Grade and Country of Origin.	No. of bags.	Dust.	Colour.	Smell.	Infestation.	
						Insects.	Moulds.
13 To copraire	F.M.S. Straits ..	802	Good	Good	Good	Very slight <i>Silvanus</i> and <i>Necrotia rufipes</i>	Very slight
10	Hot Air Dried Plantation, Rabaul	1751	Good	White	Good	<i>Necrotia rufipes</i> adults and larvae also <i>Silvanus</i> adult Moderately badly attacked	Slight
8	Plantation South Sea, Papuan	521	Moderate	Fairly good	Slightly rancid	<i>Necrotia rufipes</i> larvae Moderately badly infested No adults seen	Very badly damaged No living mould seen
17	F.M.S. South Sea ..	1870	Medium amount	Light brown	Fairly good	Badly infested <i>N. rufipes</i> and <i>Silvanus mercator</i>	Small amount mouldy No living growth
19	Plantation South Sea	1085	Much	Light colour	Fairly good	Bad. <i>N. rufipes</i> , <i>Silvanus</i>	Traces of considerable moulding by a black mould—none living

N.B.—*Necrotia rufipes* = Copra bugs.  
*Silvanus mercator* = Silvanus Beetle (now known as *Oryzophilus mercator*).

### ADVISABILITY OF LOCAL MILLING OF COPRA.

Inferior copra in other parts of the world is often milled for almost immediate consumption by the inhabitants, because, providing the oil is not kept, a percentage of fatty acids is allowable for edible oils.

There is a considerable demand for soap in New Guinea for native and plantation use, while the various government departments use fairly large quantities. If a local oil mill were established, there would be little need to send any inferior copra to the foreign markets, and certainly no copra need be destroyed. This milling would have more chance of success if peanut oil (Arachis Oil) and palm oil were capable of being expressed in the same mill.

According to the survey of the Empire Marketing Board (13, 14) the proportion of the aggregate exports which leaves the producing areas in the form of oil has steadily increased. It amounted to about 9 per cent. in the pre-war period, while in the period 1928-30 it amounted to 25 per cent. as against 20 per cent. in the period 1924-27.

This development indicates that the crushing industries in the copra-producing countries are successfully competing with the industries in the centres of consumption, and this tendency may be expected to continue since labour is generally cheaper in the copra-producing areas.

Perhaps a more important reason is that oil produced from fresh copra has a lower free fatty acid content than that produced from old copra, and, therefore, can be refined more cheaply than oil produced in Europe or America which has been stored for lengthy periods.

According to Ceylon figures (6) it is revealed by the indexes for coco-nut products that there has been a pronounced shift of the export trade, very conspicuous in recent months, from copra to coco-nut oil and desiccated coco-nut.

	Export Value.		Export Volume.	
	Copra.	Coco-nut Products.	Copra.	Coco-nut Products (Copra, Coco-nut Oil and Desiccated Coco-nut).
1927-29 .. ..	100	100	100	100
1930 .. ..	..	63.7	..	93
1931 .. ..	..	48.0	..	100.8
1932 .. ..	27.6	47.8	45.6	79.2
1933 .. ..	22.8	39.4	64.1	94.7
1934 .. ..	30.8	39.5	105.4	122.4
1934, January-August ..	27.4	35.4	98.2	114.4
1935, January-August ..	22.3	46	43.9	83.1

The expansion of oil milling in the Philippines to supply the American markets, and in India to supply their own requirements, is widely known. The comparative idleness of the mills in Central Europe has also been indicated. In Malaya during the earlier days of the development of coco-nut oil milling there were much the same decisions to make as are necessary in relation to any future development of such an industry here.

In 1918, Eaton (12), arguing in favour of local milling, pointed out that it is a sound argument of political economy that a product be processed in the country where the raw materials are, providing antagonistic influences are not

present. He stated that this was particularly true where freights were high and the distance of export great.

Two important disadvantages obtain in connexion with the export of copra, namely, the bulky nature of the product and the loss of the valuable fertilizing and feeding material it entails. It is certain that the by-product has more monetary value for cattle feeding purposes than for fertilizing purposes. Nevertheless the amount of fertilizing material removed from this country each year without any attempt at replacement runs into thousands of tons.

Again according to Eaton (12) "the principal drawback to the export of oil is the difficulty in connexion with transport. If exported in barrels it is probable that the staves, &c., for such barrels would have to be imported, although it may be possible to manufacture these locally from local timber and thus start a new subsidiary industry."

This is one of the main arguments now used against local milling because there are no oil tankers or facilities for making oil drums available. It must be pointed out that such oil drums are relatively easy to manufacture and that when emptied they have considerable resale value.

Other reasons usually advanced are as follow:—

The capital cost of the factory; the type of labour available; the difficulty of finding a market for oil unless the firms with a virtual monopoly are willing to buy the product.

The difficulty of selling oil cakes and residues, which in England and Europe bears the cost of processing, should be mentioned. Coco-nut cake could be produced here more cheaply than in Australia and this product could be made even more popular for drought feeding than is the case at present. The potential use of copra cake from such a cheap source has not been explored, particularly in Queensland and the Northern Territory. It is not known how this would affect the local manufacturers in the Commonwealth.

It is not argued that oil milling should be commenced here on a large scale but it is pointed out that the possibilities should not be overlooked. It might be possible to find direct markets for coco-nut oil in Canada, Australia and the East. Modern crushing machinery is more efficient, less complicated and less costly than formerly.

### COPRA DRIERS.

It is not intended to discuss copra drying at length in this article except to point out that one of the greatest causes of wastage in the copra industry of New Guinea is the diversity of type of copra driers used.

Many of the driers used here are quite inferior, wasting time, money and effort, and often producing an inferior product. It is safe to say that there are almost as many types of driers used as there are plantations in the country. Practically every individual has a different idea as to the best type of drier, and his own ideas of construction are often embodied in the kiln or drier which he builds. Some of these ideas are excellent and probably just as many are of no use whatsoever. Many cases are known where the fire boxes collapse, the pipes burn out early and smoke gains access to the copra, or the escape of coco-nut oil leads to conflagration.

The diversity of driers used, together with faulty construction, lack of supervision and control are among the most important reasons for variations in the type of copra produced here.

It is understood that such factors as drying immature or sprouted coco-nuts, allowing the copra to stand too long before drying (which is followed by bacterial action and rancidity), overloading the drier, bagging the copra before it is properly cooled, mixing good with bad copra, and a host of other causes, may lead to the production of inferior copra.

