The Agricultural Economy of Indonesia

by
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Preface

The Japanese invasion of Indonesia in 1942 brought to an abrupt end more than 300 years of Dutch hegemony in these East Indian islands. Under Dutch rule the Netherlands East Indies had been one of the most profitably and efficiently run colonies in Asia. They are said to have contributed annually one-sixth of the Dutch national income. Because of their financial dependence on the Indies the Dutch concentrated on economic penetration of the islands and exercised comparatively little cultural influence.

A paternalistic administration deliberately sought to preserve the traditional structure of Indonesian society as a barrier against the spread of nationalistic aspirations among the people. Political parties, trade unions, free press, and liberal education were tolerated only to a minor degree. Individuals and organizations that openly espoused the cause of Indonesian nationalism were repressed.

To the credit of the Dutch was a public health service largely responsible for one of the lowest death rates in South Asia, an efficient administrative machinery, and a land tenure law that prevented ownership of real property from passing into the hands of foreigners. Dutch law and the local traditions of communal landownership combined to protect the smallholder. Unlike other countries in the Far East, Indonesia has neither an indigenous nor an alien class of large landed proprietors and absentee landlords. But on Java the great pressure of population has brought about the opposite evil: continued subdivision of holdings to the point where native agriculture is based on uneconomic cultivation of dwarf units and marginal land. As a result, productivity is low and concealed unemployment is widespread in the rural areas.

During the Japanese occupation, the Indonesian nationalist movement got its first real opportunity of expression. It is true that the political independence promised by the Japanese invaders was a sham, but they found it more convenient to enlist the collaboration of leading nationalist elements in governing the islands than to administer in detail themselves. As the Pacific war began to go against them, the Japanese, increasingly preoccupied with other matters, turned over an ever-growing share of internal administration to the Indonesians, who thereby gained further practical experience and self-confidence.

The suddenness of Japan's surrender caught the Allies by surprise in Southeast Asia. A group of Indonesian nationalist leaders on Java quickly proclaimed the creation of an independent Republic of Indonesia on August 17, 1945. The recently liberated Netherlands was in no position to reestablish control over the islands. Great Britain was designated by the Allies to receive the Japanese surrender in Indonesia and disarm the troops of occupation, but the new Republic was more than a month old when the British forces arrived on Java. Somewhat later, when the Dutch began to trickle

back, they were quite unprepared for the vigor of nationalist sentiment and the functioning Indonesian administration that they found.

There followed a long period of political maneuvering, military action against the Republican forces, United Nations intervention, compromise truce agreements, further Dutch "police action," guerrilla warfare, and mutual recrimination. Finally, under heavy political pressure from the Great Powers, the Netherlands agreed on a formal transfer of sovereignty to the Republic of the United States of Indonesia (R. U. S. I.), which took place on December 27, 1949. This was to be a federal government of member republics and an equal partner in the projected Netherlands-Indonesia Union. In insisting upon a federal structure, the Dutch had hoped to moderate the influence of the young and vigorous Jogjakarta Republic (R.I.), which had been the leader in the fight for independence.

No sooner had the federal government been established than the member states started joining the Jogjakarta Republic and negotiations were initiated to abandon the federal structure in favor of a unitary-type government. In large measure this movement was due to the onus attached to the idea of federation because the Dutch had initiated it, but it also reflected the difficulty of imposing a workable federalism from the center instead of through spontaneous action by the member states themselves. The new unitary Republic of Indonesia was created at Djakarta on August 17, 1950, just 5 years after the original Republic had been proclaimed at the end of the war.

The new Government of Indonesia was successor to a rich heritage—the most diversified agricultural economy in Southeast Asia, a fertile volcanic soil and a lush tropical climate, 2,000 islands of varying size, and 75 million people, of whom two-thirds lived on crowded Java and Madura, with a density of more than 1,000 per square mile. Under Dutch rule the Indies had developed a unique dual economy: small-scale native subsistence agriculture, utilizing 93 percent of the cultivated land and supporting more than two-thirds of the indigenous population; and large-scale scientifically managed European estates (operated for the most part on leased land), utilizing only 7 percent of the cultivated area but supplying the bulk of the export commodities that have made these islands famous throughout the world—coffee, tea, rubber, palm oil, cinchona, sugar, tobacco, etc.

Many grave problems, however, faced Indonesia at the beginning of 1950. Property damage had been extensive during the 5 years of civil strife that had preceded the inception of the new republic. The central government was able to exercise little control over many of the outlying regions; lawless bands of guerrilla troops still roamed the rural areas, pillaging at will. Unemployment was widespread; banditry offered a means of livelihood. Native agriculture carried on, but the export economy of the islands was operating at one-third the prewar level.

Lawlessness abated somewhat during 1950, but there has since been some resurgence of guerrilla activity and terrorism. The functioning of government suffers from a lack of skilled administrative and technical personnel. Under the Dutch there was little

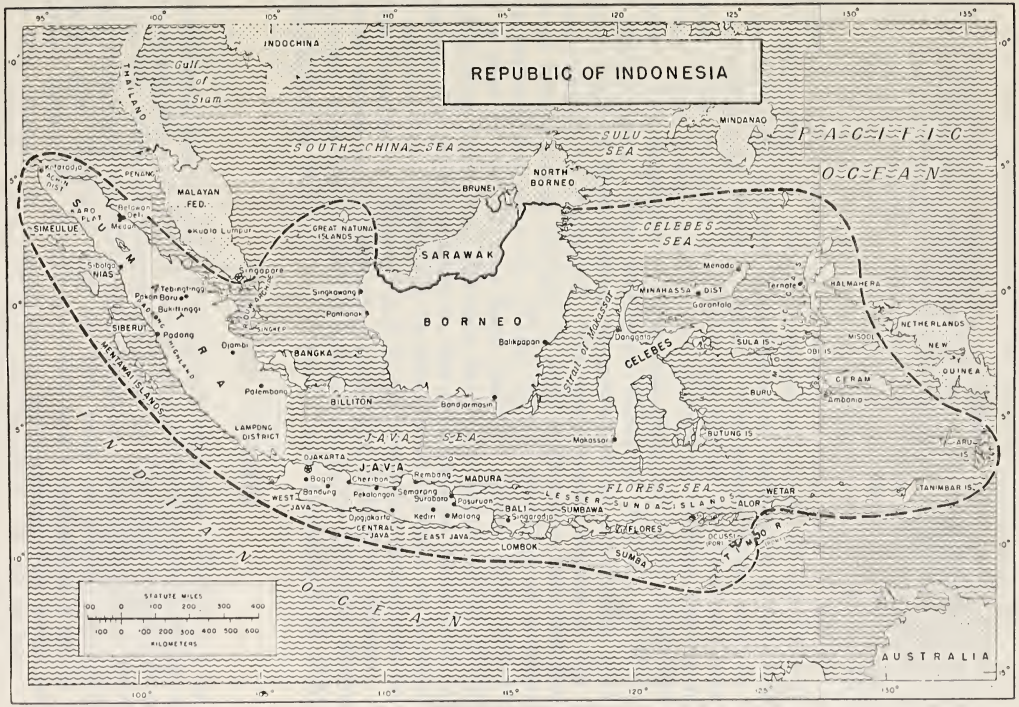
opportunity for Indonesians to gain this type of training, and now that the Dutch are gone much is dependent on makeshift. For the first time since before the war Indonesia had an export surplus during 1950. This surplus, however, was the direct result of a temporary rise in world prices for tropical commodities, particularly rubber, rather than of the monetary reforms initiated by the government. Meanwhile the Communist-dominated labor movement in Indonesia exercises an obstructionist policy that seriously hinders economic recovery and lowers labor productivity.

Indonesia undoubtedly has the potential to become one of the leading powers in the Far East. A large population and a wealth of natural resources—soil, climate, minerals—plus the great reserve areas of the Outer Islands as yet unexploited, may be combined in such a way as to yield a relatively high standard of living and a prosperous national existence. Considerable foreign assistance will be needed to develop this economy, but technical rather than financial aid is probably the most critical need.

The new government's egalitarian economic program advocates further diversification of agrarian production and improved techniques of cultivation; expansion of industrial production as an outlet for Java's rapidly growing population; development of popular economic organizations, particularly cooperative and credit institutions; and formation of investment capital through mass savings. But the raising of living standards through increased production is contingent on the prior achievement of certain basic conditions now lacking: (1) Immediate restoration of law and order, (2) improvement of government administration, (3) sound monetary and fiscal policy, and (4) cooperation on the part of the organized labor movement.

Once these basic conditions of law and order, government efficiency, and labor cooperation are achieved, a large volume of exports will be possible—sufficient to meet most of the needs for foreign exchange. But a shortage of skilled personnel will exist in many branches of government and industry for a good many years to come. At present, strongly emotional nationalism presents a serious barrier to any type of foreign investment or technical assistance. But given time these extreme sentiments will subside and more effective international cooperation will then be possible.

This monograph was prepared for publication during the latter part of 1951, at a time when statistical data on current economic development in Indonesia were obtainable only through the year 1950. Due to delays in publication, it was possible to incorporate into the text certain revisions pertaining to major economic trends during 1951. However, the author wishes to point out that his presentation and analysis are primarily concerned with developments through the year 1950. And, needless to say, the inadequacy of current information is a great obstacle in the path of any effort to describe an economy in transition.



U S DEPARTMENT OF AGRICULTURE NEG 1795 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

FIGURE 1.—More than 2,000 tropical islands situated astride the Equator comprise the new Republic of Indonesia, formerly the Dutch East Indies.

I. GEOGRAPHIC CHARACTERISTICS

Topography

The Republic of Indonesia comprises the greater part of the Malay Archipelago, which lies between the southernmost tip of the Asian mainland and the northern shore of Australia and therefore dominates the passage between the Indian Ocean and the Pacific. The Indonesian part of the archipelago straddles the Equator between 6° N. and 11° S. and stretches from 95° E. to 131° E., a distance of 3,000 miles. The width of this belt of islands is about 1,000 miles (fig. 1). Superimposed on a map of the United States, the western and eastern boundaries of Indonesia would touch both the Atlantic and Pacific coast. The actual land area is 575,895 square miles, roughly one-fifth the size of the United States.

More than 2,000 islands are contained within the archipelago. However, the Republic of Indonesia does not have sovereignty over the entire area. The northern third of Borneo is British, the eastern half of New Guinea is governed by Australia, and half of Timor belongs to Portugal. The permanent status of the western part of New Guinea (Irian) is still in dispute, but the Dutch still have jurisdiction over it. Prior to the transfer of sovereignty, it was a part of the Dutch East Indies. Since Java and the small neighboring island of Madura form the lower pivot of the island complex, the other islands in the archipelago have been traditionally referred to collectively as the Outer Islands, or sometimes the Outer Provinces. Spread out in an irregular semicircle from west to east, these major island groups are Sumatra, Borneo, Celebes, Moluccas, and the Lesser Sundas. A more detailed discussion of topography as related to agriculture is contained in chapter IV.

Monsoon Climate

Indonesia has a tropical monsoon climate. The daily variations in temperature are small, owing in part to the moderating influence of the sea, which tempers the heat by day and retains it at night. Since Indonesia is astride the Equator, the difference between the longest and shortest day in the year is slight throughout the islands; hence the duration of the sun's radiation is quite uniform and the change in temperature throughout the year negligible. What variation exists is largely a matter of elevation. At Djakarta (formerly Batavia) on Java, which is approximately at sea level, the warmest and coolest monthly averages differ by only 1° F., with an average daily minimum of 75° and an average daily maximum of 88°. The yearly average at Djakarta is 79°, which corresponds to most of the sea-level locations throughout the archipelago. With an increase in altitude the temperature decreases

1° about every 300 feet. Humidity is high, though less stable than temperature. The average annual relative humidity at Djakarta is 81 percent, with an average daily minimum of 63 and a maximum of 94 percent.

Throughout the Malay Archipelago the normal trade-wind system of the Tropics is disrupted by the influence of the neighboring land masses of Asia and Australia. In the summer of their respective hemispheres, these two continents draw the air from the opposite hemisphere across the Equator, from high pressure area to low. South of the Equator, in Java for example, from December through February air currents flow from the northwest out of Asia bringing the wet (West) monsoon to the region. From July through September the opposite condition prevails in Java, with the air currents originating in arid Australia to the southeast. This is the dry (East) monsoon, which itself yields little rain except when forced to rise over mountain barriers. North of the Equator, in East Coast Sumatra for example, these same wet and dry seasons occur but the prevailing wind direction is reversed by the earth's rotation.

In actual fact, the greater part of the archipelago usually has no truly dry season. The intense heat of the morning, characteristic of the Tropics, produces convectional thundershowers practically every afternoon, and it is in this form that a sufficiency of rain is received almost everywhere in the islands even during the so-called dry monsoon. At Bogor (Buitenzorg), south of Djakarta, thunderstorms occur on an average of 322 days a year. However, annual rainfall does vary considerably in different parts of the archipelago. For example, recorded annual averages range from a low of 22 inches in Paloe (Celebes) to a high of 277 inches at Tenjo (Java), with the following annual averages being recorded for other more typical stations: Djakarta 71 inches, Samarang 87, and Surabaya 68, all in Java; Medan and Palembang in Sumatra, 79 and 89 inches, respectively; Pontianak and Balikpapan in Borneo, 127 and 78 inches, respectively; and 139 inches for Amboina in the Moluccas.

Natural rainfall is nearly everywhere adequate for agriculture, except in certain sheltered parts of northeastern Java, Madura, and the southeastern islands nearest Australia. In Java and Madura, extensive irrigation systems relieve the dependence on rainfall and permit wet rice cultivation throughout the year. There is also considerable annual variations in monsoon rainfall, which results in there being no dry season at all in some years and a several-month drought in others.

Soils

The southwestern islands of Indonesia—Sumatra, Java, and the Lesser Sundas—are among the most volcanic territories in the world. This has been the chief factor affecting the fertility of soil in Indonesia and, in turn, its agricultural development. In Java, the most important agricultural region of the archipelago, the soils may be divided into three groups: (1) those of volcanic

origin, usually fertile and of good texture; (2) those of the alluvial plains, fertile but rather heavy; and (3) those of Tertiary origin, poor and heavy.

The land on this island has long been under continuous cultivation and, in some cases, no longer offers the same advantages as newly reclaimed areas. High yields are often impossible without application of natural or artificial fertilizers. On the whole, however, most of the soils of Java, Bali, Lombok, and parts of Sumatra and Celebes are very fertile, chiefly because of the great quantities of volcanic ash that have overlaid land of Tertiary origin. Under the influence of a warm, damp climate the volcanic material disintegrates and brings about a thorough rejuvenation of the soil.

In some sections of Sumatra, relatively recent volcanic action has improved the soil to such an extent that it is as rich as on Java, but, on the whole, Sumatra is in a less favorable position because vast areas are entirely outside the range of volcanic influence. The soil of the Celebes is mainly of the same poor quality, except for the fertile volcanic areas of the northeast and southwest. Borneo and the Dutch section of New Guinea are entirely devoid of volcanoes, with the result that hardly anywhere on these islands is the soil of such character that it can be used for consecutive plantings without costly special preparation.

