

MALAYA

---

AGRICULTURE

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## CONTENTS.

CHAPTER I.	
REVIEW OF MALAYAN AGRICULTURE ... ..	3
CHAPTER II.	
LAND TENURE ... ..	7
CHAPTER III.	
RUBBER ... ..	14
CHAPTER IV.	
COCONUTS ... ..	28
CHAPTER V.	
OIL PALMS ... ..	39
CHAPTER VI.	
CATCH CROPS :—Pineapples, Tapioca, Gambier ... ..	47
CHAPTER VII.	
MISCELLANEOUS CROPS :—Coffee, Areca Nuts, Gutta Percha, Sisal Hemp, Mauritius Hemp, Roselle, Kapok, Cotton, Nipah, Tea, Derris (tuba root), Sago, Ipecacuanha, Turmeric, Annatto ...	58
CROPS FOR NATIVE PRODUCTION :—Rice, Fruit, Vegetables, Spices, Tobacco ... ..	69
LIVE STOCK ... ..	71
APPENDIX A.	
LIST OF DISTRICTS IN THE FEDERATED MALAY STATES ... ..	72
APPENDIX B.	
SURVEY FEES ON TOWN AND VILLAGE LOTS AND LANDS AND AGRICULTURAL LANDS ... ..	73
APPENDIX C.	
AREAS OF PROSPECTIVE LAND IN THE FEDERATED MALAY STATES	74
APPENDIX D.	
CUSTOMS DUTIES—EXPORT DUTIES ON AGRICULTURAL PRODUCTS	75
APPENDIX E.	
MALAY TERMS ... ..	76

## INTRODUCTION.

In the following pages will be found a brief account of the system of land tenure in force in British Malaya, together with the present position of the production and marketing of the principal agricultural crops of Malaya.

For many years past, rubber and coconuts have been the mainstay of the agricultural prosperity of British Malaya: latterly, oil palms have assumed an ever growing importance. For this reason, these three main crops are given some prominence in these pages.

The exports of pineapples, tapioca and gambier—all of which are grown as catch crops with rubber or coconuts—have in the past provided a considerable share of the country's wealth, and at the present time constitute valuable industries suitable for production on a large scale.

Of less present importance are a number of crops, which are considered suitable for cultivation on a large scale. Some of these crops have proved their worth in the past, others, though promising, have not yet passed the experimental stage: they have here been grouped under the title of "Miscellaneous Crops."

Lastly a brief note is given of the main crops which are more suitable for native production, but which nevertheless have a local economic value of the first importance. It is not to be inferred thereby that the crops in the preceding categories are not of equal importance to the native cultivator, neither on the other hand is it yet proven that those in this last category, such as rice and fruit, are unsuitable for production on large properties: but the method here adopted for classifying these crops conveniently illustrates our present state of knowledge concerning them and their relative position in the intergal economy of the country.

# Malaya—Agriculture.

## CHAPTER I.

### REVIEW OF MALAYAN AGRICULTURE.

Malayan Agriculture has passed through many phases since the old spice days of Penang. Noted originally for spices and cloves, the cultivation of which to-day is relatively insignificant, Malaya has developed the universally important crop, plantation para rubber. The cultivation of spices was followed by sugar plantations on the rich alluvial lands in Perak; these in turn gave way to coffee cultivation, which, until disease and wild fluctuations of price ruined the industry, was general in all the States. It was fortunate that the failure of coffee more or less coincided with the successful introduction of the rubber industry. The plants introduced by Henry Wickham in 1877 (later Sir Henry), together with their descendants, formed the nucleus from which in 1895 the expansion of rubber planting on a commercial scale commenced.

The cultivation of coconuts along the coastal regions is an old established industry. The extent of cultivation has perhaps not increased as rapidly as might have been expected, owing to the possibilities promised by the cultivation of rubber. Nevertheless coconuts have retained their position, and, after many years of a depressed market, have finally justified the confidence of investors. To-day sees oil-bearing plants on a new level of economic importance, so that coconut planters can look forward with reasonable assurance to many years of prosperity.

The increasing share taken by agriculture in the development of Malaya convinced her advisers at an early date of the necessity for a Department of Agriculture, which was formed in 1905. It now consists of over thirty senior officers who are engaged on scientific and practical problems connected with the agriculture of the country, the introduction and testing of new crops which may be of value, and the investigation of possible new features which may ultimately increase

its agricultural wealth. The Field Officers of the Department are not only engaged in administering the various enactments designed to protect agriculture, but act in an advisory capacity to any planters requiring their services, and test the suitability of various crops for particular districts.

The Department of Agriculture publishes a monthly journal in English, occasional Bulletins in English containing the results of special lines of research, and quarterly journals in both the Malay and the Chinese languages.

At the end of 1926, the Rubber Research Institute was formed with headquarters at Kuala Lumpur. This institute is maintained from funds collected by means of a cess on the export of rubber. The Institute has taken over from the Department of Agriculture all rubber investigations, leaving the Department free to concentrate its attention on the many forms of agriculture for which the country is suited.

From the above remarks, it will be seen that at present the main crops are rubber and coconuts.

The main purely native crop is padi (rice) of which there are some half million acres. In addition to these there are a large number of crops which are cultivated on a small scale, but which are not unimportant, including pineapples, tapioca and oil palms. Such crops will receive attention in a later chapter.

The rapid agricultural development of Malaya has been due to the successful handling of three problems—labour, transport and surveys.

It is only necessary to point out that cheap and good labour has at all times been available—in any quantity—from the teeming millions of China and India, and the Government labour regulations have resulted in the establishment of a healthy and contented labour force throughout the country. In particular, too, Malaya owes a great deal to the initiative and pioneer work of the Chinese in the country.

The Railway system had small beginnings in 1885. By 1903 the system consisted of 340 miles of open line, while at the present time 1,022 miles are in use and through connection is established with Siam in the north. Even more

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#### LAND TENURE.

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#### CHAPTER II.

#### LAND TENURE.\*

#### FEDERATED MALAY STATES.

1926 governs the tenure of land in the  
tes. This law came into force on the  
perseding the Land Enactment of 1911  
of Titles Enactment of the same year.  
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Village land, Country land exceeding 10  
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ie State in which it is situated. Land

file by J. V. Cowzill, and published in the  
road," Vol. XVI, No. 3, May, 1928.

may be alienated to individuals, registered companies, or a corporate body authorised to hold land.

Country lands exceeding 10 acres in area are alienated on Grant or Lease of State Land. The approval of an application for such land, as also the premium to be paid and the conditions to be imposed on the title, are at the discretion of the Resident of the State in which the land is situated. As to premia, it may be said in general that, except for oil palm land, of which mention is made later on, there is nothing in the nature of a fixed premium for agricultural land. All that can be said is that premia are generally lower in Pahang than in the other three States, owing to its larger area and less advanced stage of development. The day of purely nominal premia is however, past, and, at any rate in the three Western States, premia are made to bear some relationship to the market value of the land, particularly if it is to be alienated on Grant in perpetuity.

Quit rent on this class of land is \$1 an acre a year for the first 6 years and thereafter \$4 an acre a year. There are provisions for rebate of rent for land planted with padi, or certain other approved agricultural products.

Survey fees are charged at a fixed schedule rate which will be found in Appendix B, and there are also small office fees payable for engrossment and registration of title.

Country land not exceeding 10 acres in area is a division made in the interests of Malay or other small holders. Alienation of this class of land lies with the Resident, but he may delegate his powers to the District Officer. The title to such land may be a Grant or a Lease or an Entry in the Mukim\* Register.

European applicants for country land not exceeding ten acres may, however, expect to be given Grants or Leases.

For purposes of rent such land is divided into two classes, the rent being \$1.60 to \$4 an acre on first class lands, and 80 cents to \$1.20 on second class lands. In Pahang there are also third class lands the rent on which is 60 cents an acre.

\* Mukim is a sub-division of a district.



The same considerations as to premium, survey and other fees apply to these smaller lots as to country lands exceeding ten acres.

Applications for State Land should in the first place be addressed to the District Officer of the District in which the land is situated. Applications are required to be made in duplicate on a prescribed form, obtainable at all Land Offices. New applicants, especially if their requirements are for large acreages, are well advised, before sending in any formal application, to seek an interview with the District Officer, or if that is impracticable, to enquire by letter as to the availability of land for the purpose required, at the same time informing him fully of their intentions for the development of the land and of the resources at their disposal.

The information in Appendix C as to the availability of land for agricultural purposes is given with the reservation that there is no guarantee that the areas mentioned will be still available. New applications are constantly being approved, and it will be understood that a list which may be up to date at the time of writing may very quickly need revision. In some cases, moreover, the availability depends to some extent on the extraction of timber, or the provision of drainage or communications.

The investigations of the District Officer on an application will include enquiry as to the bona fides of the applicant, and the availability of the land for the purpose required. He will have to satisfy himself that the land is not reserved or likely to be required for any public purpose, that it is not a Malay Reservation, or a Forest Reserve, not likely to be required for mining, and that it has, or can be provided with, some form of access.

The power to approve applications for State Land lies with the Resident in each State, but applications for areas exceeding 640 acres will be referred to the Chief Secretary to Government. Where the applicant is already in possession of 640 acres or over, any subsequent single application by him for land exceeding 100 acres will also be referred to the Chief Secretary.

Approval of an application is conveyed to the applicant through the District Officer, who will at the same time call for the payment of premium, survey and other fees, and quit rent. The nature of the title under which the land is to be held, and the express conditions, if any, are conveyed at the same time.

On payment of fees, the District Officer will have the land surveyed by the Government Survey Department, and, when this has been done, will obtain from the Registrar of Titles the issue copy of the document of title and deliver it to the applicant.

Occupation of land in expectation of title may be allowed with the consent of the Resident if all fees have been paid and the boundaries marked out. In such cases, however, the approved applicant occupies at his own risk to the extent that he has no claim to a greater area than stated in the application, and that payment of rent for the area applied for does not confer the right to a title for the whole extent of that area.

It is obligatory to develop land within a prescribed time and to keep the land in a good state of cultivation. Normally, the Government demands that one-quarter of the total area shall be developed within five years, and one-half within ten years.

The Government may insert a labour clause on grants of land exceeding 3,000 acres, requiring the proprietor to import within the given time limit a stated number of labourers from outside the Malay Peninsula. Fulfilment of this clause relieves the land from any further liability in this respect.

Customs duties are leviable on certain agricultural products as shown in Appendix D. These rates are liable to alteration without notice at any time.

The following are the special terms at present in force for the cultivation of Oil Palm :—

- |                                                    |                                                                                                                                                                                                   |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Special Terms<br/>for Certain<br/>Products.</b> | <ol style="list-style-type: none"> <li>1. Premium.—\$3 an acre or such less sum as the Resident may approve.</li> <li>2. Rent.—50 cents an acre for 6 years and 82 an acre thereafter.</li> </ol> |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

3. Export Duty.— $2\frac{1}{2}$  per cent. ad valorem or at such other rate as shall from time to time be notified in the Gazette.
4. Special Conditions.—The land shall be used solely for the cultivation of oil palm and such catch crops as are approved by the District Officer.
5. Cultivation clause (exceeding 640 acres).—One quarter of the land shall be cultivated within five years, and one-half of the land within ten years from the date of registration of the grant.

No fixed terms have yet been decided upon for roselle, sisal or tea, but special terms would no doubt be granted to any cultivator of these crops on an extensive scale.