As pointed out elsewhere, the great majority of copra driers in use here are of the so-called "hot air" natural draught type, and although many plantations still use smoke driers, sometimes in combination with hot-air driers, their use is diminishing.

The Ceylon type of drier has so far found favour on some plantations but its use may spread.

The extent of capital investment on driers in this country is not known or realized, nor is the cost of insurance, which is necessary to guard against loss by fire. The loss of copra by fire alone and that due to the production of inferior copra, especially where condemned, has never been estimated, but it is known to be very heavy and should be reduced.

An inferior type of kiln or drier necessarily carries greater insurance, i.e., if a company is prepared to insure badly constructed driers at all.

If the planters have decided that the "hot air" type of driers suits New Guinea conditions best, then it is desirable that a standard type of hot air drier be evolved. This would require to be cheap to construct, be able to dry a reasonably large quantity per unit period, and be cheap as regards unit labour required to work it, as well as producing a superior grade of copra.

The Director of Agriculture favours the Ceylon copra driers for this country under most circumstances, but the reasons, either valid or invalid, for its not being more extensively used are not known. It is suggested that the labour might not be used to them at first and so the working costs might be too heavy until the labour realizes the routine required. It might be that the original constructions did not follow a recommended plan or that modifications are necessary for certain districts. The planters may be to some extent prejudiced or they may consider it uneconomic to scrap the hot air driers already used.

True comparative figures regarding the actual cost of running the various types of driers used here are unavailable.

It may not be possible to construct a type of drier which would suit all plantations but it should be possible to attain much greater standardization.

The construction of experimental driers of various types would indicate reasons for faulty construction, costly running and so on, especially if comparative costs and particulars of labour required were kept. It should be of great service to the community if a battery of such driers were erected on some plantation for this purpose.

If many of the experienced planters here would furnish plans and information as to the good points and observed faults of the driers they use, together with labour costs, such information could be used for the good of the industry.

The results of experiments in copra drying on both large and small scale driers in Malaya (8) tend to show that when careful and prolonged continuous drying with moving hot air is practised, a high percentage oil content with reduced yields of dried grated copra results. Thus slow drying as in Ceylon (4 or 5 days) may, therefore, be expected to give smaller yields of dry copra with a high percentage oil content (dry basis), while rapid drying as in Malaya (2 to 3 days) will result in larger yields of dry copra which is less crisp and more prone to mould attack, and which exhibits a low percentage oil content (dry basis). The total yield of oil is independent of the rate of drying except where overheating occurs.

The explanation of the lower yields of dry copra which is obtained on careful and prolonged drying is its slow "dehydration" and perhaps also decomposition without discolouration of the "solids-not-fat". More oil is lost if copra is broken up into small pieces before drying.

There are few hot air kilns on large plantations in Malaya, as a survey by Cooke showed that 57 per cent. of the kilns used were of the smoke "Ceylon" type, 38 per cent. were of "hot table" type, while only 3 per cent. were of the natural draught hot air tray type, and 2 per cent. used hot air in forced draught driers. The hot table drier has not been used in New Guinea as far as is known.

It was shown that in the hot air kiln with 24 hours' drying (using several analyses) the oil content was 2 per cent. less on the average than on the hot table drier where 48 hours' drying was used.

The total percentage oil content as well as the yield of dry copra is dependent upon the method of drying. It is shown on chemical grounds why slow sun drying in the hot, dry seasons in Malabar, India, is responsible for the best copra produced as regards oil content, and it may be for that reason that Ceylon copra is so superior to New Guinea copra, where not more than 24-36 hours' drying is used on most plantations. In this case the chemical composition is not necessarily the same although the appearance may be very similar.

It is seen that chemical analysis, in conjunction with experiments using various types of driers is essential to determine this point alone. It is easy to conceive that some of the hot air driers (natural draught) used in New Guinea might give a copra with a higher oil content than others. Over-heating is known to cause considerable decomposition of coco-nut oil before it is expressed from copra, especially where a large surface is exposed.

It is probable, but not a decided fact, that in New Guinea, coco-nut kernel dried in a Ceylon type of drier would give a lower yield of copra of higher oil content than coco-nut kernel from the same consignment dried in a hot air drier.

The economics of the whole question can only be worked out in conjunction with experiments to determine this end. It must be understood that producers of good copra where the classification is on basis of origin, do not always get a premium for super-grade copra. The provision of an extra grade to meet the position has been suggested in some countries but so far this has not been done.

It is also recognized that there is a definite basis for the manufacturers' preference for half nuts.

In view of the above findings it is not at present easy to say why Rabaul hot air copra now closely approaches Straits copra in price. It is known that higher priced hot air driers of greater capacity than those used in Malaya are employed on many plantations here, but their true efficiency has not been determined.

### ACCOUNTING METHODS ON PLANTATIONS AND COST OF BRINGING INTO BEARING.

Cobercroft (7) advocated the use of methods of book-keeping to allow of closer calculations on the cost of work on the non-bearing areas, including allocation of a proper share in the overhead expenses.

Until the 30th June, 1921, the principle adopted was to capitalize a proportion of the total debits to the plantation revenue accounts in the ratio that the non-bearing areas bore to the total planted areas. After the 30th June, 1932, a scale was introduced based on the "German Nerton Scale," in which a palm was taken as worth 2s. 6d. for the first year and 1s. 3d. additional for each of the succeeding nine years, making a total value of 13s. 9d. at ten years. This at 48 palms to the acre on the square planting system would mean that £33 per acre was required to bring the palms to 10 years of age, i.e., minus any small returns from coco-nuts harvested. If it were taken that the spacing was 56 palms to the acre on the triangle this cost would be £38 10s. It was, therefore, considered at that time that the arbitrary basis of a graded sum of 1s. 3d. per palm was excessive.

Some companies use £48 per hectare as the cost of bringing palms into bearing and this must be considered as an outside figure. It is considered, although accurate figures are not available, that £20 to £30 per hectare would be nearer the mark, and it is probably even cheaper than that where the cost of clearing is low or where other short-term crops are utilized in bringing the plantation into bearing.