II. THE PEOPLE

Population and Density

The last official census of Indonesia was taken in 1930, when the total population was given as 60,727,233. The population in 1940 was officially estimated at 70,476,000, based on an annual increase of 1.5 percent—about 1 million per year. Since 1940 the population has not increased as rapidly, due to lower levels of food consumption and the disruption resulting from Japanese occupation, hostilities against the Dutch, and civil strife. Hence the total 1950 population of Indonesia probably did not exceed 75 million.

With a land area of nearly 576,000 square miles and a population of 75 million, Indonesia has an average density of 130 persons per square mile. This figure does not, however, reflect the real problem of population density in the Indies, because it does not take into account the extremely uneven distribution over the archipelago. The population of Java and Madura alone is estimated at nearly 52 million, more than two-thirds of the total; yet these islands make up only 9 percent of the land surface of Indonesia. The density on these two islands is 23 times the average density in the Outer Islands. In the more fertile rice-producing areas along the river banks and in the north coast region of Java, the density reaches more than 1,500 per square mile. Thus Java has become one of the most densely populated agricultural areas in the world, rivaled only by some districts of China, parts of the Ganges Valley, and the Lower Nile.

The sparsely peopled Outer Islands, with a population of 23 million and an average density of 44 persons per square mile, present a striking contrast to Java. Here, too, density varies considerably, ranging from 563 per square mile in Bali and Lombok to 84 in Timor and the Lesser Sundas, 72 in Celebes, 56 in Sumatra, 22 in Moluccas, and only 13 in Borneo. The limited fertile area in some of these islands and the dense growth of tropical jungle that prevails in others are mainly responsible for this scarcity of population.

In bringing about population density, urbanization is much less important than soil fertility. Only 6 cities on Java and 1 on Sumatra had populations in excess of 100,000 at the time of the 1930 census. In that year, 5.3 percent of the inhabitants of Java and 3.6 percent of the people of Sumatra lived in officially recognized municipalities. However, it is thought that the percentage of urbanization has at least doubled during the past 2 decades. Latest population estimates for the 4 largest cities of Java show about 2,500,000 for Djakarta, 1,000,000 for Surabaya, 600,000 for Bandung, and 400,000 for Jogjakarta.

Ethnic Groups

The population of Indonesia is officially divided into four groups: Indonesians, Europeans (including Eurasians), Chinese, and other Asiatics (mostly Arabs). The first group accounts for more than 97 percent of the total population and consists of a number of predominantly Malay races, differing in language and in other ways, but mainly Moslem in religion. Actually about 200 languages and dialects are said to be spoken in the islands, grouped into Indonesian, Melanesian, and Polynesian roots. Bahasa Indonesia, which is a revised form of high Malay, is the official language used by the government. However, low Malay still predominates as the language of general intercourse among the different language groups and between the latter and the Western population. It may take many years to bring about a real adoption of Bahasa Indonesia as the national language. The most important indigenous languages prevailing among the 52 million people of Java and Madura are Javanese, Sundanese, and Madurese. The business languages are English and Dutch.

The European element of the population was, until recently, most prominent in every walk of life. Since the transfer of sovereignty from Dutch to Indonesian hands on December 27, 1949, numerous changes have taken place that have drastically curtailed the participation of Europeans in Indonesia's public life. Many Dutch nationals have left the country in the last few years, especially those formerly in government administration. Considerable anti-Western feeling is expressed in some circles of Indonesian society.

Numbering about 1.5 million, the Chinese comprise the largest foreign group in the country. Their influence is felt most strongly in trade and commercial activities. About 60 percent of the Chinese working population are engaged in commerce and industry. In contrast, at least 70 percent of the indigenous population are engaged in agricultural pursuits, and only about 15 percent of the Indonesian working force is dependent on commercial and industrial employment.

Cultural Pattern

The existence of numerous ethnic groups on a large number of widely scattered islands has produced a varied cultural pattern. Communal instincts are strongly ingrained in these people. Rural social organization is built around the village (desa) where life is slow and unhurried, reflecting simple and easily satisfied needs. Java's rich volcanic soil permits cultivation of a wide variety of tropical food products.

The indigenous population has an ancient literature and music of its own. Bali has been widely publicized because of its high development of music, dancing, and the theater. Each village has its own "gamelon" orchestra, its own graceful and well-trained dancers, and often a puppet theater. The Balinese, aided by an excellent irrigation system, are the most adept rice growers in Indonesia, and they are highly skilled wood carvers, weavers, and

craftsmen of gold and silver. The tradition and value system of the archipelago is based largely on the principles inherent in the Islamic religion, to which 90 percent of the native population nominally adhere. The exception is found on Bali, where most of the natives are of the Hindu faith.

Literacy

The basis of rural education in Indonesia is the village school, where instruction is given in the vernacular or, if teachers and textbooks in the local dialect are not available, in Malay—lingua franca of the archipelago. Special schools are provided for the Chinese; in these schools Bahasa Indonesia and English are now being taught, though before the war the emphasis was on Dutch.

The only real statistics on literacy in Indonesia are for the years 1920 and 1930. Both surveys are based on official census findings. They indicate that although there was a slight increase in literacy during the decade covered, the number of Indonesians who could read and write was still less than 7 percent in 1930, with males predominating by a ratio of 5 to 1. Perhaps double this number are now literate, and progress should be much more rapid now that the new government is expanding the number of rural schools and adult education centers.

III. POSITION OF AGRICULTURE IN THE ECONOMY

Rural-Urban Income Distribution

The unmistakable agricultural character of Indonesia is shown by the fact that more than 70 percent of the indigenous working population are peasant farmers. Undoubtedly the number of people dependent on agriculture for their livelihood is greater than this percentage would indicate. Although efforts have been directed in recent years toward increasing industrialization, they have not been successful enough to change the basically agrarian character of the economy. Approximately three-quarters of the national income is derived from agriculture.

The gross national income of Indonesia in 1939 was an estimated US$1,554 million.[1] Of this amount, 69 percent went to native Indonesians, who constituted 97.4 percent of the total population, and 31 percent of the national income was earned either by resident foreigners—2.6 percent of the population—or by overseas stockholders. Hence the Indonesian share of the national income amounted to only US$15.85 per capita. This low level of income, one of the lowest in the world, is a reflection of the prevailing pattern of subsistence farming and concealed unemployment prevalent throughout the islands. It also reflects the utter impossibility of making an adequate income study of a nonmoney economy based on subsistence farming.

An American agency has made a more recent study which indicates that in terms of inflated postwar United States dollars the gross national product of Indonesia was $3,110 million in 1950.[2] Of this amount an estimated 75 percent was derived from agriculture, 8 percent from fishing, 6 percent from mining, and a negligible portion from forestry—a total of 89.3 percent from primary production. In contrast, industrial production according to this survey yielded only 6.4 percent of the gross national product. Assuming a population of 75 million, this amounts to an average per capita share of US$44 in the gross national product. In this study no attempt was made to analyze the actual percentage distribution of the total sum between Indonesians and foreigners.

Money has never played an important part in this type of economy where production is largely for personal consumption. The ordinary peasant is virtually self-sustaining, with his 2 acres of land planted to rice, cassava, and coconuts and with his several

[1] Calculated by Dr. J. J. Polak for the Board of the Netherlands East Indies.
[2] Far East Program Division, Mutual Security Agency. In this study no deductions were made for depreciation and taxes; hence, in this case, gross national product is not strictly comparable to gross national income.

chickens. It has been estimated that only 10 percent of the output of the average Javanese farmer is devoted to cash crops; the balance is consumed by him and his family. In recent years, however, the peasant farmer has been forced to sell an increasing share of his harvest, or to do outside wage work, in order to pay taxes and purchase basic necessities. But it is still true that the lush tropical climate and the simple rural existence led by most of the population preclude the necessity of a substantial cash outlay for the means of subsistence.

Smallholders' vs. Estate Production

The outstanding feature of Indonesia's agrarian economy is its dual nature: on the one hand, small-scale native farming carried on by most of the indigenous population, and, on the other hand, large-scale scientifically managed European plantations—agricultural estates as they are usually called. Estate production is almost entirely for export, while smallholders' cultivation is undertaken both for domestic consumption and for export, though the greater part of it is organized on a simple subsistence basis. The European-owned and operated agricultural estates utilized only 7 percent of the cultivated area just before the war, yet they supplied 60 percent of total agricultural exports.

Estate agriculture represents a substantial investment of foreign capital. The latest technical innovations are utilized, average yields are high, and generous profits are accumulated in good years. But the system lacks flexibility, for it is highly dependent on the cyclical movements of world trade and general prosperity. During the depression of the 1930's the European planters attempted measures of cooperative marketing and voluntary restriction of output to stem the tide of disaster, but in common with primary producers in other countries they found the terms of trade moving sharply against them.

In contrast to the highly specialized plantations, smallholders' agriculture is more elastic and the process of adjustment to fluctuations in world demand is accomplished without great pain. The Indonesian peasant does not put all his eggs in one basket. He may neglect somewhat his food crops in boom years and buy foreign-grown rice with money earned from copra or rubber sales, but, when the price pendulum swings back, there is nothing to prevent his planting rice or cassava among his rubbertrees and waiting for conditions to change.

In recent years, smallholders' agriculture, especially in the Outer Islands, has been furnishing an increasing share of the value and volume of agricultural exports. In 1898, plantations accounted for 90 percent and smallholders' agriculture for 10 percent of the total value of agricultural exports; in 1913 the figures were 75 and 25 percent, respectively; and by 1938 they were 60 and 40 percent. Since the war, a number of abnormal factors have prevented estate agriculture from reaching its former position (see ch. IX and X), and in 1950 the European-owned plantations furnished only 32 percent of the value of all agricultural exports, while smallholders

supplied the remaining 68 percent. It is still too early to determine whether this new relationship will continue.

While it is true that the new Republican Government of Indonesia has been fostering the development of smallholders' agriculture at the expense of estate production as part of its economic diversification policy, it has not yet reached any decision regarding the permanent status of estate cultivation. The government believes that the low standard of living in the rural areas can be raised only by the direct encouragement of small-scale producers. It seems likely, therefore, that native agriculture will at least be able to hold its own against estate enterprise in the coming years.

Principal Agricultural Products

In contrast to the other countries of Southeast Asia that are to large degree rice monocultures, Indonesia has a highly diversified agricultural economy. Both estate and native growers produce a great variety of commercial export crops, which eventually find their way to the far corners of the globe. Total agricultural exports accounted for 64 percent of the value of all Indonesian exports in 1938, while in 1950 the share from agriculture had risen to 69 percent.

Part of Indonesia was once called the Spice Islands, and today these islands still produce much of the world's pepper and a sizable quantity of its nutmeg, mace, cloves, and cinnamon. Among the other tropical agricultural exports are the three important beverage products, coffee, tea, and cocoa. Before the war, sugar and tapioca were exported in large quantities but their importance has since declined. On Sumatra, some of the world's best tobacco is grown, famous for its use as a cigar wrapper. Soap and margarine makers in many countries use palm oil and copra imported from Indonesia, and most of the world's supply of natural rubber comes either from these islands or neighboring Malaya. Java has a virtual monopoly in the growing of cinchona from which quinine is obtained. Several of the more important hard fibers are grown in Indonesia, and in addition it is the world's principal source of kapok.

The European estates do not grow food products for domestic consumption; this phase of the economy is almost exclusively sustained by smallholders' production. Irrigated rice accounts for the largest amount of acreage and is the principal food crop. Upland dry rice is also grown. Corn and cassava are staples in the diet of many peasants, though rice is far more appreciated. Peanuts, sweetpotatoes, and soybeans are grown in lesser quantities, along with other root crops and pulses. A great variety of tropical fruits are found throughout the islands but, except for bananas, they do not enter the export trade.

IV. PRINCIPAL AGRICULTURAL REGIONS

Java and Madura

The volcanic mountain range, known as the Sunda fold or anticline, that traverses the full length of Sumatra continues almost uninterrupted across the island of Java from west to east. Notwithstanding the occasionally disastrous eruptions, these volcanoes have been a true blessing to the island, covering great parts of its Tertiary soil formation with fertile volcanic ash. A second beneficial result of these volcanic mountains is the convectional rainfall they promote during the east monsoon, which would be a much drier season if the prevailing winds were not forced to rise over these mountain barriers.

The north coast of Java is a broad coastal plain—its soil a rich alluvial deposit obtained from the many short rivers that rise in the central mountains of the island. The heavy tropical rainfall results in deep erosion of the lateritic face of these volcanic cones. Between this coastal plain, which narrows somewhat to the east, and the central mountain range, there exists a hill zone of Tertiary geological origin, its soil less fertile than the lowlands because of constant leaching and the lack of alluvial deposits. Among the high mountains that form the backbone of the island, there exist a number of intermontane basins, perhaps once inland lakes but now level plains covered with fertile volcanic soil and having abundant rainfall. Java's south coast is hilly. Only in the central part are there lowlands; everywhere else hills of Tertiary origin and limestone cliffs meet abruptly with the sea.

Rainfall is generally heavy throughout the island, with a distribution such that East Java as a whole has less precipitation than West Java, and the south coast more than the north coast. Rainfall increases strongly toward the windward side of the mountains, with the prevailing wind reversing itself from east to west in the change-over from dry to wet monsoon. Most of the north coast of Java has from 60 to 80 inches of rainfall annually. The balance of the island has more than 80 inches of rainfall, with large areas along the central mountain range experiencing from 120 to 160 inches or more a year. With this abundance of rainfall and good soil, Java is one of the most completely cultivated regions in the world. At least 65 percent of the land surface is under crop cultivation.

Rice is Java's primary crop, utilizing 47 percent of the area devoted to smallholders' agriculture in 1950. Irrigated rice is grown throughout the island, with definite concentrations on the north coast lowlands, along the river valleys, and in the intermontane basins. West Java, on account of its more abundant rainfall, is a more important rice producer than East Java, while Central

Java forms a transition. Among the dry field crops, corn, cassava, and padi gogo (unirrigated rice) may be ranked in that order. Corn production is heavily concentrated in East Java, in regions where natural rainfall is insufficient for irrigated rice. About one-half the planted area of this region is in corn, whereas in West Java it is customarily grown only on the mountain slopes too steep or too high for rice cultivation. Cassava may be found throughout the island and covers about two-fifths of the area planted to corn. Padi gogo is grown in the mountain districts of Java during the rainy season; its chief concentration is in West Java. Peanuts, sweetpotatoes, and soybeans, the other leading dry crops, have no particular distribution pattern.

Of the main estate crops, only sugarcane and tobacco compete for land that would otherwise be used for smallholders' agriculture. Hence, these two crops are generally grown on short-lease lands rented for a single harvest, after which the fields are returned for native cultivation of rice. Sugar and tobacco estates are both concentrated in the lowland areas of East or Central Java. Since the war, neither crop has come close to reaching its former level of production.