A rebate of annual quit rent is allowed, if claimed by the owner of any country land exceeding 10 acres planted with coconuts or any approved agricultural product other than para rubber, tapioca or gambier. The rebate is such as to reduce the rent (normally \$4 an acre on planted land) to \$1 an acre, if the crop is padi, or \$2 an acre if the crop is any other approved agricultural product.

A perusal of the figures in the Appendix C will give rise to the reflection that, except in certain districts of Pahang, the amount of virgin land immediately available for agricultural development on a large scale in the Federated States is becoming limited. There is, however, still plenty of land to be had in Pahang, and in the Unfederated Malay States—Johore, Trengganu, Kelantan, Kedah, and Brunei.

#### STRAITS SETTLEMENTS.

Singapore.—Alienated land in Singapore is held direct from the Crown either by lease or grant. The earliest of the existing titles are for 999 year leases. In 1838 the first of the 99 year leases for land in the town were issued. Subsequently a large number of freehold grants were made outside town limits, but insufficient allowance was made for the town's expansion, so that at the present time land in the most crowded part of the town is held under title originally issued for agricultural land. After 1867 titles issued for both town and country lands were for 99 years or 999 years. Clauses with

the object of securing permanent cultivation are now practically of a uniform type, providing for rebates of rent during the first five or six years on fulfilment of certain planting conditions.

Practically speaking, there remains no unalienated agricultural land on the Island of Singapore.

Unoccupied Crown land is obtainable on leases and statutory grants, which are also being substituted for permits and expired leases. Except in the

Penang.

Dindings, there is very little unoccupied land in the Settlement.

Malacca.

Country land is held under grant or lease from the Crown, and also by customary tenure.

#### UNFEDERATED MALAY STATES.

In 1910 land legislation was introduced similar to that in force in the Federated Malay States. A chapter on Registration

Johore.

of Titles was added to the Land Enactment in 1913, introducing a system of registration of title resembling that obtaining in the Federated Malay States. Steps have been taken to give security of tenure to old occupiers, and to facilitate the work of dealing with new applications. At the beginning of 1925, of the total area of 4,800,000 acres, 1,044,444 acres had been alienated for either agriculture or mining. Forest reserves in the State cover an area of 360,640 acres. Owing to the absence of mountain ranges, the proportion of plantable land in Johore is probably larger than in any other State in the Peninsular. The land administration in Johore is in the hands of the Commissioner of Lands and Mines, assisted by Collectors of Land Revenue at Johore Bahru, Batu Pahat, Muar, Segamat, and Mersing.

The present system of land tenure is that of title by registration given by permission of the Sultan in Council. Small

Kelantan.

holdings are surveyed, and title is by entry in a register, a copy of the entry with a plan being given to the landowner. For large estates grants are issued, a duplicate being filed in the Land Office. In either case the title is possessed in perpetuity, subject to the payment of annual quit rent and the observance of such conditions

of cultivation or special conditions as may be endorsed on the title. All dealings in land must be registered to be valid, and enforcement of the transaction is made on the title. Land rents approximate to those in the Federated Malay States, but there are certain concessions to compensate for the present lack of communications.

In 1914 a Land Enactment was passed in the State which was in effect a crystallisation of precedents and approved procedure, and a consolidation of land regulations.

**Kedah.** Land may, subject to reservations, be held in perpetuity. Titles are, as in other States, subject to conditions ensuring *bona fide* cultivation. Land administration is in the hands of a Director of Lands, who is advised by a European officer known as the Adviser, Lands.

Premium and Land Tax vary according to the nature of land, cultivation, and communications. The Land Tax on large holdings is subject to revision every thirty years. Rents on small holdings vary from 30 cents to \$2 a relong (-71 acre). On large holdings it is \$1 a relong rising in the case of new alienation to \$1.50 or \$2.50 after six years.

Land administration is in the hands of a Commissioner of Lands and Mines. Legislation as regards both mining and agriculture is on the lines of that in the Federated Malay States. It will be only possible to deal with large agricultural applications with difficulty until the settlement of existing rights in land is further advanced. Agricultural land is subject to a premium of \$1 per acre (or a special premium where there is road frontage), and rent of 50 cents per acre, rising to \$1 after 10 years; there is also a 5 per cent. ad valorem export duty on produce.

Land in Brunei is held by entry in a District Register. The land law follows in the main that of the Federated Malay States. The ordinary premium for country land is

**Brunei.** \$1 per acre for rubber cultivation and 50 cents per acre for other cultivation. Double premium is charged when there is a road frontage. Land in or near towns and villages may be subject to enhanced premium. The annual rent for small holdings varies between 40 cents and \$1 per acre. In

areas over 50 acres it is 50 cents per acre for the first six years and thereafter \$2.50 per acre. A condition is imposed on titles to ensure *bona fide* cultivation. Land administration is in the hands of the British Resident, but a beginning is being made with the establishment of District Land Offices.

## CHAPTER III.

### RUBBER.

The history of the birth of the plantation rubber industry is one of the most striking romances of agricultural enterprise.

**History.** Prior to the introduction of para rubber to the East, the world's supply of rubber was obtained entirely from various wild plants, which in many cases were destroyed in order to abstract the rubber. As the demand for rubber grew, the difficulty and expense of satisfying it increased, so that producers were driven even farther into the heart of South America.

There were many plants from which rubber of varying quality was extracted; but it was found that *Hevea brasiliensis*, the present day source of rubber, gave the most satisfactory returns; and moreover, the extraction of the rubber did not necessitate destruction of the tree. A supply of seeds was obtained from Brazil, from which 22 plants in Malaya and a few in Ceylon were established in 1876—1877. The progeny of this consignment is seen to day in the millions of acres under this crop in the Middle East.

In 1905, the rubber plantations of Malaya yielded less than 200 tons, while the jungle product of South America still monopolised the market with about 60,000 tons. From that year the plantation rubber industry made great strides, until nine years later (1914) the plantations of the East—principally Malaya, Ceylon and the Netherlands East Indies—yielded more than was obtained from the American forests. At the present time, about 95% of the world's supply of rubber is obtained from the plantations. The reason for this conquest of the plantation over the jungle product was that systematised production with settled labour conditions proved

more economical, and could, moreover, market a standardised product. Another great consideration which favoured the plantation product was the assurance of a regular supply.

The truly remarkable achievement of plantation rubber is rendered all the more amazing when it is remembered that the world demand for rubber increased from 60,000 tons in 1905 to over 500,000 tons in 1925. Of the total supply of raw rubber, Malaya claims to produce nearly one half, and is still capable of increasing its output.

The present position of countries of production and consumption of rubber may be seen at a glance from the following table.

PLANTATION :—	<i>Production.</i>		<i>Consumption.</i>	
	<i>Tons.</i>		<i>Tons.</i>	
British Malaya ...	286,000	United Kingdom ...	84,900	
Netherlands E. Indies ...	204,000	France ...	38,900	
Ceylon ...	58,800	Germany ...	22,800	
India ...	9,900	Italy ...	10,200	
British North Borneo ...	5,800	Other European Coun- tries ...	20,000	
Sarawak ...	9,200	United States of America ...	400,000	
French Indo-China ...	7,400	Canada ...	20,400	
Siam, etc. ...	4,000	Japan ...	17,000	
Wild—		Australia ...	7,000	
South America ...	24,000	Other Countries ...	4,500	
Other Wild ...	9,000			
<b>Total ...</b>	<b>618,100</b>		<b>625,700</b>	

**Areas.** No accurate figures exist of the area under this crop in Malaya. The following estimate was compiled in 1925.

Federated Malay States ...	1,140,000 acres.
Straits Settlements ...	295,000 "
Unfederated Malay States—	
Johore ...	450,000 "
Kedah ...	185,000 "
Kelantan ...	33,000 "
Trengganu ...	7,000 "
<b>Total for Malaya ...</b>	<b>2,110,000 "</b>

It is possible that the area planted in Malaya since 1925 does not exceed 150,000 acres.

The following approximate areas under rubber exist elsewhere :—

Netherlands East Indies 1,400,000 acres, Ceylon 500,000 acres, India and Burma 130,000 acres, North Borneo, Sarawak and Brunei 120,000 acres, so that the total area of rubber plantations in the Middle East is between four and a half million and five million acres.

The growth of the industry is apparent from the following table of net exports of rubber from British Malaya.

1910	...	6,500 tons.	1919	...	204,000 tons.
1911	...	10,800 ..	1920	...	181,000 ..
1912	...	20,300 ..	1921	...	151,000 ..
1913	...	33,600 ..	1922	...	214,000 ..
1914	...	47,000 ..	1923	...	201,000 ..
1915	...	70,200 ..	1924	...	183,000 ..
1916	...	96,000 ..	1925	...	210,000 ..
1917	...	129,000 ..	1926	...	286,000 ..
1918	...	118,000 ..	1927	...	242,000 ..

Rubber will grow in any district of Malaya. Equally good rubber may be found on the low coastal plains and on the sides of steep hills in the interior. It is found flourishing on well drained land of a peaty nature, amongst rocks on the sides of hills and in hard laterite soil. Its growth becomes somewhat stunted at elevations above 2,000 feet. Rubber will thrive over a wide range of soils, but it is particularly susceptible to temperature and rainfall conditions. It requires an equable tropical temperature and a well distributed and high rainfall. This, with efficient drainage, will ensure successful planting on almost any soil. The conditions suitable for the growth of rubber obtain in Malaya, which takes second place to no country in the world for rapid development of the trees, their general good health, and consistent high yields. Moreover, this country has an additional advantage over many countries otherwise suitable for rubber plantations—that of an easily obtained labour force living in a suitable environment.

Most of the areas at present under rubber were previously in heavy jungle. Naturally, the earlier plantings were on land formerly under other crops, generally sugar, coffee or coconuts. With the rapid expansion of the rubber industry, the planter had perforce to penetrate further into the country. Tracts of land which

Method of  
Planting



but a short time previously had not known the foot of the white man, surrendered their giant trees to the axe, were ruthlessly burnt and rapidly planted with rubber. The Malays, scattered throughout the country, mostly along the banks of rivers, were not slow to profit by the example of this Western enterprise. They planted with rubber such holdings as they possessed, unfortunately often at the expense of their orchards and coconut palms. Rubber planting threatened to encroach on the padi areas, and it was only the firm attitude of the Government that prevented wide destruction of areas under established permanent cultivation.



RECENTLY BURNT LAND.

The Chinese too, followed the white man, organised his labour and planted his own land. Frequently too, he interplanted the rubber with catch crops such as pineapples, tapioca and gambier. The exports of these three products were very considerable in those early days, although to-day, apart from the first named, their importance has diminished.

The method of planting rubber has varied little from the practice of thirty years ago. The land after felling and

burning, or the clearing of noxious weeds if it had previously been cultivated, is holed for reception of the rubber seedlings. The rubber is first planted in a nursery, and transplanted some 9—18 months later. Various systems of planting have been popular at different times.

According to the class of land, from 100—200 trees are planted per acre. As the trees develop they are thinned out until about 60—100 trees per acre remain.

ВЕРУСТАКОВИЯ № 122  
Malaysia



A YOUNG RUBBER ESTATE.

The method adopted in thinning out is the elimination of diseased trees, those of poor growth, and those trees that, although vegetatively good, fail to yield sufficient rubber latex.

