

Rubber:

Plantation Management and Regulation in British Malaya

by

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OLD BADGER BRAND



**RUBBER:**

**PLANTATION MANAGEMENT AND REGULATION IN BRITISH MALAYA**

In the recent depression the rubber industry was hit very hard, and in an attempt to control rubber production so that it might continue to be a profitable business an international regulation agreement was adopted in 1934. In May, 1934, British Malaya became a party to this regulation. The primary object of this regulation is to enable rubber estates to operate on a normal and constant basis of production.

In order to operate on a basis of limited production, it is necessary that the estates receive an income which will allow them a reasonable profit over and above costs and overhead expenses. If the estates are to operate profitably from this limited production it is necessary that the price of rubber must be higher than it formerly was, and this price must be maintained. There are only two things that will cause a rise in price. One is an increase in consumption, the other a decrease in production.

In producing on a normal basis of operation, estates would ordinarily restrict their production. However, they do not wish to be restricted to an amount less than that which they would ordinarily produce on a normal basis of operation. This amount is approximately 80 percent of their potential production. A restriction of only 20 percent is not generally considered sufficient to maintain the desired price.

In order to bring about a greater restriction of the total production, without materially restricting the amounts which the estates can produce on a normal basis of operation, the small holdings are being restricted to a greater degree than are the estates. The small holdings are therefore credited with assessments which are considerably less than their normal production, while the larger estates are given larger assessments than their normal production would warrant.

The estates, therefore, are receiving the benefits of restriction without being restricted themselves. These advantages are twofold. First, the estates do not suffer any disadvantage during the period in which production is limited, under a normal basis of operation, and secondly, they are now, or soon will be in a position to increase the amounts they can constantly produce.

At the present time the estates are the marginal producers and cannot efficiently compete with the small holdings, but under this regulation they should reach a condition where they can compete with the small holdings.

As the conditions of estates improve, it is probable that the amount of restriction applied will be diminished to the degree allowed in accordance with the price which is desired to be maintained.

Plantation rubber is the third most important article of import into the United States and more than 67 percent of that imported is obtained from British Malaya. Of the total export of plantation rubber from that country, over 50 percent of the total is shipped to the United States.

The improvement of the conditions in rubber estates in British Malaya is very important to manufacturers of rubber products in the United States, as it assures them a permanent supply of crude rubber from that source.

There is a total of 3,647,129 acres of land alienated in British Malaya for the planting of rubber trees; of this 3,134,798 acres are planted, and the remaining 512,331 acres is composed of land cleared for planting, jungle, swamps and waste land, building sites and roads.

These planted areas are located mainly (1) along the west coast, (2) in proximity to railway lines, and (3) along the east coast of British Malaya on the Malayan peninsula.

Of the land planted in rubber trees, 1,873,724 acres are in estates of 100 acres and over, and 1,261,074 acres are in small holdings of less than 100 acres.

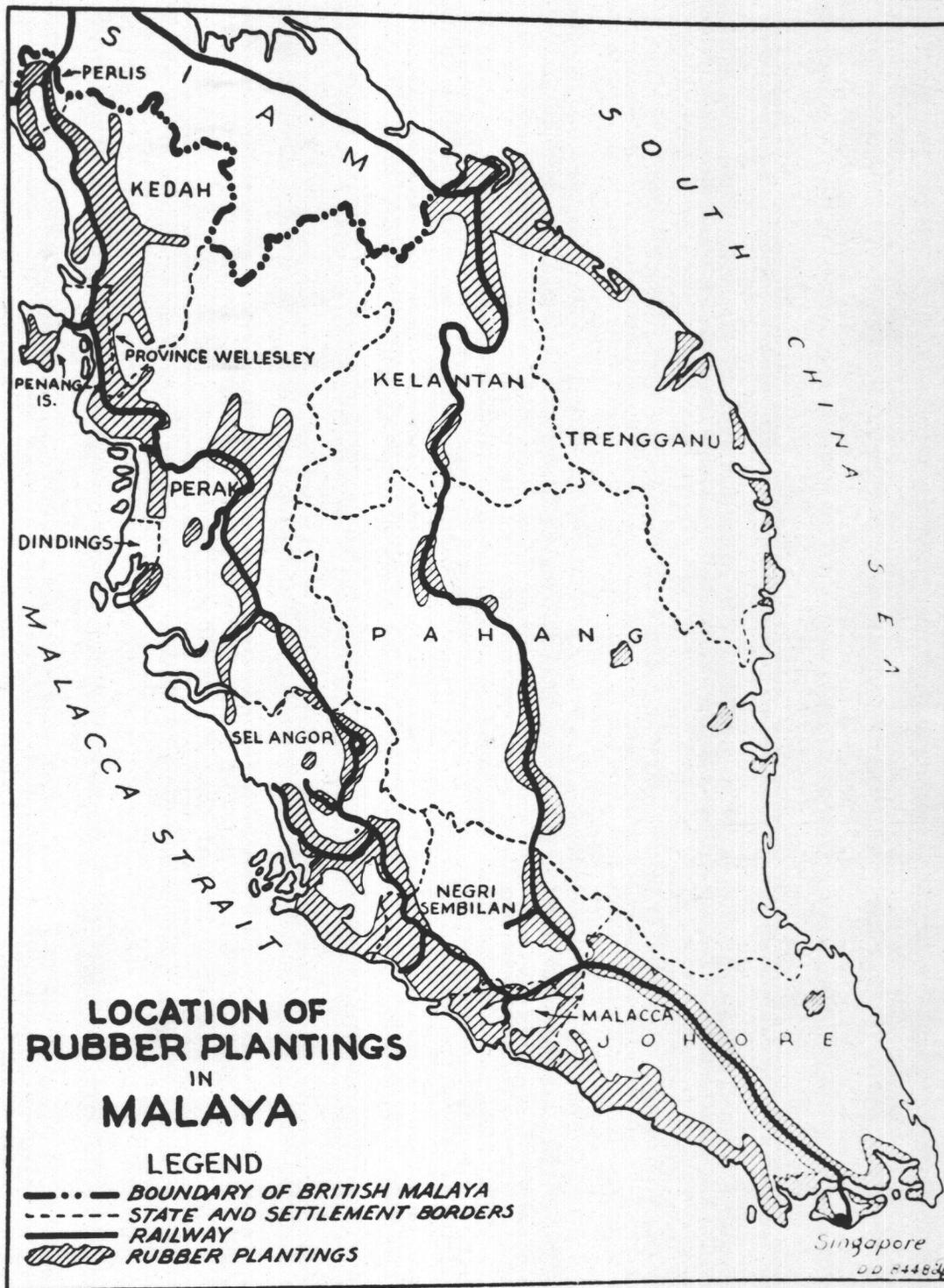
1,395,000 acres or approximately 45 percent of the planted land is owned by Europeans. The remaining 55 percent is all owned by Asiatics of various nationalities.