The most satisfactory and, in fact, the nearest to accurate method of ascertaining capital expenditure on plantations is to keep daily records of the work on which the labour is engaged; showing whether it is on bearing or non-bearing palms, charging to capital the expenditure on the non-bearing areas, and apportioning thereto a share of common and proper overhead charges in the ratio of the cost of non-bearing labour, to that of the bearing labour on the plantation.

It was considered that records should be kept on the plantations to show the labour expended on weeding and the cost thereof per acre, and also the cost of collecting, cutting copra per ton and so on, in order to work systematically and efficiently.

The cost of bringing a plantation into bearing, its capitalization and running costs, should be known as far as possible, as this only means that some efficient but simple system of plantation accounting be put into effect.

The method of valuation according to the number of palms grown, and even according to the monthly or yearly production, is only a very arbitrary basis. It must be recognized that on a 200 hectare plantation yielding 240

tons of copra per year, the returns, in proportion with cost of production, are disproportionately much greater than those from a 400 hectare property yielding the same tonnage of copra.

Where there is a large proportion of poorly bearing areas on a property, e.g., where there are pumice hills behind the better yielding areas, such poorly yielding areas are probably quite unprofitable. In such instances the whole plantation is worked as a unit and the profits on the good yielding areas may, to a large extent, pay for working unprofitable areas and thus be uneconomic.

It is seen that the basis of valuation largely used in the tender purchase of expropriation board properties, namely £1000 for a property yielding 20 tons per month, may have been sound in some cases and not in others.

It is certain that the most successful planters in New Guinea at the present time are those who keep proper books and accounts. They are thus able to state at any particular time what the relative cost of production and the net profits are.

Crop estimation is seldom carried out in New Guinea plantations notwithstanding the fact that the procedure is comparatively simple and it would enable the planter to estimate his requirements and expenditure for the ensuing year.

### COST OF PRODUCTION.

Owing to the book-keeping methods employed, and other causes, the cost of production of copra in New Guinea is difficult to arrive at, and in fact, figures only appear available for a few plantations.

In the costs kept on the board plantations around 1922-4 it was seen that the estimated working expenses were in the vicinity of £9 per ton where from 40 to 70 labourers were employed.

It was noted that the maintenance and labour costs remained relatively constant, hence the greater the yield per hectare the greater the marginal return.

The cost of production at that time is stated by many to be higher than at the present time. Nevertheless, owing to selling in large bulk more satisfactory contracts were made on the selling market.

The Hon. J. C. Mullaly, a non-official member of the Legislative Council, at a recent meeting (25) produced figures concerning an average property producing 20 tons of copra per month, with a tender valuation of £4,000 and employing 50 native labourers, which was stated to be necessary to conduct that property adequately.

It was submitted that the average cost of copra production was £7 9s. 6d. per ton. This is equivalent to £1,704 14s. 7d. on the 240 tons produced per annum. It is deduced from these figures that it would require copra to return a little over £11 per ton to meet these costs plus principal and interest owing on such a property.

The Hon. B. B. Perriman, local manager for Messrs. W. R. Carpenter and Company Limited, quoted the average cost of production as from £7 10s. to £8 per ton delivered at Rabaul or at the depot. It was admitted that some plantations are able to deliver at the depot under £8 per ton, and although one man may be

able to produce copra at £6 and another at £10 the average must be taken. Several reputable planters here have stated that their outside cost of production should be around £5 per ton, while on Kar Kar Island and Bougainville it is stated to have been produced on some plantations at £3 to £3 10s. per ton unless c.i.f. is included.

If the higher costs of production mentioned do prevail in this Territory it means that the cost of production is high in proportion with the average prices received f.o.b. Rabaul, and every effort should be made to reduce these working expenses by improved plantation methods.

The Director of Agriculture has stated that the all-in cost on a well-known estate, Malaya, which is 18,000 acres in extent, is approximately £5 per acre.

### AGRICULTURAL LEASES AND PARTICULARS OF TENURE.

A leasehold system was introduced by the "Land Ordinance" of 1922. It was specified that the maximum area that can be held by any one person as an agricultural lease must not exceed 2,000 hectares, and the unimproved capital value not more than £5,000.

The term of lease may be for any period not in excess of 99 years. The annual rental is 5 per cent. of the unimproved value, which is appraised every 20 years. The average general appraisalment for the first 20 years is one pound five shillings (£1 5s.) per hectare, equivalent to one shilling and threepence (1s. 3d.) per hectare (equals 2.4711 acres).

Up to 30th June, 1934, there were 314 agricultural leases in force, and for 166 of these lessees paid an annual rental of under £6 per annum, which means they hold areas not exceeding 100 hectares.

In addition, 104 lessees paid between £6 and £15 per annum for areas up to 250 hectares, while 41 others paid £16 to £30 per annum for areas between 250 and 500 hectares. Three lessees now pay a rental of £31 to £62 per annum for areas between 500 and 1,000 hectares. It will be seen that the average rental for agricultural leases here probably does not exceed £15 per annum, which is very reasonable.

Up to the present no estimate has been made of the total area suitable for agriculture, but it has been asserted that the area already alienated if planted up to its full capacity, would be greater than the present native population could cultivate, a statement which may or may not have any foundation.

It is suggested that there is decided room for a systematic if somewhat approximate survey of the various areas in this Territory, in an attempt to delimit the land, which in the future should be available for agricultural development. In this work it would be necessary to assess the areas necessary for native rights and requirements. A survey of this nature should prove a guide to the authorities as well as the intending settlers and resident planters. It should simplify the general procedure for land purchase and acquirement, besides indicating and mapping the areas most suited to particular crops.

Until such time as this survey is made it appears that the present conditions of land acquirement may not attract new substantial capital investment, especially where complicated negotiations are involved in obtaining new land, and the areas allowed for future company expansion are relatively small.



It has been suggested by interested settlers and others that the particular departments which are responsible for native welfare should indicate what districts or areas are, or conversely are not, over alienated in relation to the native population requirements. Thus the onus should be on the Administration and officers concerned to allow adequately for present requirements, and for any increase in population in areas where this is expected.

An applicant having selected an area suitable for his purpose in any district which he may choose and ascertained from the native owners that they are willing to sell the land to the Administration, applies to the Lands Department, through the District Officer controlling the district in which the land is situated.

Application is made on a printed form, and must be accompanied by the necessary fees. The fees vary according to the area. Thus to take up an area of 100 hectares the cost would be—

	£	s.	d.
Registration fee .. .. .	0	10	0
Deposit .. .. .	2	0	0
Survey fee .. .. .	58	5	0
<b>Total .. .. .</b>	<b>58</b>	<b>15</b>	<b>0</b>

It is necessary to deposit only one-quarter of the survey fee with the application, the balance must be paid on completion of the survey.