From the time of planting until the trees come into bearing there is little cultivation except eradicating noxious weeds, draining the land where necessary, carrying out measures to reduce soil erosion and preventing epidemic attacks of disease. It is the practice on most estates to-day to plant the area under rubber with close-growing cover crops, generally leguminous plants destined to improve the soil and prevent its erosion by the heavy rainfall. It cannot be emphasised



RUBBER ESTATE: SHOWING METHOD OF PREVENTING  
LOSS OF SOIL ON ACCOUNT OF HEAVY RAIN.

too strongly, however, that it must not be expected that such cover crops will reduce weeding expenses; on the contrary, they necessitate increased vigilance to combat the stealthy development of weeds.

Rubber comes into bearing in from 5 to 6 years from planting. The possibility of tapping must depend less on the age of the tree than on its development. The following table\* indicates the average increase in girth of rubber trees.

GROWTH IN GIRTH OF RUBBER TREE AT 3 FEET FROM THE BASE.

1st year	... — inches.	11th year	... 60 inches.
2nd	... 9	12th	... 66
3rd	... 14	13th	... 72
4th	... 20	14th	... 78
5th	... 24	15th	... 80
6th	... 30	16th	... 82
7th	... 36	17th	... 84
8th	... 42	18th	... 86
9th	... 48	19th	... 88
10th	... 54	20th	... 90

\* Compiled by Mr. Ridley, late Director of Gardens, Singapore.

Tapping may be commenced when the tree has a girth measured twenty inches up from the collar of twenty-two inches.

Perhaps no detail of rubber production has so completely changed as that of the system of tapping. Moreover, the change of policy has resulted in an immense improvement in the health of the tree, with no appreciable diminution in yield. Previously, several superimposed cuts were made on as much as half the circumference of the tree. The result was general weakening of the tree and



AN OLD METHOD OF TAPPING.

insufficient bark renewal. Compare this method, of which an illustration will be found, with the two most general methods now adopted, the single V over half the circumference tapped on alternate days, and the single cut over one-quarter of the circumference tapped daily. Other systems exist, such as a



RUBBER ESTATE: METHOD OF TAPPING.

single cut over one third of the circumference, alternate day tapping: and various methods whereby the trees are rested

for periods up to four months in the year. It will be seen, however, that whatever the present method, each is designed to give the bark ample time to renew and to prevent overtaxing the vitality of the trees.

The rubber tree, from the time of first tapping, will annually give increased returns of rubber up to about the ninth year.



RUBBER ESTATE: METHOD OF TAPPING.

The following is the average annual yield as computed for the valuation of estates in Malaya.

5-6 years.	150 lbs. dry rubber (first quality) per acre.			
6-7	240	..	..	..
7-8	320	..	..	..
8-9	400	..	..	..

increasing possibly up to 500 lbs. per acre.

There are, of course, estates and portions of estates which give higher yields than the above maximum, and it may be expected that, with improvement of the trees themselves, planting methods, cultivation and tapping, even higher yields may be expected in the future on well-conducted estates. A few words will suffice to deal with the treatment of latex.

Generally, the rubber latex, of the consistency and appearance of milk, is taken direct to the factory, where, after placing it in tanks or pans, it is coagulated by the addition of a small quantity of acetic acid.

The coagulum is put through rollers, washed, and either smoke-dried (smoked sheet) or rolled into thin long strips (crepe) and air dried. Other methods are adopted for special markets,



RUBBER FACTORY.

*i.e.*, export of latex as such, concentrated latex, dried latex, block rubber, etc.

The cost of planting rubber varies according to the class of land to be opened, the labour demands at the time, and the accessibility of the site. Less accessible areas are more expensive to open, since labour demands compensating rates for isolated districts, and transport costs are higher. Fortunately transport is not such a serious item as was anticipated, owing to the development of roads and the use of light motor lorries.

It is impossible to be dogmatic on capital cost: it depends not only on the above factors, but on the area to be planted (the greater the area the smaller the over-head charges), the rapidity of development (the more rapid, the cheaper it becomes), and the degree of efficiency aimed at. The necessity for such works as drainage, extra cultivation, and contouring hills, must also be taken into account. In round figures, on land representing average conditions obtaining in Malaya, it may be estimated that an acre of rubber can be planted and brought into bearing, *i.e.*, upkept to the fifth year from planting, at a cost of from £50—£60.

This figure is confirmed by the following estimate of capital cost made by a well-known planter.

1st year	...	...	...	...	£18	per acre.
2nd "	...	...	...	...	12	"
3rd "	...	...	...	...	6	"
4th "	...	...	...	...	6	"
5th "	...	...	...	...	5	"
6th "	...	...	...	...	15	"
Total	...	...	...	...	£62	

The same authority gives it as his opinion that a block of 250 acres may be regarded as about the smallest unit which can support an owner manager, who would be wise, however, to secure an area of at least 700 to 1,000 acres in the first instance, to permit of expansion at a later date. The minimum economic unit will depend on the capital cost, and the market price of rubber.

A considerable area of land still exists in Malaya ideally suitable for rubber cultivation. Practically the whole of



Selangor and Negri Sembilan, apart from Forest Reserve, are alienated, and most of the former State planted up. Much of Negri Sembilan is planted, but it might be possible to purchase alienated land. Suitable land exists in the North of Perak. There should be considerable areas of suitable land in Pahang, especially, above Kuala Lipis, which country is rapidly becoming more accessible owing to railway development into Kelantan. Johore, Kelah, Kelantan and Trengganu all contain areas of land not yet alienated, which may be obtained from Government on favourable terms.

The livelihood of many owners of small holdings in Malaya depends on the sale of their rubber; they must therefore tap their trees and sell rubber, irrespective of market prices, in order to satisfy their daily needs. Production costs therefore do not enter into the question so far as their personal holdings are concerned.

The case is otherwise with larger plantations where the question of cost of production is of even greater importance than that of capital cost. Production costs depend upon many factors, and the effect of the combination of these factors is quite beyond the scope of the present article. Amongst the more important factors are age of trees, area in bearing, and local labour conditions. The application of the Government scheme of restriction during the past six years makes it impossible to give up-to-date figures of normal costs of production on an estate without such restriction. During the last decade there has been an undoubted downward tendency of cost of production. The pre-restriction average figures of all-in production costs per lb. (reviewing a number of sterling Companies in Malaya) were 13-12d. in 1919, 14-48d. in 1920, 10-70d. in 1921, 8-43d. in 1922.

The London market price in pence per lb. for the past few years has been as follows:—  
 1923, 15-50; 1924, 13-84; 1925, 34-72; 1926, 23-87, 1927, 18-46.  
 It will be observed that there have been considerable fluctuations in price. This has, in fact, been a feature of the rubber industry since its commencement. It is a feature which is almost inevitable in an industry which makes rapid expansion.

Now that a period has arrived when supply and demand approximate more closely, it is unlikely that such wild fluctuations will recur. It must be recognised, too, that the cost of production frequently varies according to the price of rubber, a low price necessitating various economies in order to adjust production costs with selling price. Whether many of these so-called economies are really such is a questionable point, for undoubtedly too drastic economy is frequently reflected in permanent damage to the estate. On the other hand, very real economies have been effected during the past few years. They have been brought about not only by improved methods of tapping, but by the general improvement of the soil and consequent improvement in the health of the tree, by more efficient methods of thinning out of trees, and by improved factory methods.

The cost of production has been influenced by the Government Scheme of restriction on the quantity of rubber exported from countries under direct British influence.

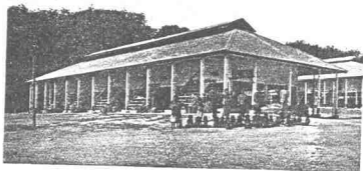
**Rubber  
Restriction.**

Owing to the general trade depression which affected rubber in common with other industries, the rubber producing industry was threatened with a crisis in 1921. Ultimately the Government put into force a scheme for restricting the amount of rubber which might be exported, based on the age of each particular block of rubber, and the market price of the commodity. The object was to narrow the difference between production and consumption, thereby dissolving the excessive amount of rubber on the market, and stabilising the price of the raw material. Unfortunately the application of this Scheme was followed by two unforeseen developments, viz., an encouragement of the rubber reclaiming industry in America which ultimately nullified the efforts to reduce the stock of raw material, and the impetus to increased planting and production in the Netherlands East Indies, which were outside the scheme. On account of these two factors the scheme was abandoned in November, 1928.

In time to come the Restriction Scheme will be chiefly remembered by the beneficial change of policy which it encouraged—the more conservative systems of tapping. This

new policy has revolutionised our ideas of the economic life of the rubber tree, and instilled its lesson permanently into the industry.

Side by side with the developments of rubber manufacture, and the constant application of this article in the manufacture of new ranges of rubber goods, scientists have studied the various phases of rubber production from the tree to the finished article. This, in conjunction with the greatly increased experience of planters—a cumulative experience, be it noted—has led to closer attention to the treatment of the soil, more efficient systems of tapping, preparation of a high and more uniform grade of rubber, marketed under better conditions and with due regard to the economics of production, so that, in spite of a better paid and better housed labour force, the improvements in the factory, and the payment of more experts, a better quality rubber can be produced at a lower cost than hitherto. The march of science and practice has not faltered. The industry has



LABOUR LINES ON A RUBBER ESTATE.

recently established a Rubber Research Institute in Kuala Lumpur, the Capital of the Federated Malay States, with a staff of some 20 trained scientific workers who are engaged in investigations directed towards further improvements.

Science has carried the industry through the critical stages of its development, over the period when unknown epidemic diseases appeared in the dense population of trees, when the maximum economic age of the trees appeared imminent, when yields threatened to decline. Most of the diseases may be cured if treated in time, and the spread of any disease may be prevented by methods that entail no large expenditure of money. Moreover, the industry is as far as ever from a knowledge of the economic life of the tree, a lack of knowledge due to better methods of tapping and closer attention to soil conservation and improvement.

In addition to the questions of cultivation, pests, diseases, and manufacture, science has given attention to the problem of improving the nature of the tree itself. The results of recent work on bud-grafting point to a further important advance in the industry. If expectations are realised, future generations of rubber trees will be produced by bud-grafting from selected high yielding trees and will in consequence themselves be capable of greatly increased yields of rubber. If such increased yields prove to be sustained during the life of the tree, they may revolutionise the practice of rubber production and, by reducing the cost of production to a new economic level, may result in the application of rubber to a multitude of uses which would otherwise be impossible.

This brief survey of an important industry cannot pretend to treat the subject as exhaustively as it deserves. The reader who wishes to peruse the subject more deeply is advised to study the literature of the Department of Agriculture and the publications of the Rubber Research Institute.

## CHAPTER IV.

### COCONUTS.

The graceful coconut palm may be found scattered throughout the Malay Peninsula, for wherever a Malay settles he plants coconuts: coconut palms date the birth of his children, besides supplying food, drink, fuel and many other necessities

of life. The coconut plantations are situated along the low coastal plain and near the banks of rivers. The principal areas in which this crop is to be found are:—Penang, Province Wellesly, Krian, the Dindings, the Bagan Datoh district of Lower Perak, along the coast from the Bernam River to Sepang in Selangor, and the coastal districts of Pahang, Johore and Kelantan.

Malaya, being outside the hurricane belt, and possessing rich soil near the sea, with a well distributed rainfall of about 90 inches per annum, may justly lay claim to suitability for coconut cultivation. In rapidity of maturity, quality of the nuts and cost of production, there is no country which can surpass Malaya. The following comparison of the coconuts grown in Malaya and in the West Indies is of interest in this connection.