Tea estates are located on the rainy mountain slopes of West Java, at an elevation of from 1,000 to 6,000 feet, whereas coffee, which needs a definite dry season during the blooming period, is found almost exclusively in the uplands of East Java. Rubber estates are located on the lower mountain slopes of West and East Java at elevations under 2,000 feet. Rubbertrees may be grown under poor soil conditions, where other estate crops will not thrive. Estate production of cinchona trees is concentrated in a small plateau area of West Java. Cinchona grows best at altitudes between 3,000 and 7,000 feet. Other scattered estate crops include cacao, cantala, sisal, and gutta percha.

The small island of Madura, adjacent to the northeast coast of Java, has no mountainous region, only low foothills and coastal plains. In fact, large parts of the island have so little natural gradient that irrigated rice cultivation is virtually impossible. Rainfall is under 80 inches, except on the west coast. Erosion is a serious problem. Madura is practically deforested, and 80 percent of its arable land consists of dry fields, three-fourths of which are planted to corn. Livestock are more numerous on Madura than on Java and much of the corn is used as cattle feed. There are no estates on Madura, but some smallholders' tobacco is grown.

Sumatra

Sumatra, the world's fifth largest island, is still mostly covered with sparsely populated tropical rain forest, although some parts have been developed into highly specialized plantation regions, which are models of tropical agriculture. In the early period of European colonization little attention was given to this island. Small settlements were started in the nineteenth century, but the Dutch did not complete the pacification of Sumatra until 1908, after which estate agriculture developed rather rapidly.

The island of Sumatra is split lengthwise by a continuous mountain system, separated from the west coast by only a narrow strip of lowland plain. Except for the swampy northern part, the alluvial soil of this west coast plain is suitable for irrigated rice cultivation and coconut gardens. The major rice areas are around the large coastal city of Padang and the adjacent Padang Highlands. The Padang Highland is perhaps the best developed part of the so-called Sumatra Rift Valley, which is an intermontane trough extending the full length of the central mountain range. The rich volcanic soil and heavy rainfall of this valley offer ideal conditions for smallholders' agriculture. Rice, sugarcane, and tobacco are grown for local consumption and smallholders' rubber and coffee for export.

The eastern coastal plain is wide except in the north. There on the narrow plain at Atjeh, irrigated rice and pepper gardens are cultivated by the local population. The coastal plain widens southward and forms the famous estate region of the Sumatra East Coast, where plantation agriculture has reached one of the highest stages of development to be found anywhere in Indonesia. Tobacco was the first estate crop to be grown on the island, having been introduced in the 1860's. The volcanic red-soil region around Deli, just north of Medan, is the home of the famous Sumatra wrapper, one of the finest quality tobacco leaves in the world.

Starting in 1905, estate rubber was planted in this east coast locale, where it gained rapidly in importance as a commercial crop, though meeting rising competition from smallholders' rubber production after 1925. On the lower foothills of the Karo Mountains to the west of this region, tea estates were established, followed later by oil palm and sisal. The oil palm has thrived in this environment and made particularly rapid progress since 1920, when it was first transplanted from the Guinea Coast of Africa. The increasing population of this area has made possible the development of a successful truck-gardening industry by native farmers on the Karo Plateau.

South of this central estate region, the eastern coastal plain is quite wide, but low and generally swampy. A wide belt of mangrove swamp separates the tidewater littoral from the inland plains and tropical jungle. This savanna region between the coastal swamps and interior jungle offers only limited agricultural opportunity. The soil is generally leached and of low fertility. A sparse population is supported by primitive fire farming (ladang cultivation). Abandoned fields are quickly overgrown with tough alang-alang grass. It is in this region that smallholders' rubber production has achieved considerable importance, the local farmers having adopted the practice of setting out young rubbertrees on their ladang clearings together with upland rice. These dry rice fields were soon abandoned, but the rubbertrees kept on growing in time forming a new jungle growth of uniform species.

At the southernmost part of the island the lowland swamps again disappear, the coastal plain narrows and, as in the north, intensive rice cultivation supports a relatively dense population and pepper is grown by the native Indonesians as an export crop.

A few large rubber estates are located here, and smallholders' coffee is of some importance. This is the so-called Lampongs region of Sumatra, best known before the war as the world's chief source of black pepper.

Outer Islands

Outside of Bali, Lombok, and parts of Celebes, few regions in the Outer Islands have any significant form of agriculture, being thinly populated, self-sufficient, and farmed almost exclusively by primitive methods of shifting cultivation. A few rubber estates are located on Borneo, and some black pepper and smallholders' rubber are grown there also. One of the world's leading centers for white pepper production is the small island of Banka just off the southeast coast of Sumatra.

On Bali and Lombok, smallholders' agriculture is highly developed, and these islands usually have a surplus of irrigated rice that is available for shipment to some of the deficit areas. Corn, peanuts, sweetpotatoes, and soybeans are also important crops on these two islands. In addition, the local farmers grow a considerable amount of coffee. The rest of the Lesser Sunda Islands are self-sufficient in rice and occasionally have corn, copra, and spices for export.

Celebes is usually a rice-surplus area, there being considerable irrigated cultivation along the coastal regions. But Celebes is best known for its large volume of copra production. The long northern peninsula of the island, known as the Minahassa, is a great center for coconut cultivation by native growers. However, it has been somewhat slow in recovering from the effects of the war. Cloves are also produced in this region. In South Celebes, corn is an important food crop and a considerable amount of coffee is harvested.

V. LAND UTILIZATION

A study of land utilization in Indonesia presents a sharp contrast between Java and the Outer Islands. Densely populated Java and Madura (1,015 persons per square mile) have a total land surface of 32.7 million acres (table 1). Smallholders' agriculture accounts for 60 percent of this area, estate agriculture for 8 percent, and government forests for 23 percent. Of the 19.5 million acres utilized for smallholders' agriculture, irrigated rice fields comprise 8.1 million acres, dry fields 7.9 million acres, and house compounds 3.5 million acres. In the Outer Islands, on the other hand, at least

TABLE 1.—*Land utilization, 1950, Java and Madura*

Classification	Acres	Percent of total land
Land used by smallholders:		
Irrigated rice fields	8,109,000	25
Dry field cultivation	7,867,000	24
Compounds, nipah groves, etc.	3,500,000	11
Tidewater fisheries	171,000	1
Total	19,647,000	61
Land held by estates: [1]		
Cultivated	1,501,000	5
Uncultivated	1,149,000	3
Total	2,650,000	8
Government forests:		
Teak	2,032,000	6
Other	5,605,000	17
Total	7,637,000	23
Other areas (villages, roads, inland waters, etc.)	2,726,000	8
Grand total	32,660,000	100

[1] Based on prewar figures.

Source: Compiled from official publications.

two-thirds of the land surface is covered by tropical forests (table 2). Only about 4 percent of the area is cultivated: 1 million acres by the estates and perhaps 17 million acres by native Indonesians, 90 percent of whom practice primitive fire farming.

Forests

The acute pressure of population on land in Java and Madura has increased the cultivated area beyond the maximum consistent with sound water conservation practice. Only 23 percent of the total land surface of Java remains under forest today, and Madura is almost completely deforested. Hydrologists believe that at least 30 percent of the land surface on these two islands should be kept under forest if an adequate water supply is to be maintained for

their growing population. The State Forestry Service has been spending considerable sums on reforestation in recent years, especially on the volcanic slopes of East Java. A 5-year program to plant several million kapok tree seedlings in East and Central Java was initiated in 1951. More than 2 million acres of teakwood forest have been set aside as state reserves on Java.

In the more developed Outer Islands—Sumatra, Celebes, and the Lesser Sundas—forest cover accounts for some 60 percent of the land surface and population density averages about 70 persons per square mile. Of the total land area, perhaps 10 percent is forested with secondary growth on land that was once used for cultivation and 50 percent is still under virgin forest. In the less developed Outer Islands—Borneo and Moluccas—population is very sparse, with a density of about 15 persons per square mile, and consequently almost the entire land surface of these islands is covered with primeval forest. If the mangrove swamps of the coastal region are included, as well as tropical jungle, the area under forest is about 80 percent of the total.

TABLE 2.—*Land utilization, 1950, Outer Islands*

Classification	Acres	Percent of total land
Government forests	25,485,000	5.8
Other forests	281,053,000	64.2
Land held by estates:		
Cultivated	1,000,000	.2
Uncultivated	[1] 2,513,000	.6
Land used for native agriculture	[2] 16,614,000	3.8
Remaining land	111,246,000	25.4
Total	437,911,000	100.0

[1] Includes about 730,000 acres on Sumatra which are being redistributed to native farmers.
[2] Estimated by allowing 0.75 acre per capita.

Source: Compiled from official publications.

These vast areas of virgin forest are one of the principal unexploited resources of Indonesia. The most important export products obtained from these forests are spices, kapok, rattan, resins, camphor, and tanning barks. Some teakwood and construction timber are also exported, and timber, firewood, and charcoal for domestic consumption are obtained. Most of the forests are of mixed species, which makes logging operations quite costly. A few unmixed areas exist—for example, the teakwood forests of Java, the fir forests of northern Sumatra, agathis forests of Borneo, ironwood forests in Sumatra and Borneo, and the cajeput forests of Borneo.

Estate Farming

When considering land utilization in Indonesia, it is of fundamental importance to distinguish between estate and smallholders' cultivation. The earliest European plantations were established during the first half of the nineteenth century, but little progress took place until the 1870's. The Agrarian Act of 1870 ended the

forced-culture system under which the Dutch Government had tried to exploit the islands as a state monopoly, and therefore paved the way for the rapid development of private estates owned or operated by independent European planters.

The plantation system thrived in Indonesia, large profits were made, and, from 1905 until the advent of the 1930 depression, Dutch, English, American, Belgian, and French capital was invested in increasing amounts. The maximum acreage under plantation control was reached in 1930–31. At that time, approximately 7.1 million acres were under plantation lease or ownership, of which slightly more than 3 million acres were actually being used. The remainder was held in reserve or, in some cases, in fallow. Area under plantation control declined during the early 1930's; then during the latter part of the decade a modest recovery set in. This trend continued until the outbreak of World War II.

TABLE 3.—*Total area and planted acreage of estates, by region and type of management, 1939*

Area	Area in estates				Classification of estates			
	Total area		Planted area		Leased		Owner operated	
	Acres	*Percent of total*	*Acres*	*Percent of total*	Long lease	Short lease	Government	Private
					Acres	*Acres*	*Acres*	*Acres*
Java:								
West Java	1,576,587	25.6	651,435	21.9	717,341	37,166	19,536	802,544
Central Java	350,309	5.7	285,819	9.6	258,803	56,647	26,677	8,181
East Java	722,713	11.7	563,801	18.9	555,493	158,754	4,645	3,820
Total	2,649,609	43.0	1,501,055	50.4	1,531,637	252,567	50,858	814,545
Outer Islands:								
Sumatra	3,130,159	50.8	1,331,298	44.7	3,101,471	269	26,408	2,011
Borneo	153,148	2.5	44,621	1.5	153,148			
Celebes	101,701	1.6	55,064	2.0	101,701			
Moluccas	90,916	1.5	35,301	1.2	90,916			
Timor and Lesser Sundas	25,152	.4	3,944	.1	25,152			
Bali and Lombok	11,811	.2	4,384	.1	11,811			
Total	3,512,887	57.0	1,474,612	49.6	3,484,199	269	26,408	2,011
Total Indonesia	6,162,496	100.0	2,975,667	100.0	5,015,836	252,836	77,266	816,556

Source: *Indisch Verslag, 1940.*

Complete figures are not available for the acreage under plantation control since the war. Lack of security in some regions has made resumption of activities impossible, whereas large areas formerly given over to estate cultivation have been usurped by landless peasants for their own use. The Republican Government has neither the strength nor the inclination to dispossess these squatters. The official policy now is redistribution of uncultivated estate reserves. It has been estimated that during 1950 the area actively cultivated by the estates was only two-thirds of the prewar average. In the absence of accurate postwar statistics on land utilization, table 3 gives a detailed picture of the distribution of

plantation agriculture just before the war. It will be noted that 94 percent of the total plantation area was on Java and Sumatra.

The estates produce more than 30 different tropical export crops, of which 8 accounted for 94 percent of all plantation exports before the war—rubber, tea, coffee, sugar, tobacco, copra, cinchona, and palm oil. Some 2,400 estates existed in 1939, averaging 2,244 acres in size on Java and 5,148 acres in Sumatra, of which about one-half the total area was actually under cultivation. Sixteen of these were government-operated estates, 14 on Java and 2 in Sumatra.

Smallholders' Farming

On Java and Madura, 68 percent of the land surface is utilized for agriculture. This is one of the highest proportions of cropland to total area that may be found anywhere in the world, but it is understandable in terms of population concentration. Smallholders' cultivation alone accounts for 60 percent of the land surface, while estate farming utilizes the remaining 8 percent. Because of acute population pressure the native farm lands are intensively utilized, with a high percentage of double cropping and irrigated cultivation. Table 1 summarizes the major categories of land use on Java and Madura. In the Outer Islands, with the exception of Bali and Lombok, about 90 percent of peasant agriculture is shifting cultivation. No accurate statistics are obtainable on the amount of land being farmed by this method, but it is probably less than 4 percent of the total. Available information on land utilization in the Outer Islands is summarized in table 2.

Wet Cultivation

About 42 percent of the smallholders' crop area of Java and Madura is under irrigation—approximately 8.1 million acres. Irrigated fields are called sawahs in Indonesia and they are used primarily for rice growing. Because of yearly fluctuations in monsoon rainfall, however, irrigation is occasionally necessary for other native crops. Estate-grown sugarcane is also irrigated regularly during the east monsoon, as it requires considerable quantities of water. Fertile volcanic soil, a tropical monsoon climate, and a well-developed technique of irrigated-rice cultivation have combined to make it possible for Java to sustain one of the most densely packed populations in the world. Grain yields per acre for wet-rice cultivation are higher than for any other cereal, and, when this fact is coupled with the Javanese practice of double cropping in rice or with a secondary food crop, the end results are extremely bountiful. A 5-year prewar average for double cropping of sawah land in Java shows a ratio of 1 to 1.45 between crop area and yearly harvested area. Approximately the same ratio prevails at present.

In the islands other than Java, Madura, Bali, and Lombok, wet cultivation is not very important. Sumatra has but a few sawah areas—parts of the west coast, the Padang Highland, the coast of Atjeh in the north, and the Lampongs in the south. In Borneo, irrigated rice fields are limited to a few coastal plains, the Kapus Valley in the west, and the regions west of Banjermasin in the

south. Some sawahs are also found in the southwest part of Celebes. In total, perhaps 4 million acres are planted with sawah rice in the Outer Islands.

Dry Field Cultivation

About 7.9 million acres on Java and Madura are currently utilized for dry field cultivation, of which 1 million acres are planted to upland rice. These dry fields are known as tegalans, except those planted with unirrigated rice (padi gogo). Practically all the arable land on Java, Madura, Bali, and Lombok is used permanently, either for sawah cultivation or as dry fields. Tegalans are more numerous on the latter three islands because the terrain in many places is unsuited for the construction of irrigated rice fields. In the rest of the archipelago there is relatively little of this sedentary farming; shifting cultivation is practiced instead.