The native owner must be willing to sell the land to the Administration before it can be selected.

The application having been made and lodged, in due course it is advertised in the *New Guinea Gazette*, and subsequently it is heard by the Land Board when the applicant may attend and state his case.

One-fifth of the land composed in an agricultural lease must be planted within the first five years; two-fifths within the first ten years, and three-fifths within the first twenty years, while during the remainder of the term three-fourths of the land so suitable must be kept planted.

The land regulations prescribe numerous tropical plants such as coco-nut, cacao, coffee, vanilla, &c., with which the land must be kept planted, but the choice of crops to be planted is left to the selector.

The procedure at present adopted apparently entails that intending settlers to this Territory should be required to enter into almost direct negotiations with the natives and bargain for their lands, &c., and the methods of determining compensation could be given a more definite basis.

Until such time as proper survey is made land acquirement will be costly, time absorbing, and not encouraging to new settlers, especially as it is not possible to indicate where and approximately how much land is available for future settlement on any map at present drawn. The policy of land acquirement, which is the basis for any increased European plantation development, could be made more encouraging to outside people, not as to terms of acquirement, which are quite reasonable, but as to means of obtaining such land.

It is safe to assume that any increased expenditure for the betterment of the indigenous population must be derived from the resources of the country.

It is believed that in the long run a great proportion of the necessary taxation for this purpose will be ultimately derived from plantation agriculture. This contention must be kept in mind as it has been regarded as a fundamental assumption in the development of British and Dutch colonies.

It is pointed out that despite the greatly increased acreage and agricultural development, only 17,000 odd natives are employed on the plantations here.

Under the German régime settlement was encouraged on Bougainville Island by giving so many hectares of land to bona fide settlers and helping them to procure labour. In this way many companies settled there, although it was stated that had land been obtainable under such terms in the British Solomon Islands, they would not have done so, but the latter statement has only a probable basis.

The development of Bougainville Island has had no deleterious effect on the native population, and the district quickly grew into a flourishing plantation area. The opinion is expressed that even now this island is not in the least over alienated.

### LEGISLATION AFFECTING THE COPRA INDUSTRY.

#### Commonwealth—

During the financial year 1925-26, the Commonwealth Parliament passed two acts—

- (1) The Customs Tariff Act (Papua and New Guinea Preference) of 1926;
- (2) The New Guinea Bounties Act of 1926.

The object of these acts was to offer an incentive for the cultivation of economic crops for which the conditions in the Territories are suitable.

Under the first of these acts provision is made for the importation into Australia of the following coco-nut products:—

- (a) Coco-nuts whole;
- (b) Coco-nuts prepared;
- (c) Coco-nuts shelled or unshelled.

Under the Bounties Act a bounty on coco-nut coir of £3 per ton was granted.

The effects of Australian Bounties and Preference Acts are most acceptable to the New Guinea copra industry, but not very far reaching, as only a relatively small proportion of this copra is exported to Australia, and as yet only experimental shipments of coir.

Reference to Table No. 14 shows that in 1933-34 Australia received 7,947 tons of copra out of a total of 62,270 tons, to the value of £36,159 out of a total of £283,329, and ranked in fourth place after France, Germany and Italy.

During the year 1934-35, 7,094 tons valued at £50,783 were exported to Australia out of a total export of 56,251 tons, valued at £361,413.

In 1929-30, Australia imported 14 per cent. of New Guinea copra, and in 1934-35, 12 per cent. of this copra.

According to the *Commonwealth Gazette* of 8th August, 1935, the primage duty of 5 per cent. on all goods including copra imported from Papua and New Guinea has been discontinued from 26th September, 1935. This is an excellent move, but will not affect the New Guinea exports of copra to any great extent.

Reference to Table No. 10 shows, however, that one great effect of Australian preference has been a definite increase in the desiccated coco-nut production in this Territory.

The value of desiccated coco-nut exported at present easily exceeds the value of copra exported to Australia, as 1,611 tons valued at £45,080 were exported in 1934-35, and 1,463 tons valued at £31,562 were exported in 1933-34. *Ceylon Trade Journal* (6) gives the following list of Australian customs duties on Ceylon products, which apply to all outside Empire countries:—

	Customs Duty.		Primage Duty.	
	British Preferential.	General.	Preferential.	General.
Coco-nut Poonac (Oil cake) .. per cent.	1s.	1s. 3d.	10 per cent.	10 per cent.
Fresh coco-nuts—				
(a) For manufacture of coco-nut oil .. per cent.	Free	Free	10 per cent.	10 per cent.
(b) Use fresh .. per cent.	Free	1s.	10 per cent.	10 per cent.
Desiccated coco-nut and prepared coco-nut .. per lb.	2d.	3d.	10 per cent.	10 per cent.
Copra .. .. . ad val.	Free	15 per cent.	5 per cent.	5 per cent.
Coco-nut oil—bottled including medicinal oils .. per gal.	1s. 6d.	2s. 10d.	5 per cent.	10 per cent.
Coir fibres (not specified) the only charges being 5 per cent. primage (and also 10 per cent. primage on packing material).				
Coir yarn .. .. .	Free	Free	5 per cent.	10 per cent.
Coir mats and matting .. ad val.	20 per cent.	35 per cent.	5 per cent.	10 per cent.
Coco-nut oil—				
Oils in vessels exceeding 1 gal. } vegetable oils, edible n.e.i. } See including fish-frying oils .. } above				
N.E.I. including medicinal oil not compounded .. per gal.	6d.	9d.	10 per cent.	10 per cent.
1 gallon—				
(a) $\frac{1}{2}$ pint and smaller sizes .. per doz.	1s. 3d.	1s. 9d.	..	..
(b) $\frac{1}{2}$ pints and over $\frac{1}{2}$ pints .. per doz.	2s. 6d.	3s. 6d.	..	..
(c) Pints and over $\frac{1}{2}$ pints .. per doz.	5s.	7s.	..	..
(d) Quarts and over a pint .. per doz.	10s.	14s.	..	..
(e) Over a quart .. .. per doz.	3s.	4s. 4d.	..	..