	<i>Malay Nuts. Per cent.</i>	<i>West Indian. Nuts. Per cent.</i>
Husk ... ..	34	57
Milk ... ..	24	12
Shell ... ..	12	13
Meat ... ..	30	18

The Government is anxious to encourage the cultivation of



COCONUT ESTATE: NEWLY OPENED LAND BEING CLEARED  
(Note band at back to keep out flood water.)

coconuts, for which reason specially favourable terms are offered to approved applicants for land.

Land suitable for coconut cultivation is limited, but may still be procured, especially in the Unfederated Malay States.

Copra, the dried kernel of the coconut, was first exported from Malaya to Europe about 1850, but it is said not to have become an important article of export until 1870. The industry has made rapid strides during the last decade, and in addition to copra there is a growing trade in locally extracted oil. The importance of the crop may be seen from the following table of net exports of copra and oil.

Net exports and value of copra and oil from British Malaya.

Year.	Quantity (tons).	Value, £.
1925 ... ..	96,554	2,246,346
1926 ... ..	104,653	2,570,626
1927 ... ..	86,649	1,948,520

The decrease in 1927 is said to be due to exceptional weather conditions, and in part to the increased amount of oil expressed locally. It must be remembered that the local consumption of oil is considerable.

The total area under coconut cultivation in British Malaya in 1924 was estimated at 492,000 acres, distributed as follows:—

	F.M.S.	S.S.	U.M.S.
Perak ...	75,000	Singapore ... 6,000	Johore ... 92,500
Selangor ...	62,000	Malacca ... 45,000	Kedah ... 27,500
N. Sembilan ...	7,000	Dindings ... 6,000	Kelantan ... 71,000
Pahang ...	19,500	P. Wellesley 55,000	Trengganu ... 8,000
		Penang ... 15,000	Perlis ... 2,500
	<hr/> 163,500	<hr/> 127,000	<hr/> 201,500

The remarkable fact is that, in spite of the long established popularity of coconuts amongst European planters and the excellence of plantations in their charge, two-thirds of the total area is held by natives in small holdings.

Coconut oil has many uses; it is utilised in the manufacture of margarine, soap and candles. Several by-products are obtained, chief amongst them being the outer fibre, from which coir is prepared, and "poonac," the residue from the expression of the oil, a valuable cattle food.

The variety of coconut grown in Malaya is the ordinary-giant type. Of recent years a prolific dwarf type has received some notice. The dwarf variety is more closely planted, matures earlier and has a shorter life than the giant variety. The following comparison of the two types may be of interest.

		<i>Ordinary type.</i>	<i>Dwarf type.</i>
5th year.	Number of nuts per palm	5	30
10th	" " " "	25	100
	Yield of copra per acre in pikuls (133 lbs.) of copra		
	after 10th year	9	16
	Number of nuts per pikul of copra	250	500

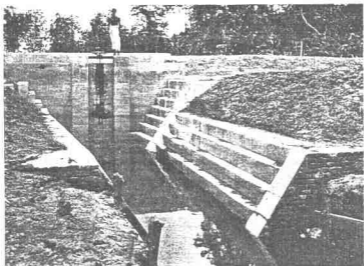
It must be remembered, however, that the cost of producing copra is higher when a large number of nuts has to be handled.

Coconuts flourish on the low alluvial soils near the sea. The problem of first importance therefore is drainage. This

*Cultivation.* frequently entails not only getting off excess water, but keeping out tidal water by means of flood gates and dams. Drainage is frequently the most expensive item in upkeep charges, but no coconut estate can be successful



COCONUT ESTATE: A BUND TO KEEP OUT FLOOD WATER.



COCONUT ESTATE: WATER GATE TO KEEP OUT TIDAL WATER AND ALLOW DRAINAGE.



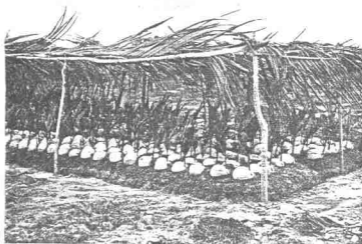
COCONUT ESTATE: DIGGING A FIVE-FOOT DRAIN.



unless drainage is deep and perfect. The main drains are frequently dug before the jungle is cleared, to dry the land as much as possible before felling is commenced.

The land has then to be felled, burnt and cleared. It is often the practice to establish a low growing cover crop as soon as possible.

Nuts from mature palms are grown in a nursery and are ready for transplanting about six months later. They are



COCONUT ESTATE: FIVE MONTHS OLD SEEDLINGS IN NURSERY.

planted in the field 48 palms per acre (Dwarfs 90 palms per acre). After-cultivation around the roots of the trees is very advantageous, especially in the early stages of growth.

When the trees reach the bearing stage, between the fourth and sixth year (fourth year with Dwarfs), the ripe nuts are collected every two to two and a half months. The average yield from mature palms is about 40-50 nuts per tree per annum, or approximately 2,500 nuts per acre per annum. The palms are in full bearing by the 10th year. Two weeks



COCONUT ESTATE : PALMS 18 YEARS OLD.



COCONUT ESTATE : REMOVING THE HUSK.



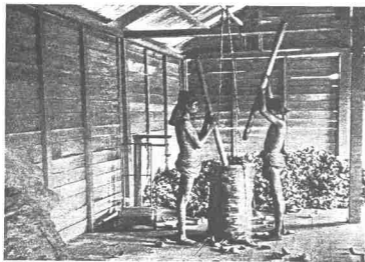
COCONUT ESTATE : OPENING THE NUTS.



COCONUT ESTATE : REMOVING THE "MEAT."



COCONUT ESTATE : COPRA KILN.



COCONUT ESTATE : BAGGING COPRA.

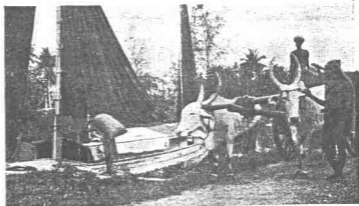
after harvest the nuts are husked, split in half, and exposed to the sun until the kernel can be easily removed. The kernel is then sun-dried or dried in kilns.

Messrs. Munro and Brown estimate the following yields from a well run coconut estate:—

6th year.	...	...	...	500 nuts per acre.
7th ..	...	...	...	1,000 .. ..
8th ..	...	...	...	1,500 .. ..
9th ..	...	...	...	2,000 .. ..
10th ..	...	...	...	2,000 .. ..
11th ..	...	...	...	2,350 .. ..
12th ..	...	...	...	2,500 .. ..

The problem of transport from the coconut estate to the port is of considerable importance. This may be appreciated

from the fact that the cost under this heading for Transport. 16 estates analysed varies from one penny to one shilling per pikul (133 lbs.). In addition, there is a considerable item for transport of the nuts from the field to the factory.



COCONUT ESTATE : TRANSPORT OF COPRA FROM FACTORY TO RIVER.

This cost may be reduced to a minimum by the use of canals along which the nuts may be floated to the factory, and by so placing the factory as to reduce the distance of transport of nuts from different parts of the estate.

Copra contains from 68 to 72 per cent of oil. As the cake remaining after extraction of the oil is a valuable feeding stuff for animals, in which a proportion of oil is a valuable constituent, coconut oil is almost always obtained by the method of expression, the yield of oil under these conditions being about 62—64 per cent of the copra.

Prior to 1914 the price of copra stood for many years at a low level. The war brought abnormally high prices, while post-war conditions have proved favourable for the industry. The future appears favourable, as there is no likelihood of over production. It is, however, possible that large supplies of other suitable oils might influence the future prices of copra.

The following are the prices per ton of copra and coconut oil during recent years.

	1921.	1922.	1923.	1924.		
Copra, per ton ...	£30 12 11	£24 15 6	£27 17 11	£29 15 2		
.. .. .		1925.	1926.	1927.		
.. .. .		£30 4 9	£28 11 11	£27 7 11		
Coconut oil,* per cwt. ...	1921. 1922.	1923.	1924.	1925.	1926.	1927.
.. .. .	47 6 38 3	43 6	46 9	48 3	46 3	45 6

The cost of bringing a coconut estate into bearing may range from £40—£50 per acre, according to the district, labour, nature of land to be developed, and administration. Since the margin between profit and loss is comparatively narrow, a successful coconut estate entails most careful economy, which can be more easily effected on large areas than on small estates.

The following running costs are compiled from an average of 16 representative estates :—Capital cost per acre £54 15s. 0d.; F.O.B. cost per pikul (133 lbs.) 13s. 2d.

With a crop, when in full bearing, of 40 nuts per palm per annum, standing charges and crop charges will amount to approximately £10 10s. 0d. per ton. On the basis of a capital cost of £40 per acre, this will yield a dividend on capital of about 10% per annum.

\* June price of F.I. Ceylon coconut oil.

In conclusion, coconut cultivation in Malaya may be recommended as a sound investment giving an assured 10% dividend on capital at post war prices of copra.

There have been notable improvements in cultivation and treatment of the crop during the past few years, which are reflected in the greatly increased exports from this country. Closer attention is now being directed to preliminary selection of varieties and the planting of new areas from high-yielding trees, as it has been found that there is a great difference between the best trees and the poorest yielders on an estate. The gradual elimination of poor trees and replacement by high-yielding trees will considerably improve the returns from Malayan coconut estates in the future.

## CHAPTER V.

### OIL PALMS.

The oil palm, a native of West Africa, was introduced into British Malaya about the year 1875, but it was 35 or 40 years later that the first serious attempt was made to cultivate the crop on a plantation scale. Of recent years the successful cultivation of oil palm under plantation conditions has attracted considerable attention in Malaya and the Netherlands East Indies, and judging from planting programmes in hand or under consideration, it is probable that the area will increase at an accelerated rate in the future. In fact it is not outside the bounds of possibility that plantation oil palms will attain the same relation to the wild product in Africa as plantation rubber has achieved to the wild Brazilian product. It is estimated that from present areas already planted in the East the palm oil production in 1936 will exceed 100,000 tons per annum, so that the product in course of time is bound to exercise a considerable influence on the oil market.

There is no doubt that the climatic and soil conditions of British Malaya are particularly suited to the cultivation of this crop: it is, in fact, stated that palms grow more rapidly and luxuriantly in Malaya than in West Africa.

By 1920 1,000 acres had been planted with oil palms in British Malaya: this was increased to over 6,000 acres by 1924, and to nearly 13,000 acres in 1926, while the 1927 returns showed that the total planted acreage in Malaya was 19,321. The amount of reserve land held by oil palm estates is 20,000 acres, while the Government has ear-marked for alienation for the cultivation of this crop a further 100,000 acres.

At the end of 1927 there were 25 oil palm estates in Malaya, of which three had over 2,000 acres planted, four had between 1,000—2,000 acres planted, and 10 estates between 400—800 acres planted with oil palms.

Up-to-date machinery has already been installed on four estates which have come into bearing. Palm oil and palm kernels were first exported from Malaya in 1923, in which year production was 195 tons of the former and 50 tons of the latter, rising to 915 tons of palm oil and 185 tons of palm kernels in 1927. A considerable increase in exports was anticipated during the year 1928.

From the above facts it will be realised that the oil palm has come to be regarded as a crop of major importance in British Malaya.