House Compounds

An important aspect of smallholders' agriculture in Java is the house compound, or kampong, which surrounds every native dwelling and provides a lush contrast to the checkered landscape of small sawahs and corn fields. Approximately 3.5 million acres on Java and Madura are utilized for kampongs, fish ponds, nipah palm and coconut groves. These kampongs, or kitchen gardens as they might be called, play an important role in the pattern of native farming, adding variety to the daily diet and often cash income as well. Garden cultivation offers an ideal work outlet during the slack period between planting and harvesting open field crops.

A wide variety of fruits and vegetables are obtained from these garden plots: beans, cucumbers, gourds and melons, wild yams, bananas, papaya, jackfruit, pomelo, and mangoes. Detailed studies made of garden culture on Java show that the share of land allotted to them by the native farmer, together with the intensity of cultivation, increases as the total amount of cropland per head decreases. Small fresh-water fish ponds are often an adjunct to the kampong, and by keeping his pond well stocked the owner always has fresh fish on hand. Frequently a few chickens will be raised.

Shifting Cultivation

In most of the Outer Islands, population density is so low that a relative abundance of arable land exists. Native farming in these areas is totally different from that on Java. Instead of intensive irrigated cultivation and double cropping, primitive fire farming is practiced (ladang cultivation). The people of these areas clear a bit of jungle or bushland by the simple expedient of burning and then plant crops in the ash-fertilized soil without attempting to remove the charred roots and stumps of trees. Little effort is made to keep the land cleared; instead, after several years of use, the plot is abandoned and soon becomes overgrown again with a thick jungle growth. The peasant simply moves on to another location, where he repeats the process of burning and planting. It is estimated that 90 percent of the population in the Outer Islands are ladang cultivators and that the land area utilized amounts to three-fourths acre per capita.

Farming of this type is only possible where there is sufficient forest reserve to permit a 15-year cycle of land use, for once a ladang plot has been cultivated 2 or 3 years it should be returned to jungle for more than a decade. Over wide areas of Sumatra, Celebes, and the Lesser Sundas, population density has now reached a point that makes continuation of ladang cultivation undesirable. The soil is rapidly becoming exhausted by too frequent use without fertilization. When the ladang clearings are only temporarily abandoned, they do not revert to forest again, but instead to grasslands that are often prematurely burned out during the dry season by accidental fires that sweep the lowland regions. Once this cover is burned off, the land is subject to erosion.

Forestry experts have begun to view with alarm this steady destruction of the primeval and secondary forests in the more populated areas of the Outer Islands, and the resulting spread of scrub grass and other steppe vegetation. Therefore it may soon be necessary to stop the practice of shifting cultivation in wide areas of Sumatra, Celebes, and the Lesser Sunda Islands and show the native farmers how to cultivate these fields over a longer period of years, if not permanently.

Reclaimable Land

Unlike many Asiatic countries, Indonesia has land reserves that are not yet approaching exhaustion. However, a sharp distinction must be drawn between Java and the Outer Islands in this respect. Java has little if any land that can be added to the cultivated area without encroaching on the forests. As was pointed out in the first section of this chapter, the amount of forest growth remaining on Java is considered below the minimum necessary for adequate water conservation. However, the various large-scale irrigation projects that are being proposed for Java will have the effect of increasing the crop area since a secure water supply, especially in East Java, would make possible a more widespread double-cropping system than is currently practiced.

In most of the Outer Islands, there are wide possibilities for expanding the cultivated area. However, any large increase would require a transition from shifting fire farming to permanent cultivation. Considering Sumatra, Celebes, and the Lesser Sundas as a whole, with their present population of more than 17 million, it is probable that half of their present forest area of 53 million acres could be gradually converted to permanent farm lands without endangering the water cycle. This would leave about 30 percent of the land surface covered with forests and, at the same time, provide a reserve of 26 million acres for new croplands. However, if the wasteful system of ladang cultivation is continued on these islands, this reserve area may be exhausted within a generation.

In the less-developed Outer Islands of Borneo and the Moluccas, a present population density of only 15 per square mile and a forest cover amounting to 80 percent of the island surface indicate that there is no immediate problem of a land shortage. Considering the present population of these islands and assuming a reasonable

rate of natural increase, there seems little reason to doubt that ladang cultivation could go on almost indefinitely. It is clear, however, that in Sumatra, Celebes, and the Lesser Sundas this shifting cultivation will soon have to give way to sedentary farming as it has already in Bali and Lombok.

Colonization

In an agrarian economy of the type found on Java, any increase in the number of inhabitants is followed by an attempt to extend the area under cultivation. Since this is no longer possible in Java, overpopulation on the land has resulted. There are two ways to attack this problem: transmigration or industrialization. The former Colonial Government concerned itself to a limited extent with colonization of the Outer Islands. The new Republican Government has stated its intention to promote both colonization and industrialization.

It was during the 1930's that the Dutch first initiated steps to induce migration to the Outer Islands, especially to the eastern and southern parts of Sumatra. The total number of colonists in the years immediately preceding the war was small, however, in comparison with the annual increase in population. The number of colonists was only 7,000 in 1932; it about doubled by 1936, mounted to 45,000 in 1939, and exceeded 61,000 in 1941. This emigration movement appears to have been sound, and it was slowly gathering momentum when the war put a temporary halt to it, but it was patently insufficient to counterbalance the estimated annual increase in population on Java—about 700,000 in the 1930's.

Among other faults to be found with the resettlement scheme as it operated just before the Japanese invasion was the small amount of land initially allotted to each family—not quite 2.5 acres. The land had to be cleared, and production was not sufficient to show an improvement over the conditions prevailing in the villages from which the migrants had come. Also, the Dutch contemplated the settling of the colonists as individual families, thus ignoring the fact that the village—not the family—is the basic social unit among the Javanese. Hence, the colonists were given only financial help when they needed the moral support and cooperation of a village group even more.

The Indonesian Government has taken cognizance of these weaknesses in former colonization plans and is trying to correct them in its own transmigration scheme. Large-scale migrations are now contemplated, based on colonization by social units—including wherever possible the headman, the priest, and other families from the same village. In addition, various economic incentives will be offered to the new colonists. An adjunct of the program deals with the resettlement of demobilized soldiers and guerrillas in the outlying islands, where they can engage in agriculture and forestry. Most of this program, however, is still in the paper stage, its implementation delayed by lack of capital and technical personnel.

While Java is 23 times as densely populated as the Outer Islands as a whole, it should not be assumed that these outlying regions

can support a population of 1,000 per square mile even at the Javanese level of living. Java's soil and rainfall make possible intensive rice culture. The Outer Islands, on the other hand, have only limited amounts of land suited to the type of cultivation that is practiced on Java. To the Javanese colonists, whose agricultural ideal is a small irrigated rice field that guarantees a regular food supply, dry land cultivation—especially of the ladang type—holds no great attraction. Under the circumstances, therefore, if migration is to be successful the government must help in clearing the forests, in building irrigation projects, and in supplying various other services that call for financial investment.

VI. LAND TENURE

Native Land Rights

The pattern of land ownership in Indonesia seems to contrast strikingly with that prevailing in other Asiatic countries; yet, these differences are less marked than they appear to be. Dutch domination of the Indies was first established through the medium of the Dutch East India Company, an organization whose main concern was the pursuit of commercial profit. In following this policy, it did not hesitate to sell or barter away large tracts of land without considering the property rights of the indigenous population. This practice came to an end early in the nineteenth century after the Dutch Government took over direct administration of the Indies from the East India Company and declared itself the sole owner of all land. Coupled with this concept of the supreme right of the state was the important principle that land actually cultivated by the native farmers should remain in their hereditary possession.

The Agrarian Law of 1870 formally established the policy that native land ownership, both individual and communal, was to be protected by the government and that such lands could not be sold to nonnatives. This latter prohibition was of fundamental importance, for it prevented legal ownership of land in Indonesia from passing into the hands of Europeans or foreign Orientals, many of whom were anxious to obtain landed property in the islands. The titular property rights of the local population were thus preserved by the Dutch, in contrast to the policy pursued by most other colonial powers.

Traditional Indonesian land law (adatrecht) recognizes both communal possession and hereditary individual possession of land. There are two types of communal possession—one with periodic redistribution of the land and the other with fixed shares. Communal possession does not extend over the kampong land, but only over the fields, both sawahs and tegalans. Hereditary individual possession according to the adatrecht is not to be confused with legal ownership in the Western sense. Such land can be mortgaged or sold only with the approval of the tribe or village, and even then transfers are allowed only within a narrowly defined group. On Java about 76 percent of native land holdings comprise heredity proprietorship, 18 percent are communal holdings, and about 5 percent are lands set aside for use by local officials.

Land tenure in the Outer Islands, like that on Java, is regulated by the adatrecht. The shifting cultivators farm on the principle of the right to use wild land. As soon as the farmer abandons his ladang and makes a new clearing, he loses all rights to the old field unless he has planted fruit or other trees on it. If he has planted

trees, he retains an individual property right as long as the trees survive. The tribe or village still retains a general right over all land in its region, thus excluding other communities from hunting or cultivating there.

Though native Indonesians are not forbidden to sell their land to fellow citizens, there has not developed in this country a class of landed native proprietors and its corollary, a tenant class, as is found in so many other parts of Asia. In large measure this must be attributed to the concept of communal property right that is so firmly implanted in Indonesian society. Only 3,387 Indonesians owned more than 43.7 acres (25 bouws) of land on Java and Madura in 1925, according to a study made in that year—36 percent of them in the Preanger Residency of West Java. No comparable studies have been made since then.

Among those who have managed to acquire moderate quantities of agricultural land, holdings generally consist of scattered small fields rather than large contiguous estates worked by hired labor. These holdings are leased to tenant farmers on a share basis, the terms of contract varying widely according to local custom. Frequently the tenant gets one-third of the rice crop if the land produces high yields, one-half if the fertility is only average, and two-thirds if the fertility is low. Sometimes the landlord supplies seed and equipment as well as land, in which case the tenant is really a share cropper, but more often the tenant supplies his own working capital. Those areas in which tenancy is most prevalent are the old Residences of Batavia, Priangan, Banjumas, and Besuki.

A limited study made on Java in 1926 showed that only 3.5 percent of the adult males tabulated were actual tenant farmers in the legal sense. In the Outer Islands, because of the more abundant supply of land, tenancy is even less marked. Undoubtedly the ever-increasing population density has raised the percentage since 1926 on Java, but it is still small—perhaps not much more than 5 percent. However, this figure falls far short of revealing the true nature of the problem. At least 25 percent of the agricultural working force on Java are estimated to be landless wage workers—prior to the war this group was primarily employed as estate labor. In addition, there is a large, but as yet unenumerated, group of small landowners who through short-lease or debt have lost effective control of their holdings.

Leasing of Land

While it is true that Dutch law did not permit Indonesians to sell their land to foreigners, the practice of leasing agricultural land was widespread and in some areas resulted in a situation analogous to tenancy. In this respect a sharp difference must be pointed out between long-term and short-term lease of arable lands. Long-term land concessions (erfpacht) extending from 50 to 75 years were granted by the Colonial Government during the latter part of the nineteenth century to a number of European planters. In general, only Dutch subjects or residents of the Netherlands and the Netherlands Indies could qualify for these leaseholds. The

maximum size of a single long-term leasehold was 500 bouws (877 acres), but there was no restriction on the number of grants any one person could obtain.

These areas turned over on long-lease to the plantations were part of the state domain—unutilized lands over which the government claimed direct jurisdiction by virtue of the fact that no native property right had been established through prior cultivation. For the most part, these leased areas comprised hilly or mountainous terrain unsuited to irrigated rice cultivation but adequate for the planting of such estate crops as coffee, tea, rubber, cocoa, and cinchona.

Unlike the hill cultures, the raising of sugarcane and tobacco requires the use of fertile lowland fields. Since land of this type was already being used for smallholders' cultivation, it was not part of the state domain subject to government-granted long-term leaseholds. European planters desiring to grow open-field crops were required to negotiate directly with the native landholders for short-term lease of agricultural land. The terms of such contracts were regulated by government ordinance, which specified the minimum rent and the maximum length for a short leasehold. Sawahs could be leased for 3.5 years and tegalans up to 12 years. Under special conditions, sugar estates were permitted to lease sawah lands for 21.5 years if the fields were returned temporarily to their owners at fixed intervals for rice cultivation during the period of the lease. According to law no more than one-third of a village's arable land could be rented out at any one time. In spite of government supervision, however, contracts were often negotiated that provided for less than the minimum specified rental or more than the maximum acreage.

There were several important exceptions to this procedure of long-term leasehold from the state domain or short lease from native cultivators. In the Vorstenlanden region of Central Java and in northern Sumatra, there existed certain hereditary Native States whose rulers exercised absolute jurisdiction over all land within their realms. Feudal dues were exacted from the native cultivators thereon. During the nineteenth century, these native princes granted a number of long-term leaseholds to European planters, including with the land the obligatory services of the peasants living on it. In this manner, a 99-year concession was obtained in 1863 from the Sultan of Deli to start a large tobacco plantation on the Sumatra East Coast, and in Central Java tobacco estates got their start in this same way.

Abuses of this system quite naturally developed, especially in Central Java on the tobacco and sugar estates, where the peasant farmers were required to perform up to 250 days of forced labor per year for the leaseholders. The Colonial Government introduced certain reforms in 1920 that abolished forced labor, reduced the term of new leaseholds to 50 years, and required that land rent be paid to the local municipalities rather than to the ruling princes.

Another exception to the prevailing pattern was the so-called private lands that had been sold outright by the East India Company in the eighteenth and early nineteenth century. These private

estates, found mostly in West Java, also exercised the right of exacting feudal dues from the peasant farmers living in the region. Protection of the native Indonesians from abuse by the landlords proved to be difficult, and under pressure of public opinion the Colonial Government started repurchasing these private estates from their legal owners during the interwar period. By 1939 about 1.6 million acres had been repurchased under this plan and 800,000 acres of private lands still remained.

In spite of the sincere attempts made by the Dutch to safeguard indigenous property rights in Indonesia, there were numerous abuses of the system. Among these abuses were the short-term lease arrangements often negotiated between the peasant landholders and the European estate operators or Chinese money lenders. The importance of these contracts in negating the system of native land rights has escaped the attention of some students of Indonesian agrarian problems. There has been a failure on the part of many observers to comprehend the full significance of the impact of an acquisitive society upon a hitherto nonmoney economy. Accustomed to subsistence farming, the peasant cultivator suddenly found himself the prey of Chinese money lenders and European planters who offered easy money on terms the peasant only half understood. It was but gradually that he became aware of having signed his land away under lease to foreigners who then required him to work the land as a share cropper and produce for the market instead of for personal needs.