#### ADMINISTRATION ORDINANCES.

The main ordinances and general relief measures affecting the copra industry in New Guinea are briefly enumerated as follow:—

- (1) The Plantation Diseases and Pests Ordinances of 1916, 1928 and 1934 (this repeals the two former);
- (2) Quarantine Ordinance (also including certain measures of the *Commonwealth Quarantine Act 1908* and on);
- (3) Copra Inspection Ordinance of 1928;
- (4) The Customs Tariff Ordinances. (These affect duties on copra, copra bags, imports, &c.)

#### Plantation Diseases and Pests Ordinance 1934.

This allows of regulations to control coco-nut plantation and native-grove inspections. The provision for regulations under the 1934 ordinance has particular reference to plant diseases (fungus and insect pests) and has been assented to by the Legislative Council. It prescribes for regulations, which

pertain to the inspection of plants, the prevention of the spread of any disease, the treatment and destruction of diseased plants, and measures for the prevention of and destruction of pests. This ordinance has been specified to include any regulation under the original 1916 ordinance which is thereby repealed.

The above ordinance is administered by the Director under the Administrator, who has appointed inspectors for the purpose of carrying its provisions into effect. The Administrator has the power to make new regulations, from time to time, which are applicable to the aims and provisions of this ordinance. Among other things it is provided that the importation of seed coco-nuts or nuts in the husk into New Guinea is prohibited unless a special permit is obtained.

### **The Quarantine Ordinance 1931.**

This provides in part V. for the quarantine of animals and plants. It also includes provision for retention of various clauses of the Commonwealth Quarantine Act of 1908 and on, and adds numerous new provisions.

Section V. also provides regulations controlling the examination of imported plants by a qualified inspector, and if the imported plants are found free from any disease, and the quarantine officer is satisfied that they can be delivered without danger of introducing any disease, they may be handed over to the importer. If any disease is present, powers are provided either to quarantine or destroy diseased plants as the case may warrant.

Section 14 of this ordinance provides that the Administrator may by proclamation prohibit the removal of any plants, or parts of plants, from any part of the Territory to any other part of the Territory unless the consent in writing of the Chief Quarantine Officer for Plants, or a quarantine officer authorized by him, has been obtained, e.g., Proclamation No. 33 applied this prohibition to the District of Kieta as a safeguard against *Sexava* spp. being introduced to that district where this serious insect pest is not known to exist.

This ordinance appears to have many of its clauses amplified in the Plantation Diseases and Pests Ordinance, and they are apparently supplementary in their effect.

A system of plant quarantine and plant fumigation is allowed for, as is the prohibition and regulation of the imports of certain plant material, liable to introduce serious diseases not already present in this Territory.

### **Copra Inspection Ordinance 1928-29.**

The Copra Ordinance has been in force since January, 1929, and provides for various penalties against infringement. It provides that no person shall make copra from other than matured coco-nuts, or buy, or sell any copra so made. A penalty is also provided for any person selling undried kernel, imperfectly dried or sweated, copra or rotten copra, or copra mixed with shell, stone, dust or other foreign substance.

This ordinance also provides the means for inspectors to be appointed with powers to pass or condemn copra for export as follows:—

All copra shipped for export from the plantations or brought from plantations to Rabaul, Kavieng or Madang shall be inspected by an inspector before shipment or transshipment as the case may be, and if it complies with the provisions of this ordinance and is otherwise fit for export, the inspector shall pass it for shipment.

If any such copra is found to be unfit for export, whether it has been previously passed by an inspector or not, the inspector may refuse to permit the copra to be exported.

If any such copra is shipped without inspection, or if any copra which an inspector has condemned as unfit for export, is shipped or transhipped to any vessel for export, all persons responsible shall be guilty of an offence for which a heavy penalty is provided.

Under the Copra Ordinance, apparently it is provided in Section 8 that a buyer may obtain a special permit from the District Officer, subject to such immunities and conditions as that officer specifies, to purchase undried copra (green copra or green coco-nut meat).

The direct result of the inspections under the ordinance is that the general average quality of New Guinea copra has improved greatly. The percentage of higher quality hot-air copra produced has nearly doubled and claims on account of reclamation are now almost non-existent. Rabaul hot-air copra has attained a price comparable with Straits F.M.S. copra, and is sold at a premium of over £1 per ton compared with South Seas F.M.S. copra.

In some districts when the ordinance came into force it was estimated that 60 per cent. of the copra being submitted for inspection was badly and carelessly dried. There was distinct lack of uniformity in the product, and the methods of curing were carelessly applied; a position which in the great majority of cases no longer exists. The advantages of copra inspection have been stressed throughout this article as have suggestions for its improvement.

There are four permanent copra inspectors employed who are stationed in the following districts and centres:—

New Britain, centre—Rabaul; New Ireland, centre—Kavieng, mainland of New Guinea, centre—Madang; and Bougainville Island, centre—Kieta; while two part-time inspectors are employed on various inter-island steamers. Usually about 10 to 15 per cent. of all the consignments exported are submitted to examination by the local copra inspectors, and for market purposes the copra is despatched under four main grades.

There are difficulties to be overcome with regard to the incidence of the inspection, such as whether it will be possible to carry out a certain amount of inspection at the plantations just prior to shipment, e.g., on the East Coast of New Ireland.

### **The Customs Tariff Ordinance 1933-1936.**

The assessed value of copra is declared each month by the Administrator and is computed according to a sliding scale as follows:—

The assessed value per ton of copra in each month shall be computed by deducting from the London price of Rabaul copra, hot air dried, on the last market day of the immediately preceding month three pounds English and converting the remainder into Australian currency at the rate of exchange operating on that day and by further deducting from the converted remainder the sum of three pounds (£3) Australian (e.g., on a London price of £10, the assessed value equivalent would be £5 15s.).

According to the schedule of tariff on exports, the following scale for rates of duty is applied:—

		Duty payable.	
		s.	d.
When the assessed value per ton is less than £5 15s.	.. ..	Free	
From £5 15s. to £11 per ton	.. ..	2	6
A sliding scale from £12 to £18 ranges—			
From	.. ..	3	6
To	.. ..	11	6

When the assessed value exceeds £18 per ton an additional 2s. per ton is charged on each £1 per ton, or portion of £1 per ton in excess of £18.

In 1931-32, it was estimated that the reduction in the rate of export duty on copra afforded the planting industry relief to the extent of £16,000.

In 1934, under the scale applied, New Guinea copra was practically free of export duties under the prices prevailing.