The palm favours a loose alluvial loam overlying a friable clay sub-soil. Heavy stiff clays, very deep peat, strong laterite and sandy soils are unsuitable for the cultivation of this crop. There are considerable areas of land in several States in Malaya which fulfil these requirements, and in order to encourage the cultivation of this crop the Government alienates land for the purpose on especially favourable terms.

Soils.

The palm fruit, which occurs in bunches varying according to the age of the palm from a few pounds in weight to over 100 lbs. each, yields two distinct oils. Palm Oil is obtained from the outer flesh or husk (pericarp). On the inner side of the pericarp is a hard shell, which contains the second commercial product, the kernel. This is exported as such, the oil being expressed in mills in Europe and elsewhere. Palm oil is at present largely used in the manufacture of soap and candles, and in the tin plate

Products of  
the Oil Palm.



industry. In the future, however, when large and regular shipments of high quality oil are forthcoming, it is anticipated that its most important use will lie in the preparation of edible fats. The kernel oil is used for edible purposes, the residual cake being marketed as a feeding stuff for cattle. On the estate remain the fibre after extraction of the palm oil and the shells: these are used as an economical fuel for the factory boiler.

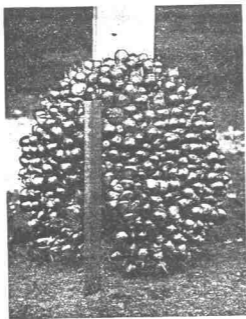
The palm seed is germinated in sand beds, from which it is transferred to the nursery as soon as germination has commenced. The length of time necessary for germination depends upon the age of the seed and the attention given to the seed in the bed. With fresh seed the bulk will have germinated in about four months.

The nursery bed should be well cultivated before the reception of the seedlings. The seedlings are placed about 18—24 inches apart in the nursery, and are ready for transplanting in the field about nine months to a year later. This long period in the nursery should be kept in view in making



OIL PALM ESTATE : ABOUT EIGHT YEARS OLD.

plans to develop an oil palm estate: the planting up of a nursery should be completed as soon as possible in order to avoid delay in developing the estate. In the absence of an adequate supply of seedlings, it will pay to purchase nine months old plants rather than suffer delay. It must be remembered that it pays to develop rapidly, for by so doing, the economic area comes into bearing at one time, and overhead charges are reduced.



A BUNCH OF OIL PALM FRUIT.

The plants from the nursery are transplanted in the field in such a way as to give a stand of from 48 to 55 palms per acre.

Subsequent upkeep of the estate involves weeding, drainage, measures to prevent soil erosion, the establishment of a cover crop, and the control of diseases and pests, particularly rats.

The oil palm commences to bear fruit about the third year,

but it is not advisable to commence regular harvesting until the end of the fourth year. At this time resort to artificial pollination, as many bunches will otherwise be found unfertilised, though care must be taken not to overtax the trees by this method of obtaining numerous large bunches of fruit. The practice of artificial pollination becomes less necessary as the trees increase in age.

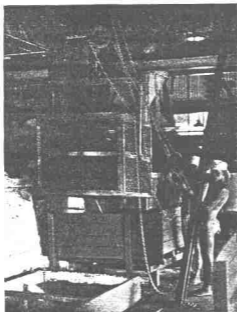
When ripe, the fruit is cut : it should be transferred to the factory without undue delay or damage if an oil of high quality is to be obtained, since delay or bruising result in an increase in acidity. These precautions ensure an oil of high quality.

In the factory the fruit is sterilised and the oil extracted as soon as possible, with the object of ensuring a high grade oil, *i.e.*, one which contains a low percentage of free fatty acids.

There is a choice of two methods for extracting the pericarp oil ; the centrifugal system, which has been adopted with



OIL PALM ESTATE: METHOD OF TRANSPORTING FRUIT TO FACTORY.

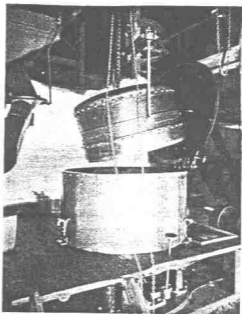


OIL PALM FACTORY: CAGE CONTAINING FRUIT IS  
STERILISED IN HOT WATER.

success in Malaya, and the press system, which is more usually practised in Sumatra.

The sterilised fruit is digested and removed as a hot pulpy mass to a centrifugal extractor, in which it is rotated at a high speed in order to separate the oil. The method in practice gives a percentage recovery of from 85 to 87 per cent. of the oil, the pericarp of the oil palm containing about 30 per cent. of oil.

After extraction of the pericarp oil, the residue is removed and dried. The fibrous matter is separated from the nuts by screening, the nuts then being cracked by means of a centrifugal cracker. The broken shells are separated from the kernel in a bath containing a suspension of clay in water, which allows the shells to sink and the kernels to float. The latter are removed and dried, after which they are ready for market.



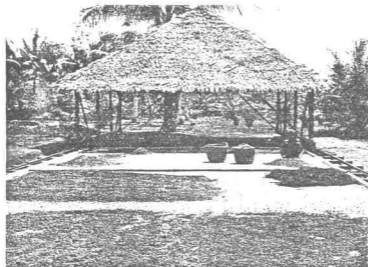
OIL PALM FACTORY : THE CENTRIFUGE WHICH EXTRACTS THE PERICARP OIL.

The oil from the centrifuge is subjected to certain manipulation with the object of eliminating the solid impurities and water, after which it contains from 2.5%—5% of free fatty acids, compared with 18% and upwards in the West African product.

The result of this care in preparation is that the plantation product commands the highest price, as it may be employed for particular purposes to which the lower grade oils are unsuitable.

Palm oil is exported in barrels, and the kernel in sacks.

There has been much controversy regarding the minimum unit which will prove profitable. Although an area of 2,000 acres is considered the minimum unit which can be worked economically by a company, it is possible for a private individual, with no overhead charges, to obtain satisfactory



DRYING KERNELS.

results from a much smaller area. It is wise to have a reserve of land for extending the area, while machinery may be obtained which may be extended by the addition of units to provide for the treatment of the crop from increased areas.

Assuming no difficult labour problems, the "all in" cost of production should not exceed £25 per ton for palm oil, and £10 per ton for kernels.

In order to form an estimate of the possible returns from an estate in full bearing, the price of plantation palm oil may be taken as £35 per ton and that of palm kernels as £20 per ton, c.i.f. European or American ports.

Taking as a basis for calculation (a) an annual yield of 16 cwts. of palm oil and 4 cwts. of kernels per acre (b) an average "all in" cost of production of £25 per ton of palm oil and £10 per ton of kernels and (c) a selling price of £35 per ton for palm oil and £20 per ton for kernels, the estimated annual profit per acre will be as follows:—

ANNUAL YIELD.		
16 cwts. of palm oil at £35 per ton	=	£28 0 0
4 .. .. kernels at £20 per ton	=	4 0 0
		£32 0 0
COST OF PRODUCTION.		
16 cwts. of palm oil at £25 per ton	=	£20 0 0
4 .. .. kernels at £10 per ton	=	2 0 0
		£22 0 0
Annual profit per acre	=	£10 0 0

These figures indicate that, even after allowing for a moderate estimate of the annual yield and a liberal estimate for the cost of production, there is a margin of profit of £10 per acre per annum : thus on a capitalisation of £45 per acre, the amount considered necessary to bring an estate into full bearing, an annual profit of £10 per acre is equivalent to a return of approximately 22 per cent. on the capital outlay.

## CHAPTER VI.

### CATCH CROPS.

Systems are devised from time to time to utilise the land to advantage between the planting of the main crop and its coming into bearing. Crops such as rubber, oil palms and coconuts, which carry from 40—100 trees per acre, may reasonably be expected to be adaptable to this system. In point of fact, a very large area now under mature rubber was planted with catch crops such as tapioca, pineapples or gambier. In this way Chinese planters of slender means have sometimes been able to pay the entire capital cost of the establishment of the main crop by means of the profits on the catch crop. Undoubtedly, unless very special care is exercised, the main crop may be retarded in growth, and be as much as two or three years late in reaching the bearing stage, but it is surely sound economy to admit this fact, if it is possible to reduce the capital cost by an amount at least equal to the profits which would be procured by the main crop in two years of full bearing.

One of the first plants to be used as a catch crop was gambier, at a time of good prices. The price to-day, however,

makes this crop unremunerative for the purpose. Tapioca has always been a favourite crop amongst Chinese for this purpose, and several factories are still in operation in Kedah and Johore, in districts recently opened by them for rubber cultivation. The use of pineapples as a catch crop is discussed



A FIELD OF PINEAPPLES INTERPLANTED WITH COCONUTS.

in another part of this book, and it is therefore only necessary in this place to record their suitability. Other crops which are sometimes used are coffee, tuba (from which an insecticide is prepared), groundnuts, and fibres such as roselle.

With a suitable catch crop it may be affirmed that it is possible to reduce the capital cost of the main crop, and that the ultimate removal of the catch crop often results in a thorough cultivation of the soil. On the other hand, care has to be taken, particularly when tapioca or pineapples are planted, to guard against impoverishment of the soil, by preventing erosion, by limiting the number of crops harvested, and by allowing for applications of manure sufficient at



least to replace the food material removed from the soil by the catch crop.

#### PINEAPPLES.

The canned pineapple industry of Malaya is one of considerable importance. The export in 1927 amounted to over 40,000 tons valued at one million sterling. The distribution of these exports was as follows :—

United Kingdom 84%, British Possessions 9%, Europe 2½%, the U.S.A. nearly 2%, and other countries 2½%. The place which fruit is taking in the daily diet of the population of the United Kingdom has assumed growing importance during the last few years : in 1912 the consumption was 1.2 lbs. per head, whereas in 1924 it had increased to 4.5 lbs. per head.

The popularity of Malayan pines is enhanced by the fact that the local industry has established a strong position in the market by producing an article of recognised delicacy and quality, at a price at which other canned fruits cannot compete.

Among the chief reasons that make possible this low cost of production are the suitability of the country for this crop and an adequate supply of inexpensive labour.

The variety of pine most commonly grown for canning is a "Queen" type, very similar to the "Red Jamaican Pine" of the West Indies. The fruit is small, weighing from 3 to 5 lbs., and has an excellent flavour when canned.

The pineapple will grow on most soils, provided they are well drained, but it is most commonly planted on undulating land with a medium loamy soil. A rich soil tends to development of the fruit at the expense of flavour.

Suckers obtained from the base of the fruit are placed in the field in rows five feet apart, so that about 3,000 plants are required per acre. The ground is kept in a state of good cultivation for 18 months, by which time one fruit per plant may be expected. Subsequently the yield will increase to an average full production of 4,000 to 5,000 fruits per acre per annum. With good management the plants continue to yield for 5 or 6 years, after

Planting and  
Harvesting.



PINEAPPLES INTERPLANTED WITH RUBBER.

which replanting becomes necessary. In actual practice, pineapples are treated in Malaya as a catch crop for rubber, and persist for about five years after which the heavy shade then cast by the rubber trees weakens the pineapple plants and renders necessary their removal.

Most of the estates cultivated with rubber and pineapples are owned by Chinese and run on a "Squatter System" under which the entire work from planting until the rubber comes into bearing is carried out by the labouring class Chinese settlers in return for the right to the proceeds of the pineapple crop. Each squatter and his family usually undertake about 15 acres.

The Pineapple "packing" industry is in the hands of a few Chinese, most of whom are also the owners of the plantations from which the pines are obtained.