The European sugar and tobacco planters offered rental payment in advance of use. Often the lease contract itself provided for the labor services of the owner; in other instances, having been so improvident as to spend the proceeds at once, as was usually the case, the peasant then became a wage worker or a share cropper on his own farm land. The Chinese money lenders were another easy source of funds, but interest rates bordered on extortion—100 to 300 percent annually—and when the peasant found he could no longer keep up the payments, his only solution was to lease his holding to the money lender. Thus, in yet another way, the native cultivator was thrust into the ironic position of being a share cropper on his own land, the very land that had been guaranteed to him as inalienable by the Dutch.

Postwar Land Problem

During the Japanese occupation of the islands, large areas of uncultivated estate land were given over to use by peasant farmers. Especially on Sumatra, which had been a rice-importing region before the war, the Japanese encouraged the local population to grow food crops on estate lands in order to make the island self-sufficient in food. The troubled conditions that arose in Indonesia following the Japanese defeat made it impractical if not impossible for many of the European planters to resume operations, and as a result additional thousands of acres were taken over by native squatters. The official viewpoint of the Republican Government favors retention of this land by those farmers now cultivating it

illegally. As a result the government is acting to curtail the area currently under long-lease by the estates.

In the past 5 years, several of the long-lease concessions have expired and are at present being continued only on a temporary basis; many other contracts will reach their terminal date in the next several years. The European planters are quite willing to accept some reduction in the size of their leaseholds in return for assurance of obtaining new legal contracts. However, various government spokesmen have called for the redistribution of substantially all the uncultivated reserve areas now held by the estates. The owners insist that their methods of cultivation require a considerable acreage in fallow. For example, the Deli tobacco planters on Sumatra East Coast have always allowed 7 years of fallow between plantings.

Postwar long-leases held by European tobacco, rubber, and oil palm estates on Sumatra East Coast totaled more than 2 million acres, of which about 1.1 million acres were being held in reserve before the war. The Republican Government proposes to redistribute to native farmers up to 740,000 acres of this area at the present time, one-half coming from the tobacco concessions and the balance from other estates. The program is getting under way somewhat slowly, with only about 150,000 acres having thus far been actually turned over to peasant cultivation.

Indications are that subsequent leases will be of shorter duration and for considerably higher land rentals, as is already the case for short-lease lands. On Java the former Dutch policy of repurchasing private lands is being continued. The present Republican Government of Indonesia has not yet formulated a clear policy in regard to the leasing of native and state lands. A special government commission has been established to study the entire land tenure system of the islands. The future place of estate agriculture in the Indonesian economy is now open to question, and it seems quite likely that the coming years will witness a continued decline in its importance to the country.

VII. ECONOMIC POSITION OF THE PEASANT

Size of Holdings

The intense pressure of population on Java has brought about a constant subdivision of holdings and fragmentation as well. Often made up of five or six small plots, the average farm on Java (according to a survey of taxpaying landowners made in 1938) was 2.1 acres in size: 0.9 acre of sawah and 1.2 acres of dry field tegalan and garden land. Comparison of the 1938 survey with earlier studies indicates that the average farm holding on Java has been slowly decreasing in size during the last half century with the steady growth of population. In 1922, for example, the average holding was about 2.8 acres—one-third larger than in 1938. The Javanese peasant is able to support himself and his family on this dwarf-size holding only through double cropping and intensive cultivation.

Farming on such an extremely small scale as is carried out on Java has two distinct disadvantages. In the first place, practically the entire cultivated area of a holding has to be used for growing food crops to feed the farmer and his family. Hence, little land can be spared for cash crops, and consequently the typical farmer is poor in capital. He cannot afford to make investments in fertilizer, better equipment, or improved seeds, which would raise his level of productivity. In the second place, dwarf farm units are uneconomic because their cultivation does not require the full services of the average peasant family. This gives rise to idleness, concealed unemployment, and unproductive labor expenditure. Occasionally this situation is partly alleviated by several members of the family occupying themselves with handicrafts.

In the Outer Islands, where land is more abundant, less intense labor is required and farming is more extensive in practice. No detailed surveys have been made of the amount of land being farmed by ladang cultivation or the average area being farmed per family, but estimates have been made on the basis of 0.75 acre per capita—which is to say about 4.5 acres for a family unit of six.

Agricultural Credit

In common with the rest of the Far East, Indonesia has a serious rural credit problem. The former Dutch Colonial Government, having found it virtually impossible to prevent exorbitant interest rate charges by local money lenders, established its own rural credit system in the years before the war. While the interest rates charged by these various state-sponsored institutions were considerably less than those prevailing on the private market, they

were not moderate by Western standards. Nor were government credit facilities adequate to meet the full needs of the people.

Many peasants were still forced by circumstances to borrow at usurious rates from Chinese or Arab money lenders, local rice merchants, or native landlords. The result was often a permanent cycle of debt, with continued interest payments far exceeding the original principal. As previously mentioned, the only escape from this vicious circle was the common practice of leasing land to the creditor in payment of debt. The present Government of Indonesia hopes to improve the rural credit situation by fostering the growth of cooperative credit facilities in the islands. Some striking progress has already been made in this direction, as will be noted in the section following on cooperatives.

The various types of rural credit institutions in Indonesia at the present time may be summarized as follows: (1) the People's Credit Bank (Volkscredietbank), (2) the local village banks (desa banken), (3) the village rice banks (desa lumbungs), (4) the government pawn shops, (5) the village money lenders, and (6) the various cooperative societies.

The People's Credit Bank was established in 1934 as a central institution for agricultural credit, by the amalgamation of a number of formerly independent banks scattered throughout the islands. It has now been named the Bank Rakjat Indonesia. Before the war it had 94 branches, of which 67 were on Java. Bank capital was in large measure furnished by the government. The bank accepts savings accounts from Indonesians and other deposits from municipalities, cooperatives, and local village banks. The People's Credit Bank makes seasonal and long-term advances to farmers, personal loans to public servants and other salaried individuals, and grants larger amounts as commercial credit to local businessmen. An interest rate of between 10 and 15 percent is charged, depending on the type of loan. In 1949, 41 percent of all loans granted went to farmers, about the same percentage as before the war. The average size of these farm loans before the war was about 22 guilders—around $12. Considering that the average per capita Indonesian income was only 30 guilders annually during this period, it is understandable that few peasant farmers were able to post collateral for a loan of this size.

Slightly smaller loans can be obtained from the local village banks, of which there were roughly 7,400 before the war, most of them on Java and Madura. These banks suffered a considerable set back during the war, and they have been in a disorganized state ever since. Much of their capital was dissipated, accounting records lost, and buildings destroyed. By the end of 1949 only 1,218 were open for business. During that year 373,000 individual loans were granted, averaging in size 18 rupiahs each ($4.75). Loans from these village banks are usually granted for seasonal purposes; the typical loan contract running for 11 weeks at 8 percent interest for the period, or about 38 percent on an annual basis.

The village rice banks developed in Java early in the twentieth century out of the traditional village granary, which was an integral part of the old Indonesian communal life. The resources of

these banks are locally obtained from within the community, and loans for either food or seed are usually made during the 6-month period preceding the harvest. Interest rates range from 25 to 50 percent of the quantity of rice borrowed for the loan period. In terms of money this interest rate would not appear quite as high, since rice prices always fall after the harvest. The number of village rice banks reached its peak in 1917, with nearly 11,000, but after that date there was a gradual decline in number, owing to the development of transportation and the slow conversion to a money economy. There were never many in the Outer Islands. Slightly more than 5,500 village rice banks existed just before the war, all on Java, but there were only 1,650 in operation at the end of 1949. Total loans and advances exceeded 27,000 metric tons of stalk-padi (unthreshed rice) in both 1948 and 1949, or about 360,000 pounds of padi rice per bank.

The needs of borrowers who want sums smaller than those lent by the village banks are only in part satisfied by the government pawn shop service. Since 1903 the right to operate pawn shops in Indonesia has been a government monopoly except in the Native States. However, many illegal pawnbrokers do exist, especially in the Outer Islands. There were 468 government-run pawn shops just before the war, of which 382 were in Java and Madura, and most of the rest in Sumatra. In addition, there were 133 officially licensed pawn shops in the Native State of Surakarta. By the end of 1950, 372 government pawn shops had been reestablished. In the years just before the war the annual number of pawns fluctuated between 45 million and 50 million. On the island of Java, where 85 percent of the government's pawn business took place, this amounted to about 5 transactions per year for every Indonesian family. About 99.5 percent of all loans made were under 25 guilders, while nearly 45 percent of the loans were for amounts under one-half guilder—less than US$0.27 in 1939.

At the present time the interest rate on small loans under 25 rupiahs is 4 percent per month (48 percent per year), while a decreasing rate applies on higher amounts, with a minimum rate of 2 percent per month for loans over 100 rupiahs. On very small loans the rate would actually be higher than 4 percent per month since there is a minimum fee set for the monthly interest payment no matter how small in value the pawned object. Loans generally average about 50 percent of the market value of the pawned item. Loans totaling 268,224,000 rupiahs were made during 1950 to 16,884,000 individuals. Hence the average transaction has increased in value since the war, amounting now to about 16 rupiahs —more than US$4 at the present rate of exchange. Before the war the government actually made a considerable profit out of its pawn shop monopoly in spite of the high bookkeeping cost of recording so many small transactions. The Dutch made a net profit of 150 million guilders during the first 25 years of operating the pawn shops. Since the war, however, net losses of about a million rupiahs per year have been sustained, primarily due to theft of pawned articles in troubled areas and inefficient operation.

Interest rates exacted by local village money lenders are very

high, ranging from 10 to 25 percent per month on small loans, or 120 to 300 percent a year. The peasant now goes to the private money lenders as a last resort, when he has nothing to pledge as security for a loan—hence, the usurious rate of interest. The Chinese and Arabs maintain a virtual monopoly in this private credit business, and being aliens they cannot obtain a mortgage against native land. This fortunate fact, which tends to keep the size of such loans small, has prevented the impoverished peasant from selling his birthright. However, as was pointed out previously, there is nothing to prevent his going so heavily in debt that he is forced to lease his land to the money lender in payment, and then work on it as a share cropper.

A certain amount of rural credit is provided by the cooperative societies. In 1940 there were 492 cooperative credit organizations but their total assets were not great, amounting to slightly more than a million guilders. The bulk of their loans were granted to government employees and other salaried personnel rather than to peasant farmers. The present government has declared its intention of fostering the development of rural credit cooperatives and in general strengthening the cooperative movement in Indonesia.

Cooperatives

The cooperative movement in Indonesia first began to take shape in the early 1930's, largely through the efforts of Dr. Mohammed Hatta, now Vice President of the new Republic. The movement originated at Tasikmalaja, West Java, and even today this is the most active center of Indonesian cooperatives. Individual cooperatives are required to register with the government, and they must conform to an established code of organization similar in most respects to cooperatives in Western countries. Credit cooperatives are further subject to the financial supervision of the government-operated People's Credit Bank. Local cooperatives in each district are affiliated with regional organizations, called Pusats, and most of these in turn belong to the Cooperative Central Association, with headquarters at Djakarta. The Pusats, managed by elected officials, perform a quasi-supervisory function over the individual cooperatives, working in close collaboration with the government.

Just prior to the war there were 624 local cooperative societies functioning in Indonesia, more than 90 percent of them in Java; 492 were credit associates, 53 were debt-amortization societies established by coconut growers, 23 were consumers cooperatives, and the balance were small producers' marketing associations. The credit societies were dominated by government employees and other salaried individuals. Farmers and small traders played only a minor part in the movement. The limited scope of prewar operation is indicated by the fact that, among 415 credit cooperatives about which information is available for 1940, total assets were about a million guilders and membership less than 42,000. During the war most of these cooperatives were either voluntarily disbanded or lost their identity through reorganizational measures

enforced under the Japanese occupation. The widespread unrest that prevailed throughout the islands in the immediate postwar period was not conducive to a resumption of activities. Hence the cooperative movement in Indonesia was virtually inoperative during the period 1942–48.

Starting late in 1949 the Indonesian cooperative movement was revitalized, largely through the efforts of its former leaders who came into government service after the transfer of sovereignty in December of 1949. A systematic program of government sponsorship and assistance to local cooperatives was immediately initiated, for it was earnestly believed that through this medium the state could best promote the economic development and well-being of the rural areas that contained 90 percent of Indonesia's population. Government credits are now being granted on a priority basis to strengthen and expand the rural cooperative movement. It is further intended to reorganize the local village banks (desa banken) on a cooperative basis, both to give other cooperatives a stronger measure of financial support, and to make rural credit more accessible to the peasant farmer. Local credit cooperatives are now offering loans to members at interest payments not exceeding 2 percent per month, or 18 percent per year, rates that are not excessive for such a capital-poor country, and that are certainly low in comparison to the interest charged by private money lenders.

Under government auspices, a new leadership-training program has been inaugurated for the cooperative movement. In November 1950, 5 schools were established in West Java by the Cooperative Division of the Ministry of Economic Affairs in collaboration with the Cooperative Central Association. Fourteen more were established early in 1951. Each school enrolls successive groups of 40 select students for a 4-week intensive course in cooperative organization, accounting, and management, with free food and lodging supplied by the government. More than a million rupiahs from the state budget has been allocated for this program, and additional schools are being planned. By the end of 1951 about 5,000 rural leaders had been graduated from the training program.

Early in 1951 the Republican Government drafted an Economic Urgency Plan for improving Indonesia's economic position within a 2-year period. Of the five parts of this 2-year plan, two are devoted to the establishment of cooperatives, two to the promotion of the peoples' welfare, and the fifth section to industrial development. The sections pertaining to cooperatives provide for further financial assistance from the government, the establishment of a new Provincial Bank for Cooperatives as a central agency to receive and disburse these state loans and grants, the further training of regional and local leaders for the cooperative movement, and the continued formation of new local societies including producers', marketing, and credit cooperatives, all composed exclusively of native Indonesians.

Under the impetus of this vigorous program for expanding the cooperative movement in Indonesia, the past 2 years have seen a phenomenal growth in the number and membership of local societies. In West Java, recorded figures show a growth from 900

societies and 100,000 members at the end of 1950, to 1,273 societies and 178,000 members at the end of the first quarter of 1951. According to a government source, there are now about 4,000 cooperative societies of all types in Indonesia with roughly a million individual members.

The cooperative movement in Indonesia has met with this rapid success not only because of government sponsorship, but also because of the traditional communal character of Indonesian rural society, which lends itself readily to the modern cooperative system of economic democracy and group participation. The internal program of popular education and leadership training sponsored by the cooperatives is tailored to the basic needs of an unsophisticated rural people, who are just now entering upon the path of self-government. And, too, the cooperative movement offers the Indonesian peasant a dynamic alternative to the appeal of Communist propaganda.