Under the Customs Ordinance the use of secondhand copra bags is prohibited. In 1929 a deduction of 5 per cent. on the gross weight of copra bags was altered to a deduction of 2½ lb., per bag off the gross weight if in bags, and this represents a distinct saving. The repeal of customs duty on copra sacks, which duty was estimated to have added an amount of 1s. 3d. per ton to the cost of production, was also brought into effect in 1929. In 1924, duty on copra sacks was 10 per cent. ad valorem, equal to about 1d. per sack.

The copra industry contributes a large revenue, in the form of import duties on such items as rice, meats, salmon, tobacco, cotton goods, parts of copra driers, &c. The import duty on rice for example is £1 per ton, while tobacco for trade purposes carries a duty of 2s. 6d. per lb.

### Native Labour Ordinances and Regulations.

Under the provisions of this ordinance the regulations are specified under which native labour is controlled, and the terms of indentured or casual employment are set out. It thus affects the copra industry in all matters pertaining to the working of native labour. It provides for the control of recruiting, provisions relating to wages, contracts, period of employment, general conditions of employment, health safeguards, &c.

All natives prior to employment must be medically examined for physical fitness.

The cost of native labour is largely affected by the conditions of work, rations, clothes, wages, housing arrangements, medical expenses, and, in some instances, recruiting expenses, provided for by this ordinance, and these necessarily must be taken into account in assessing the cost of copra production.

A recruiting licence costs £5 for each labour recruiter per annum, while a dynamite licence costs £5 per annum, plus a guarantee in case of accident; in addition to these, motor, fishing and gun licences are payable by the planter.

The suspension of the payment of the "Native Education Tax" of 1s. per employee per month for an allotted period was one relief granted the copra industry. This tax was discontinued on 1st August, 1930, and was reinstated on 1st August, 1933. It was again discontinued on the 12th July, 1935, and will not be payable prior to 30th June, 1937.

The term of contract for ordinary plantation labour must not exceed three years. It is provided that after two terms of a total of approximately five years the labourers must be repatriated to their villages for a period of three months

for unskilled labour. In the case of skilled labour, one month for every year of work is allowed. A specified minimum wage of 5s. per month is payable on the first contract of service. The minimum monthly wage for a labourer who has completed a term of three years under one or more contracts shall be 6s., while that for a skilled labourer is set at 10s. per month.

## DISCUSSION.

An economic survey of the copra industry of New Guinea indicates that coco-nut cultivation is likely to be the main feature of plantation agriculture in this Territory for many years to come.

It is certain that this industry has not received the attention in various directions which its economic importance merits, especially as the production per acre has a tendency to decline. The reason for this lack of attention appears to be that the increased production of gold, and the low prices prevailing for copra have for some time past overshadowed the position of the copra industry, and also masked the fundamental importance of copra production to the continued welfare of this Territory.

It has been the intention in this article (and also in a following article which describes the agricultural methods applied to coco-nut growing here), to indicate that the condition of the bearing areas in New Guinea leaves much to be desired, as do the cultural methods and methods of copra preparation employed.

The older planted areas in scattered parts of this country are definitely beyond their stage of maximum production, with the result that the output of such old plantations is rapidly decreasing.

In many areas where copra has been produced for a considerable number of years there is decided evidence of soil exhaustion due to manurial deficiencies.

It is impossible to continue exhausting all the manurial constituents from the soil over a period of years, especially where the decayed vegetable matter or humus is burned out of the soil due to lack of overhead shade, without undesirable results. It is time that some provision was being made to remedy this position by the most economical methods, e.g., by growing green manure crops or applying artificial fertilizers, and experimentation is necessary.

Despite the 60 per cent. increase in the areas planted here since 1917, and which now amount to more than 220,000 acres, the curve of total production has tended to straighten out since 1928, instead of showing a regular increase, when seasonal fluctuations are taken into account.

In an effort to economize on the cost of production during the slump period, and often on account of lack of the necessary finance, the labour lines and general maintenance on many plantations were reduced to such an extent that the properties have suffered considerably. The mere fact that only as many labourers are employed on the local plantations as in 1914, despite the great increase in total acreage and agricultural development, forcibly illustrates the tendency to reduce maintenance.

The need for an organized scheme of research dealing with copra and coco-nut products in this Territory is very evident. Such work must include chemical investigation of the soils, of copra produced and of the growing palms, also plant breeding, cultural and manurial tests, as well as detailed investigations on marketing problems and the insect and fungus pests present in the Territory.

This work is being pursued as far as funds and staff available will allow, but it is essential that planters and others interested should recognize the necessity for the encouragement of such work.

New Guinea copra is submitted to a compulsory system of inspection which compares more than favorably with that carried out in any part of the world.

According to the Director of Agriculture, copra inspection has saved New Guinea producers over £80,000 since 1929, of which it might be mentioned that almost every year about £15,000 is now saved on reclamation costs alone, which represents the reduction in the cost allowed to shipping firms for inferior copra. This result has been achieved at practically little cost to the producer, and it is indicated that any means which will increase the price of New Guinea copra on the world markets should be surveyed. In addition, every effort should be made to reduce incidental costs, and proper book-keeping and cost accounting should be carried out on all plantations. It must be remembered that every 1s. per ton saved on 60,000 tons means £3,000 to the Territory.

The diversity of types of driers used in the plantations here, together with faulty construction and lack of control and supervision are among the important reasons for wastage and variations in the type of copra produced in New Guinea. There are almost as many types of driers used as there are plantations in the Territory, and the capital cost involved must be very considerable. It appears that there is definite need for some form of standardization of the product by the use of driers which are cheap to construct, cheap to maintain and handle, and yet will produce a superior article. Again, controlled investigation is necessary.

One important aim should be that instead of only 60 to 70 per cent. of plantation copra being graded as hot air or superior grade copra, this should be increased to 90 per cent. or even more, which, allowing for a premium of only £1 per ton over the inferior grades, would mean a saving of many thousands of pounds to the local producers.

There is also a definite need for an economic survey of all the bearing coco-nut areas in New Guinea in order to determine the true position and future prospects of the industry. For example, it is not known what areas are actually payable, as some plantations are situated on soils entirely unsuited to coco-nuts, or whether the good areas on certain plantations are carrying the bad low-producing areas on the same plantations.

There are many reasons why over-optimistic opinions should not be formed as to the future of the coco-nut industry. Nevertheless, a pessimistic outlook is not warranted.