On receipt of the pineapples at the factory they are graded, cut into whatever form is desired, and placed in tins with sugar syrup. The tins are soldered up and plunged by the tray-load into boiling water for ten minutes or more. On removal, the tins are punctured to allow the escape of steam,

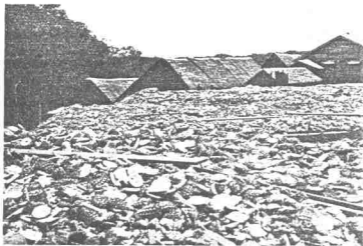


COLLECTING PINEAPPLES FOR THE FACTORY.

resoldered, and again plunged in boiling water for a short time. They are then ready for packing and export.

There are eleven factories at present working in Malaya, eight of which are in Johore, two in Singapore and one in Selangor. It is estimated that a factory requires about 3,000 acres of pines, but even then there are periods of "off" season, when the factory is practically closed down. The main cropping seasons are May—June and November—December.

Three recognised grades are prepared: "Golden Special," "Fair Average Quality," and "Number 2." These grades are made up in a multitude of forms, such as chunks or cubes, slices, whole, squar tins and tall tins, while the tins vary in capacity from  $1\frac{1}{2}$  lb. upwards. It is not generally recognised that pineapple canning entails an enormous waste of fruit in the form of parings, core, unripe, damaged or over-ripe fruit. It is estimated that two thirds of the fruit which enters the Malayan pineapple factory leaves it as waste. The accompanying illustration of such a heap



PINEAPPLE WASTE FROM THE FACTORY.

will convince one that the canning of pines calls for great care in harvesting and treatment in the factory in order that the product may retain its standard quality and continue to enjoy the confidence of the English market.

It is most difficult to form an estimate of the local cost of either production or canning of pineapples. This is accounted for by the fact that the Chinese are able to employ systems of labour management of their countrymen which are quite impossible of imitation. The facts remain that for many years the pineapple area has been sustained and that a very considerable area of land now under rubber was brought into bearing with pineapples as a catch crop. That the Chinese find the system remunerative is undoubted, but whether western methods would be equally successful is perhaps open to doubt. Without going into details, there appears to be good ground for believing that a European Company, developing an area of about 5,000 acres of suitable land, could establish a permanent pineapple estate with an up-to-date factory and work at a profit.

Commercial  
Possibilities.

The present Chinese system is extremely wasteful in labour and fruit. The waste from the factory in Malaya is discarded, whereas western enterprise would utilise this material for the preparation of alcohol and cattle food, while labour-saving devices would eliminate much confusion and delay in the factory.

The canned fruit trade is susceptible to many influences. The main consumer of the Malayan pineapple is the man of slender means; if times are bad, he may have to forgo the luxury of canned pines. Furthermore, the fruit trade in general is influenced by the weather, there being a much stronger demand in a good summer than in one of unsettled weather. The present price of canned pineapples in Singapore is about \$4.50 per case, a price, packers state, which allows them but a small margin of profit. It is probable that, with the present trade revival in Great Britain and the fact that circumstances deny the possibility of any large extension of the pineapple canning industry in the few important countries that at present compete in this market, the demand for the commodity will improve; and Malaya will continue the steady development of this industry.

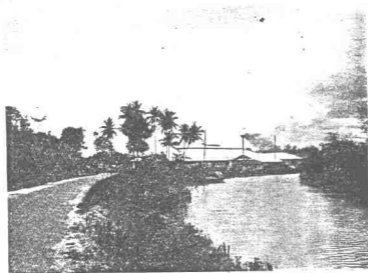
In passing, it is of interest to mention that at the instigation of the Government packers and exporters are combining voluntarily to institute new departures which will ensure that all canned pineapples from Malaya shall be of a standard quality, thereby protecting the consumer against inferior brands being passed as the produce of Malaya.

A point still far from universally recognised is the manner in which pineapple operates to enhance and improve the flavours of other ingredients with which it may be compounded. The attention of the public is directed to a booklet issued by the Malay States Information Agency, giving 50 recipes for the preparation of tasty and distinctive dishes in which pineapple plays an important part, and experimentation will doubtless evolve many others in addition.

## TAPIOCA.

The Chinese in Malaya have been the great pioneers of the tapioca industry. Until about 20 years ago they were able to acquire large areas of virgin land, which, after clearing, they planted with tapioca, either alone or as a catch crop with rubber. Prior to the introduction of rubber tapioca was treated by them as a sole crop. After about three crops of roots had been removed from the soil the land was abandoned owing to exhaustion, and new areas of jungle were taken into cultivation. The land so abandoned proved an embarrassment to the Government, as it was unprofitable to develop it again until after the lapse of many years, during which period it disseminated noxious weeds and harboured locusts. In consequence the Government forbade the cultivation of tapioca, a ban which has now been removed subject to a guarantee by the holder of the land that the tapioca will be treated as a catch crop, or adequate precaution taken to prevent soil erosion.

The tapioca of commerce is extracted from the large tuberos



A TAPIOCA FACTORY.

roots. Its preparation therefore involves the erection of a factory. This is, however, of an easily portable nature, so that as the old lands are given over to the permanent crop of rubber, the factory can advance into the lands newly opened and therefore planted with tapioca.

British Malaya has for a number of years exported large quantities of tapioca. At the present time there are about 25,000 acres under this crop, mostly situated in the Unfederated Malay States, which are less developed than the Federated Malay States. The net export of tapioca in 1927 was 27,000 tons, valued at nearly £400,000.

Where tapioca is used as a catch crop with rubber the cost of planting the catch crop is about \$5 (say 12 shillings) per acre.

Little subsequent cultivation is necessary, the first crop of about 9 tons per acre being ready for lifting from fifteen to eighteen months after planting. A second crop is planted immediately, which in fifteen months produces another 9 tons of roots. If subsequent crops are planted the yield declines considerably, unless the planter has recourse to manuring, which is unusual.

Six tons of root will produce approximately one ton of flour, a production which is, however, influenced by the ripeness of the roots. A factory, to work at full capacity, generally requires at least six tons of roots per day.

The roots are washed and macerated in a pulping machine. The pulp is carried in a stream of water to a hexagonal gauze sieve which allows the starch to pass, while the fibre is discharged at the lower end. The starch is run into settling tanks, washed several times with water, and removed after drawing off the excess water. The starch is broken up, heated in shallow iron pans and artificially dried. The various grades of tapioca depend upon the treatment of the starch, and have no connection with variation in quality.

The three descriptions of tapioca manufactured are flour, flake, and pearl. The proportion of each of these grades exported from Malaya varies considerably from year to year, and depends entirely on the popular demand at the moment.

The average Singapore prices of tapioca in 1927 were "flake" \$5.20,\* "pearl" \$8.30, per pikul, with an upward tendency, which has been maintained.

At present the manufacture of tapioca is carried on entirely by Chinese, but there would appear little reason to suppose that European enterprise could not equal the results obtained by Asiatics.

The effect of tapioca on the succeeding crop must be taken into account. It is now generally accepted that no lasting damage need be caused to the permanent crop by cultivating tapioca if attention is paid to the prevention of soil erosion and to manuring. The main crop will, however, reach maturity later than would otherwise be the case.

#### GAMBIER.

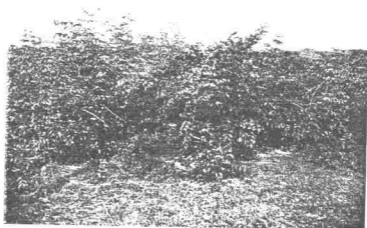
Gambier is a tanning material obtained from the leaves and twigs of a large shrub of that name, indigenous to Malaya. It was at first grown in Johore as a sole crop, but later became a catch crop with rubber after the establishment of the latter as the major planting industry of Malaya. It is, however, understood that at the present time gambier is again being grown in the neighbouring Dutch Colony as a sole crop.

Exceptional opportunities for its establishment and an upward tendency in price caused a rapid increase in gambier production between 1911 and 1918. Subsequently supplies fell off and the price jumped to a record of over \$40 per pikul, resulting in renewed interest in the crop, over production, and consequent slump in prices. With adequate supplies coming forward there would appear little prospect of an early improvement in the market.

The cultivation of gambier calls for little comment. It is not an easy crop to establish, and under present conditions it costs about £1 10s. 0d. per acre to plant and bring into bearing. This price does not include premium and rent, nor cost of opening up the land.

\* One dollar (Straits) = 2s. 4d.





GAMBIER.

The manufacture is extremely primitive, consisting of boiling the leaves and shoots in water and concentrating the extract so produced until it solidifies on cooling. Gambier is marketed in two forms, viz., block and cube.

For the preparation of block gambier, the solid extract is cut into small blocks and placed on racks under cover, where it is allowed seven days for drying. The blocks are then pressed together, packed in grass matting and covered with sacking. Such a package weighs about 60 lbs. Cube gambier is prepared by cutting the solid extract into cubes of about one inch and drying them over a fire for some days.

At the present time there remain in British Malaya only some 5,000 acres of land under this crop, and the whole area is interplanted with young rubber.

Trade returns for 1927 show that the net exports of gambier from British Malaya amounted to 953 tons of "Bale," and 2,264 tons of "Cube."

## CHAPTER VII.

## MISCELLANEOUS CROPS.

Miscellaneous crops may be considered under the following sub-headings :—

- (a) Crops grown on limited areas and possessed of an established market. In this category may be included coffee, areca nuts and gutta percha.
- (b) Crops not generally grown in Malaya, though suitable, and commanding a ready market, *e.g.*, sisal and mauritius hemp, tuba, tea, kapok, and sago.
- (c) Crops usually cultivated only by Asiatic owners of small holdings, including the important crop—rice, besides fruit, vegetable, tobacco, ginger and spices.

Nipah, cultivated for the preparation of power alcohol, appears to be in a category of its own; for the sake of convenience it will be included under (b).

In addition may be mentioned such crops as sugar-cane, cinnamon, cocaine, arrowroot, pepper, and possibly other minor crops which, although they will grow under the conditions obtaining in British Malaya, are for various reasons excluded from further notice in this book.

Coffee was somewhat extensively grown in Malaya many years ago, but its cultivation declined owing to violent fluctuations in price, disease, and the more promising prospects of rubber. During the past two or three years it has received renewed attention, and, on account of favourable market prospects, is likely to attract new capital in the future.

Malaya itself imports a large quantity of coffee for local consumption, a demand that would only be satisfied if an additional area of 25,000 acres were brought into bearing. The removal of the Australia import duty on coffee grown in British territories should prove a valuable incentive to the cultivation of this crop in Malaya.

The latest estimate places the area under coffee in Malaya at 7,000 acres. Most of this area is in Selangor, and is grown under the shade of coconut palms.

Two varieties of coffee are grown in Malaya—the Liberian (*coffea liberica*) and Robusta (*coffea robusta*). There are in addition several hybrids which are designed to be of a suitable type and disease-resistant. Most of the local coffee is the Liberian, which thrives well on heavy soils fairly rich in humus or on peat overlying alluvial clay. For this reason it has proved popular in the coastal regions of Selangor. It is of a vigorous constitution and is on the whole resistant to leaf disease. The Robusta type, on the other hand, favours a loose clay loam, is unsuited to peaty land, and grows best at elevations well above sea level.

The berries of Liberian coffee are much larger than those of the Robusta type. 12 cwt. of the former produce about 1½ cwt. of dried beans, whereas 5 cwt. of Robusta will produce an equal weight of berries.