2,783,481 acres of planted area is at the present time in mature trees, and the remaining 351,317 acres, all in young trees will mature about 1941. Under the regulation, planting is prohibited and replanting is restricted to 20 percent of the area now planted.

Over  $8\frac{1}{2}$  percent of the area of mature trees is classed as ineffective as they are on areas either abandoned or the trees on these areas are not profitable to operate. The effective area is 2,545,705 acres.

2,369,153 acres of the effective area are being tapped. The remaining 176,552 acres are being rested. An area of this size or larger has been rested for periods of a year since 1933. The area being rested is expected to increase to as much as 375,000 acres within a few years.

At the present time over 6 percent or 200,000 acres of trees are bud grafted. The area of budded trees in tapping at the present time is over 31,000 acres. The area in tapping of bud grafted trees in 1941 will be nearly the total area of bud grafted trees. It is impractical to graft trees of much more than one year of age, and the planting of trees is prohibited under the regulation, only replanting being permitted. Until 1942, there will be only a few trees which can be bud grafted.



A rubber controller was appointed for British Malaya in May, 1934, when British Malaya became a party to the international regulation agreement. All work in the administration of the regulation is done either directly by the rubber controller or through the cooperation of the regularly constituted departments of the various governments.

The Governments coming under this control are the Strait's Settlements, which include Singapore, Penang, and Labuan, the Federated Malay States, and the protected Malay States of Johore, Kedah, Kelantan, Perlis, Trengganu, and Brunei.

The cooperating departments of the various Governments are the departments of trade and customs, the department of statistics, the land offices, and the residents of the different settlements and States acting through the political officer in every district.

The administration of regulation is divided into two main parts, - that over plantations of 100 acres and over, and that over plantations under 100 acres. The larger plantations are known as "estates" and the smaller plantations are known as "small holdings".

The administration over estates is generally exercised directly by the rubber controller in conjunction with the departments of trade and customs. The "assessments" allotted each estate is a certain share of the country's quota. The proportion of its assessment an estate is allowed to export is in conformity with the proportion fixed under the quotas for all of the participating countries. There is no direct regulation of the amount of rubber that the estates may produce. However, if the rubber is not covered by export rights there would be no object in producing it as dealers are not permitted to hold rubber which is not covered by export rights.

Export rights for an estate are issued quarterly on a basis of the proportion of its assessment it is allowed to export. These are entered in a ledger maintained by the trade and customs departments at the different ports of shipment, and as such are called "export credits". The estate is informed of the exact amount it is allowed to export. At the present time an estate must use all of the export rights given it by the end of the year. If it does not, such export credit not used, may be revoked by the rubber controller. Under the law which came into effect during the fourth quarter of 1933, the date by which an estate must use its export rights will be the end of each quarter.

In order to export rubber under the regulation it is merely necessary to fill in three copies of a form and forward them with the rubber to the shipping agent at the port of shipment. The shipping agent then takes the forms to the customs officer at that port and the amounts of rubber specified therein are checked against the balance of the export credit standing to the estates account. The forms are then signed by the customs officer and one is retained by him, one is given to the shipping agent, and one is returned to the estate.

If the rubber is to be sold to a dealer rather than to be shipped directly by the estate, the export credit entered in the estate's account is transferred by the customs officer to the account of the dealer. When the dealer desires to export the rubber, he follows the same procedure as the estate when exporting directly.

The administration over small holdings is exercised through the district officers and the departments of trade and customs. An assessment is also fixed for each small holding. The proportion it is allowed

to export is likewise based on its assessment. Instead of export rights and credits entered with the customs at the port of shipment, coupons representing the amount are issued quarterly to each small holder. The small holder takes these coupons with his rubber to one of the local dealers, who turns in the coupons to the local customs officer and is given an export credit for the amounts they represent. The dealer then exports the rubber purchased from small holdings in the same way as that purchased from estates.

The coupons issued to small holdings are valid one month longer than the export rights issued to estates. The reason for extending the validity of coupons for an extra month is this -- it has been found that it takes more time for rubber produced on small holdings to get into the hands of dealers and to be shipped than it does for that which is produced on estates. It has been provided, therefore, that when dealers turn in coupons, the export credit which they receive for them is likewise valid for an extra month. Instead of being required to export all of such rubber by the end of the quarter or year, they will be allowed to export any portion of the rubber up to the last day of the month following the end of the quarter or year, as the case may be. In that way dealers who handle rubber produced on small holdings will not be put to a disadvantage.

The administration of the regulation in general has been simplified as much as possible. It is now functioning regularly but there was considerable trouble before the regulation could be put entirely into effect. This not only applied to controlling exports and to fixing the assessment of each estate and small holding, but to the relations between the rubber controller and the different Governments as well. The Straits

Settlements and Federated Malay States entrusted the rubber controller with entire control over the rubber exported from them. At first this was not the case with the protected Malay States outside of the Federation. The Government of Johore, especially, was reluctant to give the rubber controller complete control and attempted to carry out the regulation in its own way. This conflict has now been completely remedied and the rubber controller of Malaya is actually controlling the export of rubber from British Malaya as a whole.