Marketing

The economy of the typical Javanese village is based primarily on production for family consumption and involves only a limited use of money. Even handicrafts are produced by each household for its personal needs. The great pressure of population on land in Java has brought about this subsistence type of agriculture, which yields little surplus for marketing outside the village but which has in the past created no great problem since the percentage of urbanization was low. Within the village a modest amount of trade and barter takes place between individual producers. However, the professional trader or middleman is virtually unknown to this rural society as is the specialized producer of handicrafts. On designated days the native farmer takes his surplus produce to the village market place (pasar), where he endeavors to sell or exchange it on the best possible terms after much haggling over the transaction. He values the proceeds of his product almost exclusively as wages, and therefore is inclined to sell so long as the price compensates his time.

In the Outer Islands the greater abundance of land permits the average peasant cultivator a broader choice in crop selection. For him food crops are still the first, but rarely the only, consideration. He frequently raises some coconuts for sale to the local purchasing agent of the government-run Copra Foundation. And, if the price is right, he and his family will devote part of their time to producing other cash crops such as rubber, pepper, coffee, and kapok. These are sold to local traders and itinerant buying agents, who act as middlemen between the small grower and the exporter.

On Java, due to the widespread adoption of irrigated cultivation, the rural areas have traditionally produced a modest surplus of rice, amounting to about 20 percent of the harvest. The native grower threshes and husks his own rice; however, that which is not needed for household consumption is sold as stalk-padi to the nearest rice mill. After being processed it is resold by the rice mills, either to private rice merchants in the cities or to the govern-

ment-operated and subsidized Food Supply Board, which has been attempting to keep the price of rice down in order to prevent speculation and hoarding. Lack of adequate storage facilities has been one factor militating against the success of this program. In general, however, it can be said that the storage of native agricultural products does not present any particular problem since the climate of Indonesia permits year-around cultivation and hence little need exists for large stored supplies of food crops.

There is little native wholesale trade in Indonesia—at the most, an incidental intermediary trade. Wholesaling and general merchandising are almost exclusively in the hands of the Chinese, who form a distinct class of small businessmen and shopkeepers. Native handicraft production is centered not in the local villages but in the smaller towns, where industrial bazaars develop. Here the professional traders acquire their stocks of pottery, metalcraft, batik work, bamboo baskets, etc. However, as transportation and communication continue to improve, the native producer—even in the remotest village—is slowly being torn from his isolation and forced to adjust his traditional pattern of conduct to a growing sphere of trade competition.

Taxation

The Indonesian peasant, depending on his income and place of residence, is subject to a number of different forms of taxation: labor tax, head tax, land tax, income tax, export taxes, and excise taxes. The oldest of these is the forced labor tax (heerendiensten), which was abolished on Java several decades ago but still persists in parts of the Outer Islands. The labor tax imposes the general obligation of 10 to 30 days of physical labor per year on all adult males between the ages of 16 and 50 residing within the taxing district. The labor services are used for constructing and maintaining public works, generally roads. Noncitizens, government officials, teachers, and certain other categories are exempted from the tax.

The initial reason for introducing a forced labor levy was the virtual impossibility of extracting a money tax from a nonmoney economy. It was always possible to purchase exemption from the tax, and, in a number of regions where sufficient economic development had taken place, the labor tax was commuted to a general head tax some time ago. In some parts of the Outer Islands, the commuted head tax was set at a prohibitive rate, for the social code was such that road building and other types of non-agricultural "coolie labor" were considered so undignifying as to make it very difficult for the government to obtain sufficient wage labor for necessary public projects. Hence, the labor tax was maintained in those districts and in the areas where a money economy was completely lacking. Just before the war it was estimated that 16 million Indonesians still lived in districts where the heerendiensten prevailed, of which 3,150,000 were liable to the tax and 614,000 paid the money commutation instead.

Forced labor of this type was generally hated by the people, and

the nationalist groups before the war were vigorous in their opposition to it. At the present time it exists merely as a standby power in the more remote regions, to be used only for projects of great urgency. However, the government may likely find that it is a convenient means of getting work done in outlying regions, where the money economy has only superficially penetrated, if at all.

On Java the substitute head tax was abolished in 1927 and rural revenue made dependent on the land tax. All agricultural lands outside the Native States, both on Java and in the more developed parts of the Outer Islands, were subject to a fixed tax computed on the basis of the average yield of the land if planted to rice. This tax was continued through 1950 by the Republican Government, at which time it amounted to about 3 rupiahs per year (US$0.76 at the official rate) for an acre of sawah land.

A progressive income tax was first introduced in 1932, starting with a 1-percent assessment on incomes of 120 guilders or more (US$48). The expense of collecting on small incomes was so great that the minimum taxable income was raised to 800 guilders in 1935, after which date the tax had no appreciable effect on rural areas. Miscellaneous excise taxes are another way of extracting money from a rural population. They are favored by governments the world over because they are relatively painless to pay and easy to collect. Indonesia was no exception. The state salt, opium, and pawn-shop monopolies were an additional means of obtaining revenue.

Export duties have been a traditional source of government income in Indonesia for many years. The government has justified their collection as being the only effective means of taxing the peasants of the Outer Islands, most of whom escape the land tax because they are shifting cultivators. Such items as rubber, copra, tobacco, kapok, coffee, tea, and pepper and other spices have been subject to export levies at one time or another. The present Republican Government is continuing to collect export taxes.

Various studies made during the interwar years indicated that the indigenous population was paying a far higher percentage of its total income in taxes than were the European residents with their much larger incomes. With the aim of equalizing the tax load, the Indonesian Parliament passed a bill on November 4, 1950, that stated the government's intention of replacing the land tax with a graduated general income tax. No precise statement has yet been made as to the exact manner in which farmers' income will be computed for tax assessment purposes. A number of agricultural economists have expressed grave doubts as to the possibility of working out an effective procedure for taxing millions of small Indonesian farmers on the basis of income.

Handicraft

So far as can be judged from the meager information available, native handicrafts were rather less important in the parts of the

Malay Archipelago governed by the Dutch than in the rest of Southeast Asia before the coming of the Europeans. This is certainly true in most of the regions now known as the Outer Islands, where even today the bulk of the population live in extremely primitive fashion. Even among the people of more advanced cultures such as those on Java, Madura, Bali, and coastal Sumatra, handicrafts do not seem to have been practiced either as extensively or intensively as they were in the delta regions of Indochina. But in Indonesia, as in other parts of Southeast Asia, simple handicrafts have played a significant supplementary role to agriculture in the domestic economy. Even today the peoples of Indonesia supply themselves with a large part of their own requirements of clothing, household utensils and furniture, farming equipment, and the like by cottage industry carried on during the time left free from their farming activities.

One important example of an ancient handicraft, which owes its survival to local tastes and to its peculiar suitability to local needs, is the art of plaiting, still found throughout the archipelago. In Java and Madura the plaited hat industry has managed to retain its position. Bamboo (especially in Java, Madura, Bali, and Lombok), rattan (especially in Borneo), and the leaves of the pandanus and various palms are used as raw material for a wide variety of domestic articles such as hats, mats, ornamental girdles, and baskets; even the walls and floors of native houses are of plaited materials.

Another handicraft industry that also owes its survival principally to local taste, but partly to the artistic qualities that have won it fame far beyond Indonesia, is batik, which provides the people of the main islands with their traditional costume. Batik is concentrated primarily in Java and involves a special technique of partial dyeing, which consists essentially in covering a piece of fabric with wax, except for those parts of it that are to receive a particular color, dipping it, and then repeating the process for each of a number of colors until a variegated pattern is achieved. In modern times, this industry has come to depend almost entirely on imported basic fabrics, but the dyeing is carried out by the traditional methods on a handicraft basis.

The traditional arts of woodcarving, various sorts of metal work, and certain special types of weaving have all survived on a limited scale as a result of government encouragement and a certain amount of stimulation provided by the tourist traffic.

In general, it may be said that the habit of engaging in some sort of home manufacturing, sometimes merely to meet the immediate needs of the household and sometimes as a means of supplementing income from the farm, has persisted strongly among the agricultural peoples of Indonesia. During the period of the thirties it was possible to relieve some of the distress resulting from economic depression by either reviving old domestic handicrafts or introducing new ones. The recently adopted 2-year economic program recognizes the need for official encouragement and assistance to further the development of small-scale rural industry.

Food Consumption

The diet of the Indonesian population is almost completely vegetarian, as is the case in most Far Eastern countries. Cereals, such as rice and corn, and tuberous plants, such as cassava (tapioca), sweetpotatoes, and yams form the mainstay of the local diet. In the Outer Islands per capita rice consumption is higher, while on crowded Java and Madura, cassava, corn, and sweetpotatoes comprise a larger portion of the daily diet.

Nutrition experts have for many years pointed out the dangers inherent in such an unbalanced diet of starchy foods. Consumption of protective foods such as green vegetables, pulses, and fish is relatively low in Indonesia. These deficiencies are in large measure responsible for the currently high infant and child mortality rate in the country. Fortunately, the greater part of native-consumed rice is home pounded, and hence there is no serious problem of beri-beri as is the case with polished rice. However, as long as local rice production is insufficient to cover domestic needs, highly polished milled rice will have to be imported.

Annual average food consumption on a per capita basis for Java and Madura in 1949–50 was roughly as follows: cereals, 250 pounds (70 percent milled rice) ; tubers, 275 pounds (80 percent cassava) ; nuts and pulses, 75 pounds (80 percent coconuts) ; fruits and vegetables, 100 pounds; sugar, 10 pounds; vegetable oil, 4 pounds; fish, 9 pounds; meat and poultry, 9 pounds. Dairy products were negligible, but a small quantity of chicken and duck eggs, especially the latter, were consumed.

Prewar daily caloric intake for the period 1934–38 has been estimated at about 2,000 calories per day for Java and Madura composed as follows: cereals, 1,100 calories; tubers, 490 calories; nuts and pulses, 170 calories; fruits and vegetables, 50 calories; sugar, 70 calories; vegetable oils, 70 calories; meat, fish, and eggs, 50 calories. Indications are that a large part of the population existed on a much lower caloric level. Since the war the food situation has shown considerable deterioration due to the increase of population and the decline in agricultural production. In 1947 the Institute for People's Food, on the basis of a very rough estimate, grouped the population of Indonesia according to caloric ingestion as follows:

Percent of population:	*Calories per day*
5	2,500
10	2,000 to 2,500
30	1,500 to 2,000
40	1,000 to 1,500
15	less than 1,000

This averages out to about 1,600 calories per day, which, even considering the light body weight of the typical Indonesian and the low metabolism rate characteristic of Orientals, would seem a very low intake. The food availability situation has improved some since 1947, and at the present time the average daily caloric intake is in the vicinity of 1,750 calories composed as follows:

cereals, 1,000 calories; tubers, 400 calories; nuts and pulses, 190 calories; fruits and vegetables, 30 calories; sugar, 60 calories; vegetable oils, 40 calories; meat, fish, and eggs, 30 calories.[3] Indications are that food consumption levels are somewhat higher in the Outer Islands than in Java and Madura.

[3] There has been continued improvement since the above paragraph describing the 1949–50 food situation was written. More recent studies have shown that the daily caloric ingestion on Java is now at approximately the prewar level.

VIII. PRINCIPAL FOOD CROPS

During the recent war years, harvested acreage of the principal Indonesian food crops dropped steadily. The decline continued through 1946 because of the bad drought in that year. According to official statistics, the harvested acreage of the six principal food crops on Java in 1946 amounted to only 70 percent of the prewar average. It seems likely, however, that there was a tendency during this period for government officials to exaggerate the extent of the food crisis. The actual decline in harvested acreage is not thought to have been so great as officially stated.

After 1946 the situation improved; the harvested acreage of the six principal food crops reached a peak of 19.1 million acres in 1949—close to the prewar average. In 1950, however, according to official records the area in food crops declined by about 10 percent on Java (table 4). This decline was primarily in corn and cassava; the rice acreage remained steady. The explanation may be found in the rapidly rising export prices during 1950 for rubber, copra, and other tropical products brought on by United States stock-

TABLE 4.—*Estimated harvested acreage and production of principal food crops, 1937–51, Java and Madura*

[In thousands of acres and thousands of metric tons]

Crop [1]	1937–41 average	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951 [2]
Rice:											
Acreage	9,901	9,947	10,211	8,826	7,456	7,770	8,850	9,000	9,110	9,100	9,650
Production	6,564	6,402	6,263	5,297	4,338	4,082	5,511	5,616	6,015	5,806	6,477
Corn:											
Acreage	5,103	5,399	4,477	3,551	3,707	2,842	4,942	5,004	5,560	4,500	5,000
Production	2,060	2,165	1,604	1,209	963	722	1,600	1,600	1,850	1,600	1,900
Cassava:											
Acreage	2,438	2,412	2,347	2,048	1,362	1,547	2,217	2,239	2,493	1,779	2,500
Production	8,250	8,735	7,521	5,263	3,240	3,519	5,632	6,067	7,070	5,760	7,000
Sweetpotatoes:											
Acreage	492	467	446	641	762	580	650	600	472	388	450
Production	1,336	1,312	1,084	1,486	1,402	992	1,248	1,140	1,170	942	1,100
Peanuts:											
Acreage	616	625	718	432	221	326	464	583	647	563	600
Production	194	206	211	108	56	71	130	165	190	171	176
Soybeans:											
Acreage	991	1,189	948	458	321	583	700	867	835	808	880
Production	301	352	273	108	61	120	183	256	250	245	260
Total acreage	19,541	20,039	19,147	15,956	13,829	13,648	17,823	18,293	19,120	17,138	19,080

[1] Production in terms of rough rice, dry shelled corn, fresh cassava tubers, fresh sweetpotato tubers, shelled peanuts, and shelled soybeans. For peanuts, use factor 1.55 for unshelled nuts, for rice, use factor of 70 percent for milled rice.

[2] Preliminary.

Source: Compiled from official publications.

piling and the Korean crisis. As a result farm labor was diverted from subsistence cultivation to the production of export crops. Corn, cassava, and sweetpotatoes are considered by Indonesian farmers to be a poor substitute for rice in the daily diet. Consequently, when there is a choice, the peasants prefer to grow cash crops or rice.

The increased demand for rice during 1950 forced prices up and brought about increased rice imports and increased domestic production of rice in 1951. By late 1951 the favorable price relationships that had initially caused the export boom had been partly dissipated, and there was a substantial return to the pattern of subsistence farming. Total harvested acreage for the principal Javanese food crops in 1951 was approximately the same as in 1949.

In addition to the major crops shown in table 4, an estimated 2.5 million acres of minor annual crops are grown by native cultivators on Java and Madura. These include approximately 300,000 acres of such root crops as potatoes, yams, arrowroot, and taro; 500,000 acres of miscellaneous pulses; and about 140,000 acres of native tobacco. At least 1.5 million additional acres on Java are planted with the five perennials most important as cash crops: coconuts, kapok, tea, coffee, and rubber. In all, about 18 percent of the native farm area is utilized for house compounds (kampongs), nipah groves, and fresh water fish ponds. These kampongs are planted with a wide selection of fruits, vegetables, gourds, and melons, in addition to a number of cash crops like coffee and tea.