In conclusion, provided suitable land is selected for the purpose (and such should not be difficult to procure), the cultivation of coffee in Malaya is recommended as offering a reasonable return on the capital invested.

The areca nut is cultivated by Asiatics, chiefly in certain parts of Johore, where there are about 8,000 acres under this crop, although it is found in all parts of the country, especially on land fairly rich in humus. So far as the writer is aware, its cultivation has not yet been undertaken on an extended scale with European capital and management, but recent investigations of the Department of Agriculture point to the fact that the crop could profitably be grown under plantation conditions.

The nut is chiefly used as a masticatory by people of Eastern races, and with the natural increase in population the demand for the nut is steadily increasing. It also finds use as a dentifrice, and in medicine, and in small quantities in the production of dyes and tanning materials.

There are many varieties of areca nut, and several methods of preparing the nut for the market. Decision on the most suitable variety and the method of preparation must depend upon the market in which the crop will be sold.

Malaya, the Netherlands East Indies and Ceylon are the



ARECA NUT PLANTATION.

largest exporters of areca nuts, the bulk of such shipments going to India for native consumption.

The native-owned areca nut estates in Johore are much neglected, and the price of the product suffers from insufficient care in grading and preparation. Yet it is estimated that such an estate gives a return of 20% a figure which should be increased on an efficiently managed estate.

It has been pointed out that the present figures of yield and of market price of Malayan areca nuts are adversely affected by bad planting methods and faulty handling. Investigation also shows that there is much wastage of labour in the preparation of the product for the market. Improvements in these directions should result in a very favourable improvement in the prospects of this crop.

The price of this commodity has improved steadily in recent years. The average price of Malayan exports in 1927 was \$206 (approximately £25) per ton. The average yield on native areca nut plantations is 7 cwt. per acre.

Gutta percha, used principally for the protection and insulation of deep sea cables and in electrical industries, is obtained from the "Taban merah," a forest tree *Gutta Percha.* indigenous to Malaya, Sumatra and Borneo. The gutta was originally prepared from the liquid obtained by making incisions (tapping) on the trunks of the trees growing wild in the jungle. This method was found to be unsatisfactory, consequently in recent years estates have been planted up with the trees, which are constantly pruned in order to extract the gutta from the pruned leaves and twigs. This pruning restricts the trees to a more or less dwarf habit.

Owing to expensive machinery, the cultivation of this crop is only justified on a large scale. There are two such estates in Malaya, and others exist in the neighbouring Dutch territory.

The world demand for fibres has for many years been insistent, and has been satisfied from many sources and from many parts of the world. Chief amongst *Sisal Hemp.* such hard fibres is sisal. Recent investigation in the Middle East has proved the suitability of this region for the economic production of this fibre, and although there are not yet sisal estates in the Malay States, the experimental work has proved sufficiently satisfactory to justify the recommendation of this crop to the investor.

The plant from which this fibre is obtained (*Agave rigida*, var. *sisalana*, Perrine) is a native of South America, but has been successfully introduced into most tropical countries. Improvements in machinery for the preparation of the fibre have gone far to stimulate its cultivation, in consequence of which this industry will undoubtedly develop during the next few years.

Sisal requires a porous soil, allowing good aeration. It possesses a wonderful range of adaptability regarding climate. As far as growth is concerned, the average soils found on the western side of the Peninsula appear quite suitable for the requirements of this crop.

The age at which the first cutting of leaves may be taken

is usually after the third year. In this country the time of cutting is immaterial, so long as a definite system is adopted. A yield of approximately 15 tons of green leaves per acre per annum, giving a return of dry fibre of approximately 12 cwts., are the results obtained from this crop in Malaya.

The life of the sisal plant is from six to ten years, so that a system of replanting of an estate is necessary in order that the factory may be kept working and the land utilised to the best advantage.

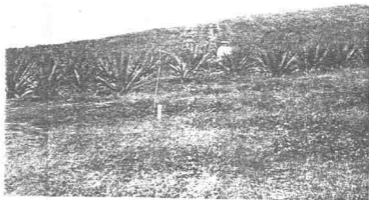
Many careful tests of fibre content under plantation conditions have been carried out by the Department of Agriculture. The fibre content was found to vary from 4 to 5 per cent., depending largely on age of plants, a result which compares well with similar investigations in other countries. Furthermore, many bulk samples have been submitted to buyers in England and elsewhere, who have reported very favourably on the quality.

Owing to the high cost of machinery, it is essential that the plantations should be fairly extensive in order that large and regular supplies of leaves may be available to the factory. The smallest economic unit is probably 1,500 acres, while it is considered that a 5,000 acre estate will prove a more easily managed and economical unit.

An estimate of cost of production in Malaya is difficult, owing to the fact that there are no estates other than Government experimental areas devoted to this crop. The Dutch East Indies, however, where similar conditions obtain, and where there are several successful estates, estimate cost of production at about £20 per ton, which, allowing a moderate price for the fibre, gives a return on capital of 25%.

Prices for sisal fibre have remained fairly steady during the past twenty years, with the exception of the period of the great war, when prices soared. The present price of £40—£46 per ton seems likely to be maintained, and is one which is very satisfactory to producers. Sisal hemp is a crop which promises a sound future, and it is urged that the prospect of successful development of the industry in Malaya compares favourably with any other country where this crop is grown.

Mauritius Hemp (*Furcraea gigantea*) is in many respects similar to the sisal plant, and the crop is treated in much the same manner. The higher percentage of fibre produced by sisal as compared with mauritius, together with the fact that the former commands a higher price in the market, points to the advisability of growing sisal, although it must be remembered that mauritius produces a heavier crop of leaves.



MAURITIUS HEMP.

Roselle (*Hibiscus sabdariffa* var. *altissima*) has been cultivated for its fibre as a catch crop with rubber, the fibre finding a ready local market for rope making. The plant can be recommended as a minor crop in view of the fact that the fibre can be prepared easily by hand labour and that machinery is unnecessary.

Kapok is found growing in native homesteads throughout Malaya, and flourishing particularly well on the alluvial soils near rivers. No serious attempt has, however, been made to cultivate the tree commercially. As

The Cotton Tree.

there is a steady world demand for kapok, which finds its use chiefly as a mattress filler, it would appear well worth consideration as a plantation product in parts of Malaya.

Cotton has been grown by the Department of Agriculture, and by a few private individuals, with varying success. The climate in parts of Malaya is probably unsuitable for this crop, as dry seasons are uncertain, but in Kedah and Kelantan, where the seasons are more defined, conditions might be found more suitable.



WEEDING IN A FIELD OF KAPOK.

Many other fibre crops, including bowstring and manilla hemp, have been cultivated successfully by the Department of Agriculture, but their industrial possibilities are as yet very uncertain.

The Nipah Palm is indigenous to the muddy banks of the tidal rivers of the Malayan Archipelago. It produces a fruit the stalk of which, after special treatment, yields a saccharine liquid containing from 10 to 20% of cane sugar.

Nipah.





NIPAH.

This juice in a tropical atmosphere, without special treatment, rapidly undergoes fermentation to alcohol, and, to a slighter extent, acetic acid.

A small native industry has been in being for many years for preserving the juice and producing a crude brown sugar, or allowing the juice to ferment to alcohol for potable purposes, or further fermenting to acetic acid for nipah vinegar.

In the Philippine Islands it has been the custom during the fruiting season for the peasants to sell fermented nipah juice to the big distilleries for the production of alcohol.

More recently (since 1921), considerable attention has been given in the Malay Peninsula to Nipah as a plantation crop for the production of alcohol for power purposes (in particular as a local motor car fuel), or alternatively for the production of acetic acid, for which there is a big local demand.

In 1921 the systematic planting of nipah was undertaken as a plantation crop, and at the present time two estates of an area of over 2,000 acres are established with flourishing young palms. From observations which have been made it



NIPAH ESTATE : SHOWING DRAINAGE.

appears that nipah, grown under suitable conditions on the west coast of Malaya, will fruit throughout the year and yield over 1,000 gallons of alcohol per acre per annum.

The larger part of the capital required for a nipah estate will be due to the distillery. This will vary greatly with the size of the plantation which it is to serve, and will probably average \$200—\$250 per acre, while the cost of bringing the estate into bearing at 4 years is between \$60 and \$70 per acre.

It is doubtful if an estate of less than 2,000 acres is an economical proposition, though a similar area of smaller estates supplying a central distillery might be able to work at a profit.

With the exception of one or two early ventures, tea has never been grown commercially in the Malay States.

By this it should not be inferred that the country is unsuitable for the purpose or that land could not be found capable of producing first quality tea. The explanation of this neglect probably lies in the fact that at a time when Malaya was being opened up suitable and accessible land for the purpose was available

in Ceylon, and that rubber claimed all the capital that came to Malaya. The finest tea is grown at an elevation of 2,000 ft. or more. In the days when the tea estates in Ceylon were being developed such land in Malaya was as yet scarcely explored. It was only through the rapid development of the rubber land and the activities of tin prospectors and of the Survey Department that such suitable land became known: in fact the development of a hill station in Perak, which is even now in its infancy, has attracted public attention for the first time to the available records of the type of land to be found on the mountains, rainfall and other meteorological data. The information recently collected has favourably impressed several Ceylon tea planters now resident in Malaya who strongly urge the cultivation of tea on the Malayan hills. The Department of Agriculture and several individuals have conclusively shown that tea grows well in the lowlands, while the Department has also established a very successful experimental area of the crop on Cameron's Highlands (4,750 ft.).

The dried root of the tuba plant (*Derris elliptica* and *D. malaccensis*) is recognised as a valuable insecticide, and may be found under patent names as an ingredient of certain proprietary preparations for this purpose.

The plant is indigenous to Malaya, where it has long been known to the natives and used by them for fishing.

Tuba is usually treated as a catch crop, as it matures in eighteen months from planting. Several planters have undertaken the cultivation of tuba, exporting the root to Japan and Europe in particular. The weight of crop will vary considerably according to the richness of the soil and the length of time it is allowed to continue growth. It is found, however, that the toxic content of the root is proportionally less after two years, so that a crop of between one ton and two tons may be taken as a working basis.

Prices vary from time to time, as both demand and supply are at present very uncertain. Ninepence per pound may be taken as a reasonable figure, which should allow for a profit when the crop is treated as a catch crop.

Most of the so-called sago of commerce is small pearl tapioca. The sago-palm, from which is obtained some of the sago of commerce, thrives exceedingly well in Malaya, growing best on low marshy land on which it is almost impossible to grow any other crop with the exception of rice. The sago is obtained from the trunk, which reaches maturity in about nine years. As the palms are continually throwing up new shoots from a creeping stem, a continuous crop of about 50 trees per acre after the ninth year may be expected. It is said that a tree of average size will procure about 2 cwt. of sago flour.

The cultivation of this crop in various parts of the Peninsula is in the hands of Malays and Chinese, and in consequence accurate figures of cost of production are not available. In time the Department of Agriculture will be in a position to give such data when an area now being cultivated comes into bearing. At present attention may be drawn to the possibilities of the successful production of sago owing to the ease with which it grows in Malaya, the simplicity of manufacture, and the steady world demand for the product.

A drug is extracted from the dried root of Ipecacuanha. This plant is suitable for cultivation in Malaya, and has been successfully grown on a commercial scale in Ipecacuanha. Selangor and Johore. It requires intensive cultivation, under which system a yield of about 500 lbs. of root per acre may be expected. Ipecacuanha is marketed in the form of dried root, in which form the product is at present worth about 10/—10/6 per lb. There is, however, but a limited demand for this drug, and any attempt to cultivate the plant on a large scale would probably have the effect of reducing its market value considerably.