To pay for the administration of the regulation, as well as other expenditures less directly involved, a tax of \$00.006 United States currency per pound is levied on domestic rubber by all the Settlements and States in British Malaya. By law the tax may be increased to \$00.012 per pound but no other taxes may be imposed on rubber produced in or exported from this country.

It is provided in the regulation that the rubber fund shall be devoted to the following purposes: (a) the payment of all expenses in connection with the administration of the ordinance and of any purpose relating thereto; (b) the payment of such expenses of the international rubber regulation committee as the Government of the Straits Settlement may be liable to contribute; (c) the payment of contributions to the Rubber Research Institute of Malaya; (d) the furtherance of rubber research, the improvement of the rubber industry, and the support of propaganda relating to rubber; (e) the payment of contributions to the revenues of the colony, the rural boards, and the education board; and (f) such other purposes whatsoever as the governor in council may approve.

No portion of the income from the tax has as yet been appropriated for the support of propaganda relating to rubber. According to the

director of the Rubber Research Institute, a plan is being considered at present whereby the international regulation committee in London will institute a world-wide campaign to disseminate information which will tend to develop and increase the uses of rubber. If that plan is adopted it is not likely that the present tax of \$00.006 per pound will be sufficient to cover the added expenditure. In that case the tax might be increased to the full amount allowed under the regulation.

The amounts fixed as British Malaya's quota, as compared with the quotas for all countries in the agreement except Indo-China, for the years 1934 to 1938, are shown (in long tons) in the following table:

Year	Total basic quota including revised figures for Siam	British Malaya	
		Basic Quota	% of Total
1934	1,021,500	504,000	49.3
1935	1,113,000	538,000	48.3
1936	1,193,000	569,000	47.7
1937	1,242,000	589,000	47.4
1938	1,276,500	602,000	47.1

The quotas for British Malaya, apparently, have been fixed on the basis of the estimated potential production of the country. As such they are considered to be reasonably just. Of the amount fixed as its quota for any one year, the country is allowed to carry over only 12 percent from one year to the next.

Each estate and small holding receives an assessment which is supposed to be its rightful share of the basic quota for the country. There has been, however, a great deal of discrimination between the assessments given to estates on the one hand and those given to small holdings on

the other. During the year 1935 estates were given a total assessment of 343,724 long tons and small holdings 194,276 long tons.

The proportion of its assessment, which each estate and small holding is allowed to export is fixed in accordance with the proportion of the country's basic quota that is allowed to be exported. For the first quarter of 1935, British Malaya, and the other countries joined in the international regulation agreement were allowed to export 75 percent of their basic quotas. For the second quarter the proportion was fixed at 70 percent and for the last half 65 percent. Later figures on the quota are not available at the present time. Accordingly, the amount of its assessment an estate or small holding is allowed to export is likewise 75 percent during the first quarter, 70 percent during the second quarter and 65 percent during the last half of the year. The amount estates were allowed to export during the first quarter of 1935 was, therefore, 64,448 long tons and that for small holdings 36,427 long tons. Each estate is informed quarterly of the amount it will be allowed to export. Small holdings are given coupons quarterly for the amount they are allowed to export.

If an estate or small holding cannot or does not want to produce the amount of rubber it is allowed to export, it may transfer its export rights or coupons to another owner anywhere in British Malaya. An estate will usually transfer its excess rights to another estate of the same company which is in a position to produce the extra amount.

Export rights or coupons cannot be transferred to dealers as such, but if the dealer is a plantation owner, as is usually the case, there is no limit to the amount that may be transferred to him. In this way a considerable trade in coupons and export rights is carried on, and a large amount of the rubber which is produced by small holders, in excess

of the amount of coupons they receive, may be covered with coupons or export rights. The export credits and coupons which some estates and small holdings cannot or will not use, are practically all used, therefore, by other estates or small holdings. At the end of 1934, only 2420 long tons of export rights and 2460 long tons of coupons were unused.

The domestic exports of rubber were 243,871 long tons during the seven months of regulation in 1934. The amount British Malaya was allowed to export during those seven months was 256,200 long tons. The amount exported was, therefore, 12,229 long tons less than the amount allowed. This difference, according to the rubber controller, is not a deficit. It is a carry-over representing rubber which was actually produced by small holders but which could not be placed in the hands of dealers in time for it to be shipped by the end of the year. The actual production was, therefore, either equal to or slightly in excess of the quota of 256,200 long tons.

A number of factors are concerned in the normal production of rubber in the future. The factor having the greatest influence on normal production in the future is the increase in the effective acreage. Calculating the increase on that account alone, it is estimated that "normal production" in the years 1936 to 1943, as compared with that of 1935 would be, in long tons, as shown in the following table.

Year	Normal Production	Effective Acreage
1935	484,650	2,545,705
1936	508,944	2,686,049
1937	531,384	2,806,049
1938	543,167	2,871,006
1939	557,876	2,950,500
1940	563,839	2,985,449
1941	570,731	3,018,788
1942	572,018	3,026,476
1943	572,512	3,029,428

There are several other factors which will cause an increase in the normal production, particularly that of estates.