Land is cheap in New Guinea, as is labour, and there are still plenty of areas available which are suited to coco-nut planting, and this crop is a simple culture which suits the labour available.

No greater uncertainty exists for the future of coco-nuts than for the majority of other oil crops, and labour is cheaper in the tropics than in most of the temperate zones.

It appears unlikely that the high prices ruling for copra during the years prior to 1929 will return. Nevertheless, at this stage, the indications are that copra should yield payable returns over a number of years. The confidence of the local coco-nut planters has been largely restored by the lenient action of the Commonwealth Government of Australia in readjusting the basis of future payments for expropriated properties in accordance with the fluctuating prices of copra, or, in other words, the actual cash returns from the properties concerned.



It is the considered opinion of many competent authorities that there should be a good living for the coco-nut planter who is prepared to get the most out of his property.

The question of the development of suitable auxiliary crops, so that the planters in this Territory will not be dependent upon the market vagaries or any one crop, is a matter which is now occupying the attention of the planters and the Department of Agriculture.

### SUMMARY.

Coco-nut production is the most important feature of agriculture in the Mandated Territory of New Guinea, and copra is, by far, the most important agricultural export.

New Guinea is the largest copra exporter in the South Seas. Its yearly exports of copra usually exceed 60,000 tons, equivalent to 40 per cent. of the total exports from the South Pacific Ocean.

Large European-owned plantations form the bulk of the planted areas. The selection of the plantation sites has been confined chiefly to the islands and coastal areas, due mainly to the question of transport and the suitability of the coralitic and volcanic soils to coco-nut culture.

The cultivation of large areas of coco-nuts by natives is of fundamental importance to the internal economy of the Territory. The proportion of native copra cured by European planters and included in the total exports is not yet estimated.

The history of the development of the copra industry is traced from the beginning of German colonization to the present time.

The total capitalization of the plantation copra industry in New Guinea is in the vicinity of £5,000,000, of which almost £3,000,000 represents the capitalized value of expropriated properties.

The area of coco-nuts now planted is approximately 225,000 acres, representing an increase of 60 per cent. since 1917. Despite the increase in acreage, there is now a decided tendency for the production to remain constant or even to decrease, the causes of which are discussed.

In the peak years of 1925-26 and 1928-29, the value of copra exported exceeded £1,000,000, while in 1934 it had decreased to approximately £283,000, and had increased to only £360,000 in 1935.

The production of shredded and desiccated coco-nut is now a small but established industry in New Guinea.

A survey of the factors influencing the fluctuating prices of copra and other vegetable oils is presented. These factors cover a wide range of geographical, climatical and political circumstances.

The chances of recovery and stabilization of copra prices are discussed, and, although the immediate prospects are reassuring, there is need for caution in assessing the long-term prospects of the industry.

The advisability of planting new areas in New Guinea is discussed and advocated because of the peculiar suitability of New Guinea conditions to coco-nuts. Probably no more uncertainty prevails for the future of coco-nuts than for most other oil-producing crops, and it is advisable at least to maintain present production.

The quality of New Guinea hot-air copra is much superior to South Sea Islands F.M.S. copra, which fact is indicated by the substantial premium for price obtained, and is largely attributed to the compulsory system of copra inspection in vogue here.

A greatly increased production of higher quality hot-air copra is recorded in the last two years, accompanied by a substantial reduction in the amount of smoke copra produced. This is largely caused by the proportionately higher prices obtained for the better quality product in the depression period.

The price movements for the various grades of New Guinea copra are traced, together with the price relationships with various grades of copra from outside countries.

The total deductions from London prices for New Guinea copra, from which the net prices f.o.b. Rabaul are computed (so-called "parity") have shown considerable shrinkage in recent years compared with those operating in 1928-29.

Some information available on the condition of New Guinea copra after its arrival in England is presented, together with facts concerning manufacturers' requirements and prejudices. The possibility of local oil milling is also mentioned.

Greater standardization and the employment of cheaper and more efficient types of copra driers are urged in order to reduce further the percentage of lower grade copra exported, and the considerable waste of capitalization on faulty driers.

The costs of bringing plantations into bearing and cost of copra production here are difficult to assess, owing to the varying conditions which prevail in scattered parts of the Territory, and the inconclusive figures available.

The various reliefs afforded to the copra industry in this Territory by various enactments of the Commonwealth of Australia and the New Guinea Administration, which have greatly assisted plantation interests, are described.

The need for research on coco-nuts and copra products as well as field experimentation and an economic survey of the individual plantations is emphasized.

#### ACKNOWLEDGMENTS.

Acknowledgments are due to the Hon. G. H. Murray, as a great deal of the correspondence cited was in answer to inquiries instituted by him in foreign countries.

In several instances, facts gathered by the Commonwealth Bureau of Commerce proved of valuable assistance, also articles and leading editorials compiled by Mr. R. W. Robson for the *Pacific Islands Monthly* and by Mr. Gordon Thomas, editor of the local *Rabaul Times*, which were referred to in the preparation of this article.

Thanks are due to Mr. F. McPherson, of the Survey Branch of the Lands Department, Rabaul, for his valuable assistance in the preparation of the included graphs, and to Mr. C. R. Parker, of Messrs. W. R. Carpenter and Company Limited, for his assistance in the compilation of the valuable table and graph on copra prices.