Rice

Rice, the economic foundation of native agriculture, particularly in Java, is by far the most important food crop of Indonesia. The various islands of the archipelago may be divided into three groups with respect to rice production—surplus, self-sufficient, and deficit. Java and Madura, Bali, Lombok, and South Celebes have had in recent times a rice surplus, which entered the interisland trade. Timor, Flores, Sumba, and Sumbawa are usually self-sufficient, and the islands of Sumatra, Borneo, Moluccas, Banka, and Billiton must import rice. Rice cultivation in Indonesia is of three distinct types: sawah, or wet cultivation; padi gogo, or upland dry cultivation; and ladang, or shifting fire farming. On Java and Madura, about 90 percent of the rice area is irrigated sawah, the balance padi gogo. In the Outer Islands, with the exception of densely populated Bali and Lombok, shifting cultivation accounts for at least 25 percent of the rice area and a far higher proportion of other croplands.

Of the 19.5 million acres of land utilized for smallholders' agriculture on Java and Madura, the area devoted to rice cultivation in 1950 amounted to 45 percent (8.77 million acres), of which 8.11 million acres were sawah and 0.66 million acres were padi gogo. Since the total area planted to rice in 1950 was about 9.6 million acres (of which 9.1 million were harvested), it is apparent that 800,000 acres of the sawah area (10 percent) was being double-

cropped with rice. In 1951 this double-cropping in rice rose to 17 percent, as about 10.13 million acres of rice were planted, of which 95 percent were harvested. The tropical climate permits a year-around growing season, but, where lack of water or poor soil fertility prevents a second crop of irrigated rice, the dry sawah is usually planted with a secondary food crop (polowidjo) such as corn, sweetpotatoes, or peanuts, which will be ready for harvest before the next rice planting season.

On Bali, 301,000 acres of rice were harvested in 1950, of which 84 percent was sawah; on Lombok 188,000 acres were harvested, 95 percent of it sawah. More than 3 million acres of rice are harvested annually on Sumatra, much of which is from ladang cultivation. About a million acres of rice is grown each year in South Celebes, and another million acres in Borneo. According to various estimates, perhaps 300,000 additional rice acres are scattered around the archipelago, but current statistics of a precise nature are entirely lacking. The total area under rice in the Outer Islands probably fluctuates between 5.5 million and 6 million acres annually.

Current average yields for irrigated rice on Java are about 1,500 pounds of rough rice per acre (33 bushels). In comparison with the three traditional rice exporters of Southeast Asia, Java has rice yields equal to those of Thailand, 20 percent higher than Burma's, and 45 percent higher than Indochina's. But Java is surpassed by China, with average yields of about 2,200 pounds and by Japan with 3,300 pounds per acre. In the Outer Islands, with the exception of Bali and Lombok, yields are much lower (700 to 1,200 pounds per acre), due to the extensiveness of dry rice cultivation, both ladang and padi gogo. Per capita rice consumption, however, is about 12 percent higher because there are fewer people in the area and holdings are larger.

Rough rice production on Java-Madura was estimated at approximately 6.5 million metric tons during 1951, a substantial improvement over the poor harvest of 1950. Precise data on the regional distribution of rice output in the Outer Islands are not available, but current production there is probably in the vicinity of 3.25 million metric tons of rough rice. Hence, total rice production in Indonesia is now almost equal to the 10 million tons annual production achieved before the war, but it should be remembered that population has increased by more than 5 million.

The current trend in both domestic rice production and foreign imports is upward, in contrast to the prewar situation, when the need for rice imports diminished as domestic output increased. Back in the mid-1930's, as a result of the world economic crisis that curtailed the market for Indonesia's traditional plantation exports, the Colonial Government initiated measures intended to make the archipelago self-sufficient in food production. During the decade 1926–35 imports of milled rice had averaged about 500,000 metric tons annually (in terms of rough 700,000 tons). To counteract this situation prices of domestic staple crops were fixed by the government at a level that assured native producers a fair return and hence tended to increase local production. The influx of cheap rice from the surplus areas of Burma, Indochina, and Siam gradu-

ally diminished, since imports were subject to a price-equalizing duty. On Java, total rice production moved steadily upward and by 1936 local supply exceeded demand and a surplus was available for export to the Outer Islands. Only in 1941, for the first time in many decades, was Indonesia as a whole a net exporter of rice, and then only 50,000 metric tons of milled rice.

After 1941 the rice situation deteriorated. Under the Japanese occupation, which commenced in 1942, productivity decreased for several reasons. The livestock used for plowing were depleted in number, heavy military requisitions of rice reduced the peasants' will to work, new agricultural equipment was unobtainable, and the elaborate irrigation systems in some parts of Java were not kept in good repair. By the end of 1944, rice production on Java was 20 percent less than before the war. The islands were restored to Allied authority in 1945 but the critical situation remained. Beginning in 1946 and extending into 1947 the severe drought caused widespread crop failures. Over-all rice production declined to a new low, officially estimated at 38 percent less than the prewar output, and large-scale emergency imports were required to alleviate the serious famine that resulted. However, as previously indicated, there was a tendency during this period for government statistics to exaggerate the decline in production and cultivated acreage.

Since the latter part of 1947 the rice harvests have greatly improved, and production has now almost regained its prewar level. Current output, however, is quite insufficient to meet the increased need of an expanding population, plus the new consumer demand resulting from high export prices for tropical products. Hence, rice imports are also increasing. Rice imports in 1950 were more than 340,000 metric tons, while during 1951 about 425,000 metric tons of milled rice were imported. Current rice imports are coming almost entirely from Burma and Thailand, and from the United States under Mutual Security Agency (formerly ECA) allocations. There is little prospect that Indonesia will become self-sufficient in rice during the years immediately ahead.

Wet rice in Indonesia, as in other Oriental countries, is grown in small inundated paddy fields supplied with water either by artificial irrigation or by damming up the heavy monsoon rains in the open sawahs. Laborious terracing is a common practice, with narrow rice terraces cut into mountain slopes having as much as a 45° incline. Water from mountain streams is channeled into the upper levels and then allowed to drain slowly down the hillside, overflowing from one terrace level to the next. At the present time, only 8 percent of the rice area on Java and Madura (0.7 million acres) is under dry cultivation. Of the other 8.1 million acres, about 20 percent is watered by modern gravity-flow irrigation systems built by the Dutch during the two decades preceding the war. Another 20 percent is supplied by small ditch systems utilizing local streams, and the remaining 60 percent is irrigated by the collection of rainfall within the narrow retaining walls or dykes that surround each small paddy field. A single holding of 2 acres is liable to be divided into a dozen or more of these tiny sawah plots.

Irrigated rice cultivation is without doubt the most time consuming and laborious of all types of agriculture. Up to 10 times as much effort is required to grow an acre of rice as for other field crops like corn, sweetpotatoes, and peanuts. Preparing the fields for cultivation starts with repairing the dykes, after which the fields are flooded and the water allowed to soak into the soil for several days to soften it. If the rice fields are supplied with water by artificial irrigation, then plowing and planting can take place at almost any time. But since most rice paddies are watered either by direct rain or rain-fed streams, this work of preparing the fields for planting cannot commence until the arrival of the wet monsoon in November or December, in which case harvesting will start 4½ months later, at the beginning of the dry monsoon.

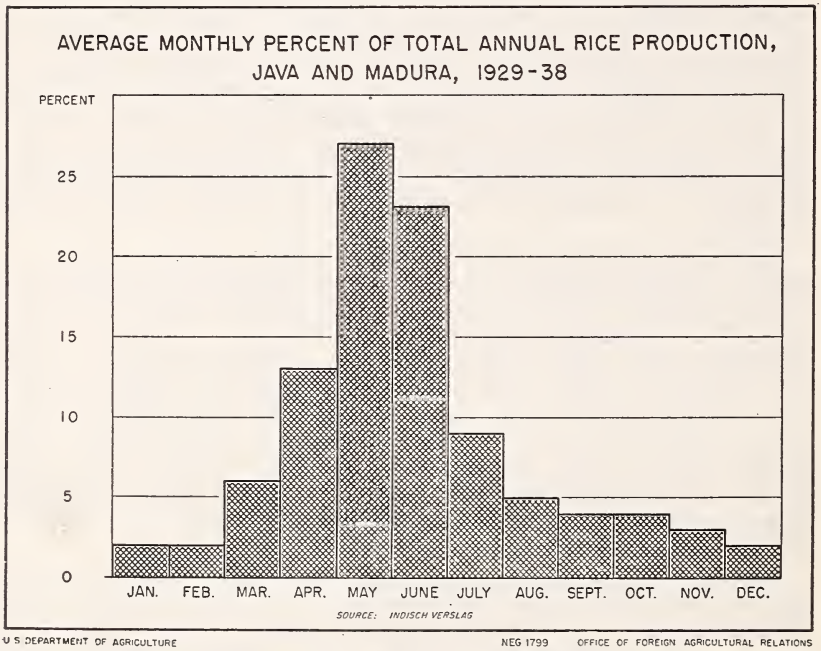


FIGURE 2.—A tropical climate and a fertile soil make possible the growing and harvesting of rice the year around on Java, when irrigation is used. The peak harvest period, however, is from April through July.

After the newly flooded fields have soaked for 2 or 3 days, they are plowed several times with a team of water buffaloes. Instead of plowing a straight furrow, a circular course is followed, ending up in the middle of the field. After plowing is completed, the parts close to the dykes and the corners of the field that have not been reached by the plow are dug up with a heavy mattock. This is followed by repeated harrowing, until the soil is broken up into a soft muddy emulsion. Sometimes the farmer does this by simply wading around in the field barefoot and squeezing the mud between his toes.

Meanwhile, rice seedlings have been grown in special nurseries, occupying about 10 percent of the total area to be planted. The seedlings are ready for transplanting a month or so after germination. Often the nurseries of a single cultivator are inadequate to supply all his needs when his fields are ready, in which case he must purchase seedlings from other cultivators or from one of the government seed farms. These farms, established in the late 1930's, have introduced new, improved seed varieties. By 1941 there were about 100 such farms on Java, operated by the Agricultural Service, and nearly one-half million acres had been planted with improved-type seedlings. Current plans of the Ministry of Agriculture call for expanding these farms, with the eventual goal of one for every 20,000 to 25,000 acres cultivated. During 1951 the government opened more than 70 new seed farms.

Transplanting of rice is traditionally a woman's job in Indonesia as in most other Asiatic countries. The seedlings are carefully pulled from the nurseries and tied in small bundles of about 20, after which the mud is washed off the roots and the plants are topped and then transported to the fields. In the newly prepared paddy fields women wade calf-deep in mud and water, bending over all day rhythmically poking holes with their left forefinger and inserting 3 seedlings at a time with their right hand. Working rapidly and with mechanical precision, 25 girls can transplant 2 acres during an 8-hour day. After the rice has been transplanted, little remains to be done until harvesttime, except for weeding and regulating the flow of water into the flooded fields. As shown in figure 2, the principal harvest season is during the dry months of April through July, though rice is grown and harvested the year around on Java when sufficient water can be obtained for irrigation during the growing period.

After the rice has ripened, the water is drained from the fields and harvesting begins. This tedious job is also traditionally left to the women. Thousands of young women return to their native villages at this time of year to help with the harvest and to take part in the local festivities that follow. Before the actual work begins, certain religious ceremonies are performed, and then the women move into the mud-caked, dry-bottom fields to harvest the rice. Using a small sharp sickle, they cut each separate rice stalk from the plant about 12 or 15 inches below the head. The individual stalks are bound into sheaves weighing 10 to 15 pounds each and known as stalk padi. These sheaves of stalk padi are laid out in the sun to dry and then stored in sheds until threshing takes place. About 80 percent of the crop is used on the farms, where it is hand-threshed and then husked by pounding it with a pole inside a hollow stump. The surplus is sold to the nearest rice mill in unthreshed sheaves of stalk padi.

After the harvesting of the wet monsoon rice crop on Java, the sawah fields are seldom left in fallow. About one-fifth are currently replanted with a second crop of rice grown during the dry monsoon. Sufficient water for flooding these fields is obtained from the few well-developed irrigation systems built by the Dutch during the interwar period. Since even during the so-called dry

season there is ample rainfall in many parts of the island for crop cultivation, a secondary crop (polowidjo) of corn, cassava, sweetpotatoes, peanuts, or soybeans is often planted on the drained sawah field, especially if soil fertility is adequate. More extensive double cropping and better yields for both rice and secondary crops could be obtained with improving and extending irrigation facilities on the island and by more widespread application of fertilizer. As Java's population continues to grow, this problem of raising food output per acre becomes a matter of ever increasing importance.

The native farmer is probably aware that his rice yields could be raised materially if he applied chemical fertilizer, but few can afford it. Also, there is a strong reluctance to use fertilizer of any kind on food crops that do not bring a cash income. The United States Government's Special Technical and Economic Mission (STEM) to Indonesia is attempting to overcome these difficulties and prejudices by making more and cheaper fertilizers available to the farming population.

Further extension of rice acreage in Java appears to be rather limited, as there is little unutilized land suitable for irrigation. More than half that now in use is rolling to hilly and has been adapted to rice cultivation only with much effort. But there is at the present time great interest in the possibilities of expanding dry land cultivation of rice on Java. The government is currently conducting experiments along this line in 72 different localities. However, it appears quite likely that better results will be obtained on Java from continued efforts to improve agricultural yields and extend the practice of double cropping by construction of new irrigation facilities for land already being cultivated, wider use of fertilizer, and development of improved seed strains.

Native-grown rice moves into the distributive system through the local rice mills. Indonesian stalk padi is not comparable to paddy rice in other parts of Asia or to rough rice in the United States, since 12 to 15 inches of straw is included with the unthreshed rice heads. The millers of Java report a 50-percent output of milled rice from stalk padi as purchased, or a yield of 70 percent in milled rice from the rough rice after it has been threshed. By mid-1951, there were 475 rice mills in operation on Java, 350 of them members of the Rice Central Organization, a miller's trade association.

The government-operated and subsidized Food Supply Board (Jajasan Bahan Makanan), which has a monopoly on rice imports, purchases considerable quantities of rice direct from the millers. This domestic purchase program has encountered stiff competition from private buyers, however, because of the low price offered by the Food Supply Board. In an attempt to lessen the price competition and prevent speculative hoarding, maximum wholesale prices for rice were established by government decree in October of 1950. This action produced a severe shortage of rice stocks in Djakarta at the end of the year, with accompanying scarcity prices at the retail level. On December 1, 1950, price ceilings for West Java were abolished, with the result that new stocks of rice moved into the major urban centers and the retail price declined. In line with

the government's policy of keeping down the price of necessities, the operations of the Food Supply Board are subsidized from the state budget. During 1950 its program of selling rice at retail below purchase cost created an operating deficit of 180 million rupiahs.

Corn

After rice, corn is the principal Indonesian foodstuff and the only other important grain grown in the archipelago. On Java, corn acreage is roughly one-fifth that planted to rice, and production is concentrated in Central and East Java, where large sections are not suited to irrigated rice cultivation. On the small island of Madura, about three-fourths of the planted area is in corn. Other important corn-growing regions are in South Celebes, Bali, Lombok, and the Lesser Sundas. The quantities grown in other parts of the archipelago are relatively insignificant.