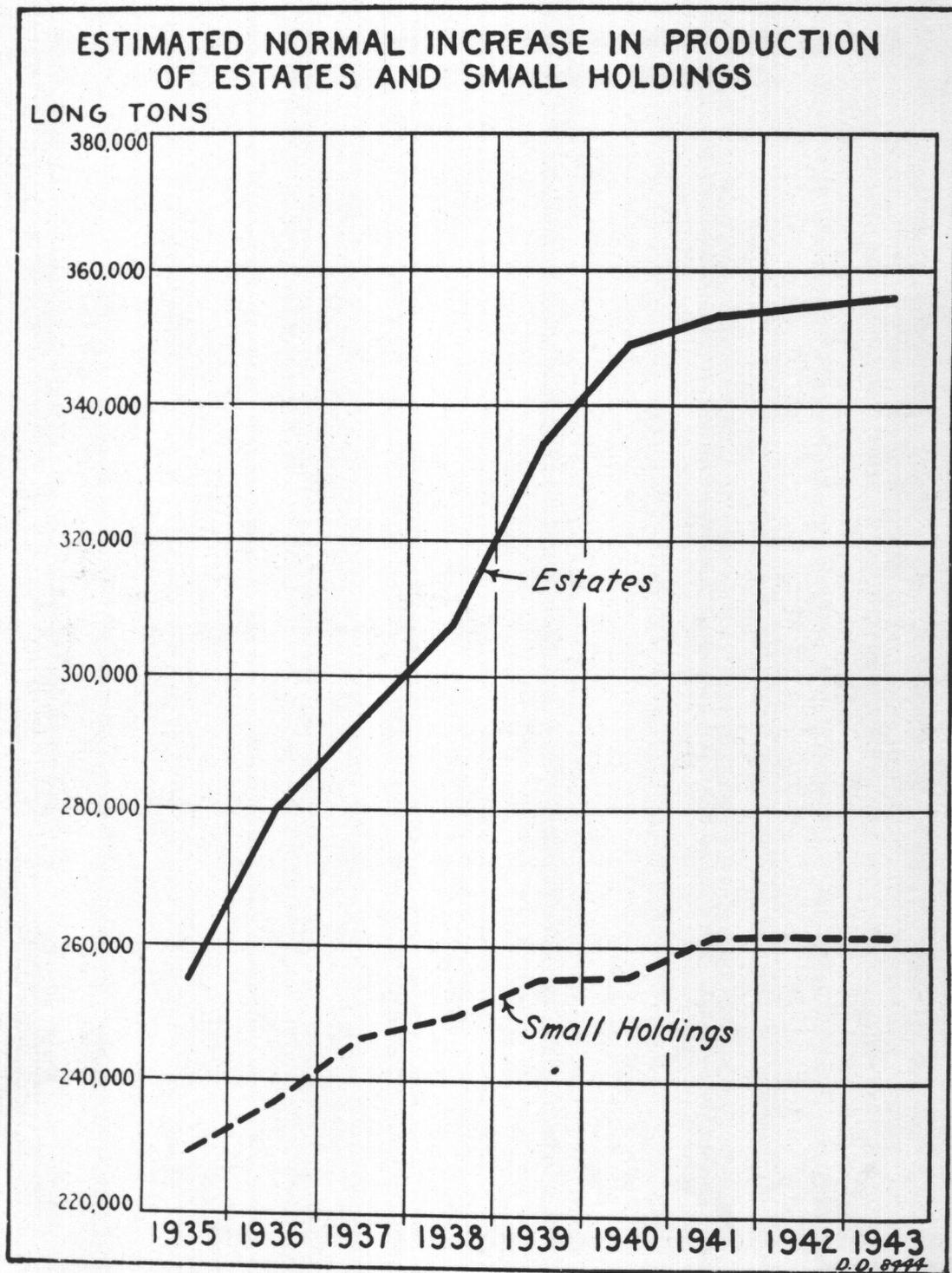
One is that of placing certain areas in resting. Under normal conditions of production, one-third of the acreage of the estates should be in resting for periods of a year each. The resting of acreages in small holdings is not done and is not likely to be done in the near future.

As was stated in the section on areas, it is estimated that there are at present 30,618 acres of bud-grafted trees in tapping, out of a total bud-grafted area of approximately 200,000 acres. As the area brought into tapping increases, the excess yield of bud-grafted trees will be a factor in increasing the annual normal production.

Other factors whose effects on production cannot be estimated are: (1) root, bark, and leaf diseases; (2) the present bark reserve and the rate at which it is consumed; (3) the condition of the soil; (4) the decline in the yield of old trees; and (5) replanting.

On the basis of all the factors affecting the future normal production, it is estimated that the "normal production" of rubber in British Malaya during the years 1936 to 1943 as compared with that of 1935, would be (in long tons) as shown in the following table. The quotas for British Malaya during the years 1935, 1936, 1937, and 1938 have been inserted for comparison; it will be noted that for corresponding years, the quotas are much higher than normal production. The normal production of planted areas, particularly estates, is much less than their potential production.

Some local authorities claim that the peak in production of rubber will not be reached until 1945. The rubber controller, however, places the peak year as 1943.



Year	Total Normal Production	Quotas
1935	484,650	538,000
1936	517,311	569,000
1937	541,241	589,000
1938	558,403	602,000
1939	590,467	-----
1940	605,908	-----
1941	615,539	-----
1942	616,826	-----
1943	617,320	-----

When preparing to establish a rubber plantation the jungle is first cleared from the land prepared for the planting of rubber seedlings. A hole is dug for each seedling and they are planted in rows, usually about 100 trees to the acre.

At the present time, as previously stated, new planting is prohibited by the regulation but replanting is allowed up to 20 percent of the acreage planted. The original purpose of this provision was to allow for the replacement of trees taken out. Very little of this, however, is being done. Planters would rather plant the land held in reserve than to place a seedling in the particular spot where an old tree stood. As yet they are only allowed to do the latter. The question is being taken up with the international regulation committee, and it is expected that planters will be allowed to plant in reserve land a number equal to the trees which have been taken out. This number, however, will not necessarily amount to 20 percent of the trees planted.

At the present time there is quite some difference in opinion on the question of bud-grafting versus selecting seeds.

The bud-grafting of rubber trees is based on the theory that the

high yielding properties of one tree can be transferred to another by grafting. Dormant buds are required, and as practiced at the present time the budding of Hevea is a modified form of patch or shield budding. In this, a rectangular panel of bark is removed from the stock at a point where normally no bud is situated. The panel is replaced from the budwood by a correspondingly shaped panel which contains a bud.

Experiments made by the Rubber Research Institute have shown that as compared with the average production of 400 pounds of rubber per acre of mature trees, bud-grafted trees will produce the following averages:

	# per Acre
First year of tapping	400
Second year of tapping	650
Third year of tapping	850
Fourth year of tapping	1000
Fifth year of tapping	1100
Sixth year of tapping	1200

and thereafter approximately 1300 pounds per acre per year.