## LITERATURE CITED.

1. America. Bureau of Raw Materials, American Vegetable Oils Industry. (Correspondence with Commonwealth Bureau of Commerce.)
2. Australia (1921 and on). Official Year-books of the Commonwealth of Australia (particularly No. 14, 1921).
3. Australia (1934-35). Commonwealth Bureau of Commerce, Correspondence.
4. Barker, S. G. (1935). *Coir*. (Report on the Attributes and Preparation of Coco-nut Fibre). Empire Marketing Board, No. 71. H.M. Stat. Off. Lond., Sept., 1935.
5. Burns, Mr. J. (1935). "Annual Report of Burns Philp & Co. Ltd." (Published *Sydney Morning Herald* and *Pacific Islands Monthly*.)
6. Ceylon, (1935). *Ceylon Trade Journal*, Vol. 1. Nos. 1 and 2. Issued Bur. Ind. and Com. Dept. of Registrar-General and Director Commerce. Intell., Times of Ceylon Co. Ltd., Colombo, Oct., Nov., 1935.
7. Coberoff, A. R. (1923-24). "Report on Expropriated Properties, New Guinea", by Yarwood Vane & Co., with G. Mason Allard. Printed for Com. of Aust., 1923-24.
8. Cooke, F. C. (1933). "Investigations on Coco-nuts and Coco-nut Products." Dept. of Agr. S.S. and F.M.S. Gen. Series Bul., No. 8, Kuala Lumpur, 1933.
9. Cooke, F. C., and Simpson, H. J. (1932). "Copra Production by the Malay Small Holder." *Malayan Agr. Jour.*, Vol. XX., No. 7. Special Coco-nut Numbers. July, 1932.
10. Corbett, G. H., *et al* (1935). "The Attraction of *Necrobia rufipes* De Geer (the Copra Beetle) to the Fatty Acids of Coco-nut Oil and to Types of Copra." *Malayan Agr. Jour.*, Vol. XXIII., No. 5, May, 1935.
11. De Fremery, P. (1930). "Over Omnivore Insecten in Copra" (Omnivorous Insects in Copra.) (Ber. Afd. Handelsmus, Kol. Inst. No. 44, Amsterdam, 1929.) *Rev. App. Ent.* 18 Ser. A., 4, April, 1930.
12. Eaton, B. J. (1918). "Copra and Coco-nut Products." *Agr. Bul. F.M.S.*, Vol. VI., No. 12, pp. 570-592, Nov., Dec., 1918.
13. Empire Marketing Board (1932). "Oil Seeds and Vegetable Oils." Publication No. E.M.B./C./4. Compiled in the Statistics and Intelligence Branch of the E.M.B. H.M. Stat. Office, London, Sept., 1932.
14. Empire Marketing Board (1932). "Survey of Oil Seeds and Vegetable Oils." Vol. 2. "Coco-nut Palm Products." Publication E.M.B./61, H.M. Stat. Off., London, Dec., 1932.
15. Faure, Blattman & Co. Ltd. (1934). Review of the Oil and Fat Markets to 31st December, 1934. (Messrs. F. B. & Co., London.)
16. Frank Fehr & Co. (1933). Review of the Oil Seed, Oil and Oil Cake Markets for 1933. (Messrs. F. F. & Co., Holland House, London.)
17. Frank Fehr & Co., (1935-36). Monthly Market Reviews. Largely compiled from English Board of Trade Returns for Oils, Fats and Oil Seeds.
18. Furness, Rex (1933). "Crops Products and Manufacture in 1932." Published in Oils, Fats and Soaps. January, 1933.
19. Georgi, C. D. V., and Gunn Lay Teik. "The Removal of Plant Nutrients in Coco-nut Cultivation." (Spec. Coco-nut No.) *Malayan Agr. Jour.*, Vol. XX., No. 7, p. 358, July, 1932.
20. Hart, H. M. J., *et al* (1934). "The Export Crops of the Netherlands Indies in 1932." Dept. Econ. Affairs, Bul. Cent. Bur. Statistics 122, Nov., 1934.
21. Lloyds. (1934). "Lloyds Calendar, 1934." Pub. Lloyds, Lond, Oct., 1933.
22. Malaya, (1934). "Report of the Vegetable Oil Committee." Appointed by H.E. the Governor of the Straits Settlements and High Commissioner for Malay States. Chairman Dr. H. A. Tempany, Director of Agr., F.M.S. and S.S. Kuala Lumpur.
23. Malaya (1934). "Abstract of the Above Report." "The Present Economic Condition of the Coco-nut and Other Oil Producing Industries." *Malay Agr. Jour.*, Vol. XXII., 9, p. 402, Sept., 1934.
24. Malaya. (1935). *Straits Weekly Budget of Malaya*. Pub. Singapore. (Particularly issues of 8th and 15th August, 1935.)
25. New Guinea Mandated Territory. (1933-35.) "Hansard Reports on Legislative Council Debates." Printed Rabaul. (Particularly Meeting No. 2, July, Aug., 1933.)
26. New Guinea, Mandated Territory. (1922-35). Annual Reports on the Administration, Territory of New Guinea (14 Volumes). Submitted to the Council League of Nations 1922-35.
27. New Guinea, Mandated Territory (1934-36). *Rabaul Times Weekly Newspaper*. Pub. Rabaul. (Numerous leading articles quoted.) 1934-36.

28. List of New Guinea Properties. Sold by the Custodian of Expropriated Property. (Com. of Aust.) As at the 1st Jan., 1928. (Printed Melb.)
29. Passmore, F. R. (1931). "The Depreciation of Prepared Copra by Moulds and Insects." *Bul. Imp. Inst.*, Vol. XXIX., No. 2, 1931.
30. Rayner, J. H., & Co. (1934-35.) "Weekly Reports on West African and Other Produce." (J. H. R. & Co., London, Liverpool and New York.)
31. Robson, R. W. (1932-36). "Pacific Islands Year-Book 1932."
32. Robson, R. W. (1934-36). "Pacific Islands Monthly." Various issues. (e.g., 21st Mar., 1935, and 20th Nov., 1935.) Pacific Publications Ltd., Sydney, Aust. (Edited by Robson.)
33. Schnurmacher, Leo, Inc. (1935). "Review of Coco-nut Products for 1935." Pub. Manila Jan., 1936. "Copra and Coco-nut Oil."
34. Snodgrass, Katherine (1928). "Fats and Oil Studies No. 2." *Food Res. Inst.*, Stanford Univ., Calif., April, 1928.
35. Snodgrass, Katherine (1928). "Margarine as a Butter Substitute." "Fats and Oil Studies No. 4." Stanford Univ., Calif., Dec., 1928.
36. Shelton, E. M. (1934). "The Coco-nut Industry and the Excise Tax." *Amer. Chamb. Commerce, Jour. of the Philippine Is.*, Vol. XIV., No. 12, Dec., 1934. (Abstracted.) *Malayan Agr. Jour.*, XXIII., No. 3, March, 1935.
37. Walker, H. S. (1906). "The Keeping Qualities and the Causes of Rancidity in Coco-nut Oil." *Philippine Jour., of Sci.*, Vol. 1, No. 2, p. 117, Feb., 1906.
38. Ward, F. S., Cooke, F. C. "Copra Deterioration." *Spec. Coco-nut No.*, *Malayan Agr. Jour.*, Vol. XX., No. 7, July, 1932.