The turmeric of commerce consists of the dried underground rhizomes of a perennial herb which grows freely in Malaya. No attempt has been made, however, to compete with the product of India. The plant takes one year to reach maturity and yields about 8,000 lbs. of sun-dried rhizomes, or 1,000 lbs. cooked rhizomes.

The dye obtained from the seed of the Annatto shrub is employed in colouring lacquer and silks, but its principal use is as a colouring matter for various foodstuffs, more particularly butter and cheese. The plant grows freely in Malaya. The price is, however, at present so unsatisfactory that attempts to establish a market for local produce have been abandoned.

Of crops suitable for native production brief mention need be made in this place. Chief amongst such crops is padi (rice) of which there are over 500,000 acres in Malaya. In view of the importance of this crop to the country the Government gives every encouragement to its cultivation, and will not, in fact, alienate land suitable for padi cultivation for the planting of any other crop. Padi has not been the subject of European enterprise on a large scale in Malaya, but such a venture would not necessarily be devoid of success when it is remembered that the largest padi growing district in Malaya produces crops which, with one exception, are greater than those produced in any other padi area in the world.

Fruit of various kinds is found in most Malay homesteads, but it is only of moderate quality, since it cannot be claimed that the owners pay any great attention to the cultivation or improvement of their trees. The Brazil nut was introduced into Malaya in 1912, and has been successfully established. It will prove a desirable addition to the small fruit orchards in the country, although there is no present intention of establishing plantations of this tree.

Vegetable growing is mostly in the hands of Chinese, whose gardens may be found on the outskirts of towns and villages.

Spices are cultivated by natives, chiefly in Penang Island, where formerly a considerable trade was effected with nutmegs and cloves. Pepper grows well in many districts, and its cultivation might well be extended by those possessing the necessary special knowledge of this crop, since the market price is at present high on account of shortage of supplies.

Tobacco is grown on a small scale by natives on newly opened land. It is questionable whether climatic and soil

Crops for  
Native  
Production.



BANANAS.

conditions are suitable for high class tobacco, but there is a large demand in the East for the low quality tobacco, which might well be satisfied in part from leaf grown on the quickly productive alluvial soils found in various parts of the Peninsula.

Buffaloes, cattle, goats, sheep, pigs and poultry are found throughout the Malay Peninsula. Buffaloes are used in the cultivation of padi lands and to drag heavy timber

*Live Stock.* from the jungle.

Siamese cattle provide the greater proportion of the fresh meat of the markets, and there is a considerable cattle trade with Siam. Except in Kelantan, comparatively few cattle are raised in Malaya for other than draught purposes, probably because of the lack of large areas suitable for grazing.

Goats are kept and bred by most Malays and by Tamil labourers on estates; they form a welcome addition to the table for feast days. In certain parts of the country a distinct breed has been developed, which is employed in a local sport of ram fighting.

Sheep are found less frequently. As a rule they are poor and look neglected.

Pigs are bred by Chinese, especially in the vicinity of Tapioca factories, where a plentiful supply of suitable food is provided by the refuse from the factory. Amongst Chinese pig breeding is a profitable undertaking, which is jealously guarded, so that only a few Europeans have also been known to be successful in this enterprise.

Poultry, including ducks, geese, guinea fowl and occasionally turkey, are found in almost every homestead. They are mostly poorly bred and receive little attention, being left practically to find their own livelihood.

The reader will be correct in inferring that stock raising in Malaya leaves much to be desired. Enthusiasts have from time to time imported good stock, but quality soon becomes lost under such spasmodic enterprise. The Government has commenced stock raising on a small scale with the objects of ascertaining which breeds are most suitable for local conditions and of providing stud animals to raise the general quality throughout the country.

## APPENDIX A.

## LIST OF DISTRICTS IN THE FEDERATED MALAY STATES.

STATE OF PERAK.				
<i>District.</i>				<i>Town.</i>
Batang Padang	...	...	...	Tapah.
Kinta	...	...	...	Batu Gajah.
Krian	...	...	...	Parit Buntar.
Kuala Kangsar	...	...	...	Kuala Kangsar.
Larut	...	...	...	Taiping.
Lower Perak	...	...	...	Teluk Anson.
Upper Perak	...	...	...	Grik.

STATE OF SELANGOR.				
<i>District.</i>				<i>Town.</i>
Klang	...	...	...	Klang.
Kuala Langat	...	...	...	Teluk Datoh.
Kuala Lumpur	...	...	...	Kuala Lumpur.
Kuala Selangor	...	...	...	Kuala Selangor.
Ulu Langat	...	...	...	Kajang.
Ulu Selangor	...	...	...	Rasa

STATE OF NEGERI SEMBILAN.				
<i>District.</i>				<i>Town.</i>
Port Dickson	...	...	...	Port Dickson.
Jejebu	...	...	...	Kuala Kluang.
Kuala Pilah	...	...	...	Kuala Pilah.
Seremban	...	...	...	Seremban.
Tampin	...	...	...	Tampin.

STATE OF PAHANG.				
<i>District.</i>				<i>Town.</i>
Bentong	...	...	...	Bentong.
Kuala Lipis	...	...	...	Kuala Lipis.
Kuantan	...	...	...	Kuantan.
Pekan	...	...	...	Pekan.
Raub	...	...	...	Raub.
Temerloh	...	...	...	Temerloh.



## APPENDIX B.

SURVEY FEES ON TOWN AND VILLAGE LOTS AND LANDS AND  
AGRICULTURAL LANDS.

	\$
5 acres and under ... ..	25-00
For each additional acre up to 10 acres ...	4-00
10 acres ... ..	45-00
For each additional acre up to 25 acres ...	3-00
25 acres ... ..	90-00
For each additional acre up to 50 acres ...	2-00
50 acres ... ..	150-00
For each additional acre up to 100 acres ...	2-00
100 acres ... ..	250-00
For each additional acre up to 200 acres ...	1-00
200 acres ... ..	350-00
For each additional acre up to 300 acres ...	0-90
300 acres ... ..	440-00
For each additional acre up to 500 acres ...	0-80
500 acres ... ..	600-00
For each additional acre up to 1,000 acres	0-70
1,000 acres ... ..	950-00
For each additional acre above 1,000 acres	0-60

In addition to the survey fees prescribed above, the following charges shall be payable for boundary stones and pipes, and shall, in default of payment, be recoverable in the manner prescribed by Part XVIII of "The Land Code, 1926," for the recovery of sums due on account of rent :—

	\$
For each boundary stone employed ... ..	1-00
For each pipe employed ... ..	3-50

In calculating survey fees prescribed above, an additional part of an acre shall be reckoned as an additional acre.

Provided that, in a case of any agricultural land not exceeding 5 acres, if the Collector is satisfied that the applicant has not the means to pay survey fee, in accordance with this scale, the Collector may at his discretion remit such part of the survey fees not exceeding two-thirds thereof as he may consider to be proper.

## APPENDIX C.

AREAS OF PROSPECTIVE AGRICULTURAL LAND IN THE FEDERATED  
MALAY STATES.

STATE OF PERAK.		
<i>District.</i>	<i>Area.</i>	<i>Remarks.</i>
Kuala Kangsar	—	Very little land below an elevation of 1,500 ft.
Krian ... ..	About 5,000 acres ...	Mainly swampy land.
Upper Perak ...	Nil ... ..	Mainly Forest Reserve and Malay Reservation
Lower Perak ...	Some 20,000 acres possibly good for sugar.	—
Batang Padang	Nil ... ..	—
Larut ... ..	Nil ... ..	—
Kinta ... ..	Nil ... ..	Mainly given up to mining.

## STATE OF SELANGOR.

<i>District.</i>	<i>Area.</i>	<i>Remarks.</i>
Kuala Lumpur	Nil ... ..	—
Kuala Selangor	Large area, but swampy and devoid of access.	Awaits drainage and communications.
Ulu Selangor ...	About 67,000 acres ...	Not all immediately available.
Ulu Langat ...	About 10,000 acres ...	Mostly hilly and devoid of access.
Kuala Langat	About 42,000 acres ...	Awaits drainage and communications.
Klang ... ..	About 1,000 acres ...	—

## STATE OF NEGRI SEMBILAN.

<i>District.</i>	<i>Area.</i>	<i>Remarks.</i>
Seremban ...	Nil ... ..	—
Coast ... ..	About 1,800 acres ...	—
Jelebu ... ..	About 30,000 acres ...	Has first to be exploited for timber.
Kuala Pilah ...	A few areas still available	—
Tampin ... ..	About 17,000 acres ...	Not all immediately available.

## STATE OF PAHANG.

<i>District.</i>	<i>Area.</i>	<i>Remarks.</i>
Temerloh ...	About 350,000 acres ...	—
Pekan ... ..	Large areas available ...	—
Kuantan ... ..	About 130,000 acres ...	Does not include inaccessible areas.
Kuala Lipis ...	Large areas available ...	—
Raub ... ..	Land is available ...	—
Bentong ... ..	Little land available ...	—

## APPENDIX D.

## CUSTOMS DUTIES.

## (EXPORT DUTIES ON AGRICULTURAL PRODUCTS.)

Description of Article.	Duty.
Coconuts and copra ... ..	1½ per cent. <i>ad valorem</i> .
Coffee—	
Coffee other than dry cherry or parchment coffee:	
When the value is—	
Less than \$22 per pikul ...	Nil.
Not less than \$22 per pikul or more than \$24 ... ..	1 per cent. <i>ad valorem</i> .
More than \$24 per pikul but not more than \$26 ... ..	1½ " "
More than \$26 per pikul but not more than \$28 ... ..	2 " "
More than \$28 per pikul ... ..	2½ " "
Dry cherry coffee ... ..	The above duty, calculated on one-third of the gross weight.
Parchment coffee ... ..	The above duty, calculated on two-thirds of the gross weight.
Gambier ... ..	15 cents per pikul.
Gutta-percha (cultivated), meaning gutta-percha as defined in the Forest Rules, 1920, produced from trees which have been cultivated on alienated land to the satisfaction of the Chief Secretary ... ..	2½ per cent. <i>ad valorem</i> .
Pepper... ..	30 cents, per pikul.
Rubber (any cultivated rubber, including latex):	
When the price of rubber as notified for the time being in the Gazette is between 35 cents per pound and \$1.50 or over.	A sliding scale of 1 per cent. to 3 per cent. of the value of the rubber calculated at the price notified for the time being in the Gazette.

(One gallon of latex shall be taken as equivalent to three and one-half pounds of dry rubber.)

The Chief Secretary has exempted from payment of the export duty leviable on rubber, all rubber goods manufactured in the Federated Malay States. This exemption shall remain in force for a further period of five years, commencing from the first day of September, 1927.

## Sugar—

Sugar ... ..	1 per cent. <i>ad valorem</i> .
Sugar-cane ... ..	1 cent. per pikul.
Tapioca ... ..	2½ per cent. <i>ad valorem</i> .

## APPENDIX E.

## MALAY TERMS.

1 relong	=	.71 acre.
1 orlong	=	1½ acres.
\$1.00	=	two shillings and fourpence.
1 gantang	=	1 imperial gallon.
1 kati	=	1½ lbs. (approximately).
1 pikul	=	100 kati (133½ lbs.).