Selecting seeds of high yielding trees and using them instead of ordinary seeds is advocated by some instead of bud-grafting. As yet, there have not been sufficient actual experiments completed to prove whether the high yielding properties of a tree can be carried on to other trees in this manner. Now that planting is prohibited, except by recognized experimenters, it will not be possible to make tests on a large scale and to develop fully the idea if it promises to be successful.

The rubber plantations are never actually cultivated. The ground is turned up a bit, however, when the weeds are removed. Weeding is generally practiced on all estates at present, but clean weeding or clearing is no longer customary. The harmful weeds are eradicated, but the others, especially those providing shade are just cut back periodically.

This is known as "controlled forestry". This is much less expensive than clean weeding and is generally considered more beneficial to the trees. Cover crops of leguminous species were previously quite prevalent. Due to the fact that "controlled forestry" gives a satisfactory cover and at much less expense, only a few estates at present, therefore, have cover crops planted.

Fertilizing is not generally done except on estates with unproductive land. The fertilizer most commonly used is sodium of ammonia.

The "A - B - C" system of operation is the one most generally accepted by the estates. This system makes it necessary to partition the effective area of the estate into three parts, A, B, and C.

Parts A and B are placed in operation for a year while part C is resting. Under the usual procedure part A is tapped one day and part B the next. Other estates tap part A for a month and then place it in resting for a month. During the month A is resting part B is tapped. At the end of the month part B is rested and part A brought back into operation again. Thus parts A and B are alternated monthly.

When a year under the "A - B - C" system has been completed, part B is placed in resting for a period of one year and part C is brought into operation along with part A. When 2 years have been completed part A is placed in resting for a year and part B is brought into operation again. When 3 years have been completed, part C is placed in resting and part A is brought into operation. The cycle have then been completed and will be repeated indefinitely.

The following seven steps in the preparation of plantation sheet

rubber are generally followed on the various estates. They are, (1) latex collection, (2) latex handing, (3) coagulation, (4) coagulum handling, (5) machining, (6) drying, and (7) grading and packing.

The collection of latex is known as tapping, and is the drawing off of latex from the tree, by making incisions in the bark. The incision made is usually a half spiral or "V". The half spiral is the more modern. The incision is made on only one side of the trunk, which is divided into two panels. The first incision is made on one panel about 3 feet 6 inches above the ground. A thin slice of the bark is cut away each time the bark is tapped. If the tapping is done well, not more than an inch of the bark is cut away each month. When finally the bark has been cut away down to an inch or so of the ground, the other panel is then tapped.

The latex upon issuance from the bark is like milk. If it is allowed to stand in a warm place or in contact with dirt it tends to deteriorate. Because of this, it is necessary to use clean receptacles if loss in quality on account of premature coagulation is to be avoided.

Where the latex shows signs of premature coagulation, it is necessary to use an anti-coagulant in the field. For estate use, sodium sulphite is considered the cheapest and best. This anti-coagulant should always be added to the latex; it should not be placed in the collecting bucket until required.

Latex should be transported to the factory in covered vessels. Tank trucks can be used for this purpose but a truck provided with comparatively light galvanized iron tanks is considered best. The transportation of the latex in perfect condition is of extreme importance.

When the latex arrives at the factory it must be cleaned and brought into a state suitable for coagulation. For both purposes dilution is essential. The fluidity of the field latex must be increased in order to facilitate the separation of foreign matter. For this purpose latex is diluted with water, the effect of which may be increased by the use of an alkali in controlled proportions. For this reason, sodium sulphite when added to latex assists in bringing about the desired result as it increases the fluidity of latex and allows foreign matter such as sand to separate and settle faster, and bark and other light woody particles to rise more rapidly to the surface.

The latex is then poured into long aluminum-lined troughs. The dilution of the latex is measured by determining its specific gravity and then a weak solution of acetic or formic acid in water is added to the latex. Partitions 2 inches apart are inserted into the troughs and the latex is left to coagulate.

Taking everything into consideration it is desirable to coagulate latex with the maximum dry rubber content and to make a sheet as large and as thin as possible. By so doing, unnecessary capital outlay on dilution tanks and coagulating vessels will be avoided and factory handling charges will be reduced to a minimum.

The next morning the coagulum, as the coagulated latex is known, is ready to be taken to the machines and rolled out. The coagulum is taken from the tank and from there to the machines, great care being taken not to tear or deform the coagulum in any way. The slabs of coagulum are then passed through four pairs of rollers. The space between

each succeeding roller is less and the last one is ribbed. The milled product is a ribbed sheet some four feet in length, twenty inches in width, and one fourth inch in thickness.

After the machining process the sheets are washed and then hung up for the draining and preliminary drying period. The sheets are then taken to the smokehouse where they are dried and cured. It takes from four to seven days to dry and cure a sheet, depending on the liquid content of the sheets and the amount of regulated heat that can be applied. For this reason it is usually about ten days from the time the latex is collected until the prepared rubber can be shipped from the estates.

It is of utmost importance to the estate manager to see that his product is sorted efficiently and is correctly graded as the whole parcel is graded on specimens of the worst sheets in the parcel. The rubber exported from the estates is generally packed in plywood cases, which are either imported or purchased from local manufacturers. They are received knocked-down and assembled on the estate. The cost of the assembled crates is approximately \$00.45. These expensive cases seem to be used from custom as much as from necessity. The cost per pound of rubber packed is slight, however, as each case will hold about 224 pounds of rubber. The local representatives of rubber manufactureres have used burlap for packing and by doing this reduce the cost by considerably over half. However, it appears that overseas buyers prefer the rubber packed in plywood cases.

A most important development of the past few years is the form in which rubber is being exported. Latex is now being exported in liquid, concentrated, and paste form, and in all forms makes up at present 3 percent of the domestic export. The director of the Rubber Research Institute is of the opinion that the proportion will soon increase to 25 percent.

The estates range in size from 100 acres to nearly 10,000 acres. The following table shows the range in number and size:

Size in Acres	No. Acres	%	No. Estates	Ave Ac.
5000 and over	222,844	12	30	7,428
1000 -- 5000	1,051,267	56	562	1,881
500 -- 1000	317,356	17	443	716
100 -- 500	276,257	15	1,297	212
Total	1,813,124	100	2,332	803

The ownership of estates, by races, is shown in the following table:

Race	No. Acres	%	No. Estates	Ave Ac.
European	1,394,037	73 $\frac{2}{3}$	976	1,428
Chinese	356,942	19	984	362
Indian	63,069	3 $\frac{1}{3}$	267	135
Japanese	57,600	3	36	1,600
Malay	12,000	$\frac{2}{3}$	59	203
Others	7,240	$\frac{1}{3}$	10	724
Total	1,890,888	100	1,332	810

The European estates are owned primarily by public limited liability companies. The Chinese estates are almost entirely privately owned, as are the Malayan. There are no Indian estates owned by public limited

liability companies. The acreage of Japanese estates, which are owned by public limited liability companies, slightly exceeds that held by them privately.

It is probably of interest to note that there is only one American company growing rubber trees in Malaya. This is the Malayan American Plantations, Ltd., a subsidiary of the United States Rubber Co. Inc. This company has five estates with a total planted acreage of 29,134 acres. This is a public limited liability company.

The constitution of estates is divided as shown in the following table:

	No. Ac.	%	No. Est.	Ac.
Public limited liability companies	1,321,984	70	815	1,622
Private limited liability companies	71,330	4	44	1,621
Owned by private individuals	497,574	26	1,473	337
Total	1,890,888	100	2,332	810

The public limited liability companies are usually represented in British Malaya by managing agents. Ordinarily the agents are one of the large importing and exporting houses. Through them, the directors instructions are transmitted and the agents are responsible for their being carried out. They are customarily paid a considerable fee for that purpose.

If a number of companies are interlocked through their directors they will have the same managing agents. In such cases the agents can employ an inspector out of their fee. The inspector not only visits the different estates continuously, but he is generally entrusted with the supervision of the estate managers as well.

The managers are generally sent out by the company, but it often happens that a manager is supplied by the inspector. In such cases the manager becomes a direct employee of the company which owns the estate, but he may at any time be shifted from the estate of one company to that of another which is interlocked through the directors. In that way several men can act as relief managers for a number of estates while the manager ordinarily in charge is on leave. A leave of 6 months is usually given every 3 to 4 years. Estates are now generally run by managers alone, except on very large estates where a European or American assistant or two may be employed as well. In the latter case it is not necessary to obtain relief managers from other estates.

All unplanted land which is not reserved by estates and small holdings is owned by the State. Unplanted land which is bought for the purpose of planting rubber trees must be specifically alienated for that purpose. According to law the premiums for land which is to be held by estates are from \$12 to \$90 per acre, as may be fixed by the Government resident. No unplanted land is being purchased at present because planting is prohibited under the international regulation agreement, but if it were, the present premium to be paid to the Government would be about \$60 per acre.

It is estimated by the Rubber Research Institute that under present conditions unplanted land could be brought into bearing for \$48 to \$60 per acre. Extension of a going plantation is much less expensive than starting a new plantation.

The equipment on a rubber estate of approximately 2000 acres which

produces rubber in ribbed smoked sheets, would consist of two latex receiving sheds placed at convenient points on the estate, a factory which is also a receiving station, a storage shed, houses for laborers, a hospital, a shop, a temple, an office, a manager's residence, a 5-to 10-ton motor truck, the manager's car and a bullock cart. All of the buildings, except the manager's residence, are plain boarded and roofed with galvanized-iron sheets.

The factory has a cement floor and contains 8 to 10 latex troughs lined with aluminum, four 20-inch rollers, and a small Diesel engine. The equipment in most estate factories is now old, but recently a number of estates have installed new factory equipment of the latest design. The greatest improvement is the all-in-a-row rollers, which are now becoming generally accepted. Formerly the rollers were placed side by side. In that position they could only turn out 300 pounds of ribbed sheets per hour as against the 900 pounds possible with rollers in a row.

If the estate is shipping latex, no factory is required. It is only necessary to have a tank for holding the latex until shipped. If the estate is shipping concentrated latex it must be equipped with several centrifugal separators, which are on the order of a cream separator, 18 inches in diameter.

The ordinary smokehouse is a shed raised above a furnace which is fired with wood obtained on the estate. Within the shed are a number of racks on which the ribbed sheets are hung like towels. A modern type of smokehouse is now being constructed on several estates. It is divided into four compartments. A furnace is attached to each compartment, thus allowing a better regulation of the heat.

The transportation equipment of an estate is very limited. If the laborers were not required to carry the latex they collect from one to four miles, the estate would have to have three or four times as many trucks or bullock carts.

For estates which are shipping liquid or concentrated latex an elaborate outlay of transportation equipment is necessary. A special truck equipped with a large tank is required to carry the latex to the railway, and a large storage tank must be placed alongside the railway. Special railway tank cars are required for transporting the latex to the port of shipment, where a very large storage tank must be placed. Machines for pumping the latex into the ship's tanks by compressed air have to be installed.

For rubber land that has been granted in perpetuity, an annual fee of \$2.40 per acre is normally levied by the State or Settlement in which it is located. For land which is held on a temporary occupation basis the quit rent is \$3.00 per acre per year.

At the present time there are nearly 20 laborers to every 100 acres. An estate of 2000 acres, therefore, would have 400 laborers. Including the manager, the four native assistants, and an office clerk there would be 406 people employed on an estate of that size. The number of people actually residing on an estate of that size, however, might be over one-third again as much. Most of that number would be the dependents of the Indian laborers.

There is no labor shortage in British Malaya at the present time, except in a limited district in central Johore. In this district the

Chinese are able to demand \$0.60 per day which is approximately two and a half times the average wage. Indian men and women are each receiving at present about \$0.25 per day. On some estates the women may be paid a little less. Children receive about one-half as much. Chinese are usually employed on a contract basis and were paid during 1934 at the rate of \$0.03 per pound for the rubber content of the latex they collect. They usually bring in about 16 pounds per day so they receive an average daily wage of \$0.48. As compared with the Chinese, the Indians only bring in an average of  $11\frac{1}{2}$  pounds per day, which if they were on a contract basis would net them about  $\$0.34\frac{1}{2}$  per day. They actually receive that much, however, when the extra expense to which the estate is put on their behalf is taken into account. The Chinese who are working on a contract basis are not housed, hospitalized, or generally looked after by the estate. That is all done by the contractor who employs them for the estate.

Most of the Chinese are tappers. Of the Chinese, Indian and Javanese labor forces combined, the proportion of tappers is about 54 percent. The rest of the combined labor force is made up of field workers and weeders, 44 percent; and factory workers 2 percent. In addition to the regular laborers, there is one native assistant to every 100 laborers.

The setup for the small holdings differs considerably from that of the estates. In the small holdings class there is approximately 1,330,000 acres alienated for rubber plantations, of which 1,261,074 acres are planted. The remaining 69,276 acres is in reserve and waste land and building sites. Of the planted acreage, 1,110,700 acres are in mature tappable trees. The remaining 150,300 acres are in young trees.

It is estimated that only 312,000 acres or one-third of the total planted acreage in small holdings, are of 25 to 99 acres each. The remaining 949,074 planted acres are all in small holdings of less than 25 acres each.

The following table shows ownership by race, and the number and size of small holdings.

Race	Acreage	%	Number	Ave Ac
Malays	693,591	55	165,000	4 1/5
Chinese	378,322	30	21,000	18
Others	189,161	15	16,000	17
	<u>1,261,074</u>	<u>100</u>	<u>197,000</u>	<u>6 2/5</u>

Practically all of the small holdings are privately owned. A large proportion of those held by Malays are located in Malay reservations. For such land they only pay from \$6 to \$30 per acre. These holdings cannot be sold to anyone other than a Malay.

There are no restrictions against the sale of small holdings outside of the Malay reservations. In fact, a large number of them have been recently bought up and combined into large estates.

The total equipment of a small holding usually consists of a few pans for coagulating the latex, one or two rollers, and if there happens to be sufficient acreage, a small smokehouse. Usually no accommodations are necessary for the owner or his laborers, as ordinarily they are permanent residents of the neighborhood.

The owner usually acts as his own manager. With the Malays it is customary for members of the owner's family and their friends to act as laborers. These laborers not only do the tapping and collecting but also

the weeding and general field work as well. They were in 1935 generally employed on a basis of \$0.05 to \$0.053 per pound of rubber content of the latex collected.

The Chinese and Indian owners of small holdings usually employ their laborers on the same basis, though they may pay a little less. If their holdings are of sufficient acreage, however, they may approximate the status of small estates. In such cases they employ Indian laborers at a flat rate of \$0.21 per day and provide them with a palm-leaf hut in which to live.

The production of rubber on the small holdings is quite similar to that of the estates, except that it is done in a much cruder and primitive way.

At the present time the Government is making an attempt to teach the owners of small holdings how to improve their method of cultivation as well as the manner in which they prepare rubber for exportation. Some favorable results have already been indicated and it is possible that this factor will have considerable influence on not only the condition of small holdings, but also on the price they can obtain for their rubber.

The United Planting Association of Malaya first came into existence on January 1, 1935. This association was founded for the purpose of attempting the better coordination of the representation of rubber growing interests in British Malaya.

The membership of the United Planting Association of Malaya is made up of the following: (a) individuals as partners and/or shareholders in concerns owning land; (b) companies, corporations, partnerships, proprietary planters, which own land; (c) agents and/or secretaries for

companies, or persons who own land in holdings of 51 acres and over; (d) the Rubber Growers Association; (e) state and district planters' associations, all included but the Malayan Estates Association, which represents some 20,000 acres.

Altogether the United Planting Association of Malaya represents over 2,000,000 acres of rubber land in British Malaya. This association now has quasi-official status and is recognized by the Government as the official representative of rubber growers in British Malaya, although it is not yet in a position to express a united opinion.

The Rubber Research Institute was established by the Government about five or six years ago to investigate and experiment in all phases of both the production and the manufacture of rubber. It is financed by the income it receives from the tax on rubber exports.

The Institute is divided into a number of departments. Several are concerned with the treatment of the soil and the care of trees, one is concerned with the methods of preparing rubber for exportation, and one is concerned primarily with the processes of manufacturing rubber products. The undertaking of the last two mentioned are of particular interest to manufacturers in the United States.

The department which is concerned with the methods of preparing rubber for exportation not only experiments with possible improvements, but also investigates specific cases in which the rubber exported contains impurities or deteriorates in transit. If manufacturers anywhere receive shipments of rubber which are in any way irregular, they have only to inform the Rubber Research Institute and the causes of the imperfection will be investigated and, if possible, corrected by its

field officers. This is one of the principle services the Rubber Research Institute can offer the individual manufacturers.

The service it can offer manufacturers as a whole is the discoveries it makes from its experiments in the processes of manufacturing rubber products. Possibilities of manufacture are investigated by the Rubber Research Institute. Its purpose in this, of course, is to develop and discover the uses to which rubber can be put. Some of the discoveries now known have either emanated from or have been perfected by the Rubber Research Institute.

In addition to the Rubber Research Institute, several rubber manufacturers have laboratories in British Malaya. The main purpose of these laboratories is to analyze the chemical composition of the rubber they buy and to advise the producers of what alterations in the method of preparation are necessary in order to make the composition of the rubber conform with the requirements of the manufacturers. This is a comparatively new procedure in British Malaya and may have the effect of completely altering the present classification of rubber.

Rubber produced on estates is sold either in London by the companies owning the estates or in one of the local markets. The greater proportion is sold locally but considerable is sold in London.

When rubber is sold by producers directly to export dealers, a negotiation price is usually fixed. Of that amount, the estates will only receive 70 percent or so in cash. The export dealers supposedly hold the rubber for 30 days. During that period the estates are permitted to select the prices quoted on any one day as the sale prices for the different grades in rubber.

The export dealers grade and pack the rubber and at the end of the 30 days pay the estates the difference due them in accordance to the amount of each grade. Relatively little rubber is sold directly by estates to export dealers.

Most rubber produced on estates is sent to the companies managing agents, who may act as export dealers as well. If they do not, they will sell the rubber to export dealers in one of the local markets. Rubber which is handled by managing agents is never paid for on a negotiation-price basis. Most managing agents are located in Singapore, and rubber is usually sent to them by train. The importance of the railway is reflected in the location of estates, a large proportion of which border the railway lines in British Malaya.

The total costs for rubber produced on estates ranges from \$0.036 to \$0.084 per pound. The average total cost in 1935, on a basis of costs of 20 companies, was \$0.0561 per pound. This total cost included bringing trees to bearing, preparation of rubber for export, upkeep of buildings and machinery, general charges and the export tax of \$0.006 per pound. The following table gives the various costs:

Items	Cost per pound
Trees in bearing	\$ 00.0080
Preparation of rubber	00.0236
Upkeep of buildings and machinery	00.0010
General charges	00.0175
Rubber tax	00.0060
Total	\$ 00.0561

During the year 1935 with the price of rubber at about \$0.126 the

estates made an average profit of \$0.06 per pound of rubber produced.

On the basis of the average normal production of 246.8 pounds per acre for all the acreage, both effective and otherwise, in estates, the gross profit per year should be approximately \$16.50 per acre for each acre in the estate.

To derive the net profit, it is necessary to deduct the salaries paid to directors and the expenses of an office if one is maintained in addition to that of the managing agents.

The total exports, in long tons, of plantation rubber from British Malaya during 1934, divided according to classes and the amounts consigned to each country, were as shown in the following table:

Country	Dry smoke sheet	Sole crepe	Latex	Total
United States	332,627	25	6,098	338,750
United Kingdom	133,667	787	3,298	137,752
Continent of Europe	116,566	337	4,067	120,970
Japan	51,821	19	204	52,044
British possessions and protectorates.	18,507	63	457	19,027
Netherland India			1	1
Other countries	8,589	28	47	8,664
<b>Total</b>	<b>661,777</b>	<b>1,259</b>	<b>14,172</b>	<b>677,208</b>

It is estimated that  $32\frac{1}{2}$  percent of the total was exported by mainland shipping agents and export dealers;  $22\frac{1}{2}$  percent by local representatives of manufacturers of rubber products, and  $22\frac{1}{2}$  percent by Singapore rubber mills.

There are 25 rubber milling companies in Singapore, 5 of which do 70 percent of the business. Each of these 5 companies have four or five mills, the rest having only one mill each.

The purpose of these mills is to prepare rubber for exportation. The greatest part of the rubber they receive is in the form of wet sheets, having an average water content of 25 percent and not suitable for shipping over great distances. They are milled on a series of rollers into blanket and mottled crepe. These forms of crepe are dried by steam heat, 20 to 30 days being required, depending upon the water content.

The mills also receive a considerable quantity of rubber in the form of scrap, lump, and bark. These are the odds and ends which could not be made into sheets or crepe by the estate or small holding. They include the strippings left on the tree after the flow of latex has ceased, the sediment in collecting cups, and any bits which are mixed with bark or other material. These are milled principally into bark crepe. Bark crepe is air dried and the time required is about 20 to 30 days.

Blanket crepe makes up about 65 percent of the mills output; 15 percent is bark crepe, and 10 percent is mottled crepe. The other 10 percent is made up of smoked sheets. These are received by mills in the form of either unsmoked or improperly smoked sheets. They can be prepared for exportation in less than a weeks time.

The rubber milled is purchased from estates, small holdings, and dealers, and at the weekly auction held in Singapore, and is sold directly to buyers in the United States and elsewhere. About 70 percent of the blanket and bark crepe is sold to American buyers and a

small proportion to local rubber dealers.

Singapore is the principal rubber market in British Malaya. Not only is the greatest proportion of domestic exports brought to it, but most of the rubber imports into the country pass through that market as well. The other markets, such as Kuala Lumpur, Penang, Malacca, and Ipoh, are concerned primarily with rubber produced in the particular districts in which those towns are located.

The company agents, located in Singapore and the other towns in which there are rubber markets, are the principal contact between the estates and the different markets. A great deal of the rubber is shipped directly to London, but they also sell locally. They sell direct to local representatives of foreign buyers and to the rubber milling companies, but most of their local business is with the export dealers.

Five foreign manufacturers are represented in the Singapore market by local buyers. Four of the foreign manufacturers represented are American. The representatives are located in Singapore but rubber is obtained from all available sources. Their principal sources are the small holdings, or the dealers handling such rubber, and the rubber mills. The rubber is usually delivered in a loose form and is graded, packed, and shipped by the local representatives. The total amounts, as well as the amounts of each grade purchased, depend upon the orders received from the foreign manufacturers.

The primary object of the local administration of rubber regulation is to enable rubber estates to operate on a normal and constant basis of

production. It is on this basis that they now hope to continue the production of rubber.

At the present time, the supply of rubber which manufacturers receive from small holdings in British Malaya is considerably reduced. That supply, on the other hand, is being preserved to some extent by the regulation. The restricting of small holdings forces them to adopt a far more conservative basis of production than they would otherwise have at the present level of prices.

When and if the regulation is withdrawn, therefore, rubber manufacturers may be among those who have been benefited by the regulation.

Under the regulation, British Malaya is required to export all but 12 percent of its allowable exports during the calendar year. For that reason, estates are required to use all of their export rights during that period and small holdings are only allowed a carry-over of approximately one month's production. When the quarterly cancellation of export rights and coupons comes into effect, estates will be required to use their coupons within a few days thereafter. This requirement should assure more regular export of each quarter's production of both estates and small holdings.

Rubber products manufacturers' representatives in Singapore have expressed the attitude that with a permanent and constant supply assured, the price, so long as it is constant and reasonable, is not so important.

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