Dried corn meal, often a substitute for rice, is an important part of the native diet. Corn starch is widely used in puddings, and unripe ears, harvested when the plants are about 2½ months old, are a popular vegetable. The young green leaves of the corn stalk are used as wrappers for native strootjes (cigarettes). In addition, dried corn is an important cattle feed, and the stalks make good fodder. Cattle raising in Indonesia is centered in East Java and Madura, where corn production is most prevalent. Prior to the war, 100,000 to 125,000 metric tons of dry shelled corn were exported annually to Europe and Japan. Since the war, however, exports have been negligible because production has been lower and most of the corn has been used at home. In fact, all corn exports have been prohibited by government decree since November 3, 1950, because of the current food shortage.

Immediately before the war, total corn production in Indonesia was averaging around 2.5 million metric tons of shelled grain a year, of which about 2 million tons was grown on Java and Madura, and an estimated 250,000 tons on Celebes, 90,000 on Bali and Lombok, 125,000 in the Lesser Sundas, and 35,000 tons elsewhere. Slightly more than 5 million acres were harvested on Java and Madura, while about 1.2 million harvested acres are estimated for the Outer Islands. As seen in table 4, there was a steady decline in corn acreage and production on Java and Madura during the war years, with the low point being reached in 1946. Since then, acreage has been close to the prewar average, but production has been substantially less due to soil exhaustion and poor yields per acre. The poor 1950 harvest is attributed to a combination of climatic factors and the rubber boom. Corn production in the Outer Islands is thought to have regained its prewar position of about one-half million metric tons annual harvest.

In Indonesia corn is generally harvested 4 months after planting. On Java, climatic conditions make possible three distinct harvest periods a year. Two corn crops may be grown in succession on dry upland fields (tegallons) during the rainy season, while a secondary crop of corn, cassava, or sweetpotatoes is often planted

on the rice fields (sawahs) during the dry season. Corn yields are relatively low because about 75 percent of the area devoted to corn is upland dry field, less fertile than sawah land. The possibility of increasing local corn yields through the development of hybrid varieties has been recognized for some time by agricultural authorities in Indonesia. At the present time, active work in this field is being carried on by the agricultural experiment station at Bogor (Buitenzorg) in West Java. Indonesian agronomists do not believe that the importation of hybrid seed from the United States is practical because of the difference in the length of day and other climatic conditions in the two countries.

Cassava

Most of the cassava (manihot) grown in Indonesia is on the islands of Java and Madura, where it ranks as the third most important native food crop. In the Javanese diet, cassava holds a place somewhat similar to that of the potato in Europe or the United States. The fresh roots are peeled, quartered, sun dried for several days, and then ground into gaplek meal, which is sometimes used for cattle feed as well as for food. The food value of cassava root is considerably less than that of rice or corn, but, since the root can be readily grown on land too poor for much of anything else, it has become a basic food crop on Java. In the Outer Islands the relative abundance of land makes it unnecessary to cultivate cropland on which nothing but cassava will grow. Hence, comparatively little gaplek is eaten outside of Java and Madura.

In times of food scarcity, production of cassava may be increased. When other foods are abundant, there is usually a substantial surplus of cassava for export, processed as one of several types of tapioca products. Exports of various tapioca products averaged 288,000 metric tons a year during the period 1937–41, equivalent to about 1,346,000 tons of fresh cassava root. During the war, none was exported and since then exports have been slight. Although table 4 indicates that less cassava has been produced in recent years than before the war, the amount available for domestic consumption has not declined proportionally; the curtailment has been in exports. The sudden, but temporary, decline in planted acreage and production during 1950, similar to that recorded for corn, is directly attributable to the rubber boom, which made it more profitable to tap rubber than to grow cassava, and to climatic factors. During 1951 the trend position was recovered.

Cassava is a dry land crop requiring 7 to 9 months to mature. Agricultural studies on Java have shown that as land becomes exhausted in fertility and less suited for rice cultivation, the native farmer tends to plant corn, and after a still further decline in productivity the land is relegated to cassava as a crop of last resort. Prewar production on Java and Madura averaged about 8,250,000 metric tons annually from a harvested area of more than 2,400,000

acres. As seen in table 4, the same acreage is now producing only about 7 million tons per year, an indication of declining soil fertility. Cassava is also grown in small amounts in Bali, Lombok, and Celebes. Production on Bali and Lombok is well above prewar levels, with an estimated 40,000 acres currently under cultivation, while about 55,000 acres are said to be planted in Celebes.

Sweetpotatoes

Sweetpotatoes are an important native agricultural commodity in Indonesia, frequently grown as a secondary crop on irrigated rice fields. Accurate acreage and production statistics are not available for either Java-Madura or the Outer Islands since all output is locally consumed. Prewar and wartime production averaged more than 1,300,000 metric tons from about 500,000 acres (table 4). Postwar production has declined, due to an apparent gradual shift in preference from corn, cassava, and sweetpotato cultivation to peanuts and soybeans. As was the case for corn and cassava, the 1950 planted area and production for sweetpotatoes was one of the lowest on record, with less than a million metric tons harvested from about 388,000 acres. In the Outer Islands, sweetpotatoes are a common native food crop, but current production in these regions is unknown.

Peanuts

Peanuts are one of the principal legumes cultivated on Java and are regarded as an important native food crop. Almost without exception, peanuts are grown on dry land, the crop ripening in 3 to 4 months. Cultivation is fairly general, though nearly half of the crop comes from East Java. Minor amounts are grown in the Outer Islands, especially Bali and Lombok, but here again no reliable statistics are available. By 1949, peanut production on these islands had regained its prewar position of nearly 200,000 metric tons a year, but in 1950 a 10-percent decline in harvested area and production took place (table 4). Recovery in 1951 was slight.

For the most part, peanuts are eaten in roasted form, though large quantities are used in the manufacture of peanut oil. The byproduct, peanut cake, is used not only as a sweetmeat, but also as a concentrated feed for cattle. The tops of the plant are used as hay. Exports of peanuts totaled approximately 11,500 metric tons in 1949 and 29,000 tons in 1950, of which the bulk was consigned to the Netherlands. A program to increase the export of peanuts was introduced by the government in July 1949. Though all foreign exchange transactions are regulated by the government, peanut exporters are permitted to retain for free disposition a certain percentage of the proceeds from each shipment. Domestic shortages of most consumer goods made this proposal attractive and peanut exports rose during the last months of 1949.

Soybeans

Though of comparatively recent significance on Java, soybeans have now surpassed the acreage and production of peanuts on that island. After 1932, soybean acreage expanded rapidly on Java, more than doubling within a decade. The cultivated area declined sharply during the Japanese occupation, and by 1945 it was reduced to less than one-third of the 1942 acreage. Since 1945, as noted in table 4, there has been a steady improvement in the volume of production, though the prewar level has yet to be obtained. About 260,000 metric tons of soybeans were produced on 880,000 acres in Java-Madura during 1951.

Originally concentrated on Java, the cultivation of the soybean has more recently been extended to other regions. No statistics are available on the production in the Outer Islands as it is still considered to be relatively insignificant there. Much improvement in soybean yields is needed, as they are lower in Indonesia than in other countries. The current Indonesian yield of about 600–650 pounds per acre is only about one-half of the United States yield and two-thirds of the yield in Manchuria.

IX. ECONOMICS OF ESTATE AGRICULTURE

Scale of Operation

Only 1.3 percent of Indonesia's soil—6.2 million acres—was under estate management just before the war. Approximately 3 million acres of this area were actually being cultivated—about 8 percent of the total cultivated area on the islands. However, the significance of this acreage was far greater than these percentages might indicate. Estate-grown products comprised 60 percent of the value of all agricultural exports in 1938, while Western-owned enterprises as a whole supplied about 40 percent of the government's tax revenue.

There were 2,400 estates operating in Indonesia just prior to the war, half of which were on Java (there are no estates on Madura), one-quarter on Sumatra, and the balance scattered through the Outer Islands. Of the total estate area, 43 percent was on Java (primarily West Java), 51 percent on Sumatra, and only 6 percent in the other islands of the archipelago. As might be expected because of the greater pressure for land on Java, the ratio of planted area to total estate area was highest on this island. On Java, 57 percent of the estate area was being cultivated, on Sumatra 43 percent, and in the other islands only 37 percent. Again reflecting the relative abundance of land in the Outer Islands, the average-size estate was 5,148 acres on Sumatra but only 2,244 acres on Java.

Since the war, there have been numerous indications that the future scale of estate operations in Indonesia will be considerably smaller than in the past. Currently, the area under active operation is only two-thirds of the prewar figure. Some of the land has been redistributed to peasant cultivators; some has been taken over by native squatters. Too, the disturbed conditions in the country, and the accompanying general lack of security, are not conducive to rebuilding estate agriculture.

Labor

Most of the plantations are worked with hired labor. In overpopulated Java the estate owners have no special labor supply problem; all the labor needed may be secured from the surrounding villages. In addition to the landless peasant who must earn his living by wage work, there is the owner-cultivator who has such a small plot that he and his family must supplement their income by occasional outside work. Continued subdivision of holdings on Java has reduced many plots below the subsistence level. Those estates engaged in upland cultivation of hill crops—coffee, tea, cacao, oil palm, cinchona, rubber—obtain their labor supply from these two groups. For sugarcane and tobacco, a somewhat differ-

ent arrangement is often made. Operators of these estates, for the most part, lease the land for one growing season, thus permitting rotation of sugar or tobacco with native-grown food crops. In this case the peasant-owner usually contracts to work the land he leases to the estate, thus becoming a share cropper on his own farm. Before the war, it was estimated that one out of every four Javanese males was dependent on estate agriculture for at least part of his income.

Another type of labor arrangement, once fairly common on Java but today almost extinct, is the feudal right of landlords on private lands and rulers in Native States to exact obligatory labor dues. A native ruler could, for example, rent out a part of his domain, together with the labor services of those peasants living on it. The dwellers thereon would thus be obliged to perform up to 250 days of work a year for the leaseholder with little or no compensation. Before the war the Dutch were attempting to reduce by legislation the burden of the forced labor service, in some cases repurchasing privately owned lands that had been acquired prior to passage of the Agrarian Law of 1870, which outlawed the direct sale of land to non-Indonesians. The present government proposes to continue this repurchase policy.

Obtaining labor for the estates in the Outer Islands is often an entirely different problem from that on Java. Because these islands are sparsely populated, many of the estates must depend almost entirely on imported labor, either from Java or, as was frequently the case before the war, from South China. The conditions under which these imported laborers were employed, and the manner of holding them to the provisions of a contract, were subjects of much recrimination. Though the situation improved in time, it was still true before the war that in some cases contract laborers were imprisoned for desertion.

Since the war the whole labor picture has changed radically. Under the Dutch Colonial Government, an organized labor movement was prevented from developing. Since the transfer of sovereignty, trade unionism in Indonesia has experienced a phenomenal, if uneven, growth. Because of the confused political conditions prevailing in the country, there has been little opportunity for a normal, healthy development in the labor field, and a majority of the recently formed labor federations bear little resemblance to trade unions in the United States. To date, the largest and most active trade union central organization in Indonesia has been the Serikat Organizasi Buruh Seluruh Indonesia (All Indonesian United Workers) commonly known as SOBSI. This organization is identified with the Indonesian Communist Party (P. K. I.) A number of the largest and strongest trade unions in the islands are affiliated with SOBSI, while many others appear to work in close harmony with it.

The general labor picture during 1950 was characterized by a succession of strikes, work stoppages, "slowdowns," demonstrations, and continued demands for higher pay and shorter hours. A new labor law was adopted by the government in 1950 establishing a 7-hour day, 40-hour 6-day week, but in practice this has ap-

plied only to Western-operated enterprises. The SOBSI organization has so far demonstrated greater interest in maneuvering for political power and making a show of strength than in achieving the long-run interests of the workers. Under these circumstances the estates have had great difficulty operating, what with continued work stoppages, political agitation, and outright sabotage. A continuation of these conditions will quite likely mean a closing down of many estates in the next several years.

Capital

Foreign capital invested in estate agriculture in Indonesia amounted to about $800 million before the war (2 billion guilders), of which some $600 million was Dutch, $100 million British, $20 million or $30 million American, and the remainder French and Belgian. Most all of the investors in sugar and cinchona were Dutch and they dominated palm oil, coffee, and tobacco. In the field of rubber, Great Britain and the United States, as well as the Dutch, had important investments.

Before the war the Indonesian banking system was dominated by three large Dutch commercial houses and two British. The lack of domestic capital forced these banks to engage in long-term investment financing, as well as in short-term credit activities. Not only did they finance many Western-operated agricultural estates, but the two largest Dutch banks even owned a considerable number of plantations. Hence their business was totally different from the concept of "orthodox" commercial banking as undertaken in Europe and America. Even those smaller banks that had no direct connections with the plantations got the major share of their business from financing the export of agricultural products. Since most estates operated on leased lands, loan collateral generally took the form of a mortgage on unharvested crops.

Since the war, the financial picture has changed considerably. Due to the uncertain future status of direct foreign investment in Indonesia, and the present lack of security in many areas, European and American investors are reluctant to put additional capital into the islands. If this situation is not changed, the prospect for continued large-scale estate enterprise in Indonesia is not encouraging, since such operations are dependent on heavy capital investment, and such funds are at present lacking within the domestic economy.

Cooperation

From the very earliest days the Dutch planters recognized the need for active cooperation, not only to represent their common interests to the Colonial Government and the mother country, but also to perform scientific research on behalf of their own industry. The initial difficulties of farming under little-known tropical conditions soon led to the realization that scientific research studies were absolutely essential to the continued existence of estate cultivation in the Indies. Experimental stations were a costly

undertaking; hence they were established for the most part on a cooperative basis.

The sugar growers of Java, faced with a highly competitive world market, were the first to organize. During the 1880's, three separate experimental stations were founded to conduct research on improved types of cane and methods of cultivation. In 1895 the General Syndicate of Sugar Producers was established to promote the common interests of the industry. In 1912 the two surviving experimental stations were amalgamated under the single direction of the sugar syndicate, one to study technical and chemical problems and the other to specialize in agricultural techniques. In recent years one station, at Pasuruan, has carried on the work for the entire industry. After the First World War another organization, the Union of Sugar Producers (V. J. S. P.) was established as a central sales organization for the sugar growers.

Other planters on Java followed suit, and, in addition to a number of small organizations of only local significance, there developed four large and powerful producers' associations: one each for cinchona, tea, and rubber, and a joint association for coffee and cacao. These four affiliated to form the General Agricultural Syndicate, which now maintains four experimental stations and performs other services similar to the work of the sugar syndicate. A station at Malang functions on behalf of coffee culture, the tea and rubber stations are at Bogor, and the cinchona experiment center is at Pengalengan.

The European planters on East Coast Sumatra likewise have their own organizations. The tobacco estates there are all affiliated with the Deli Planters Association, while the rubber growers have united in the General Union of Rubber Planters (A. V. R. O. S.). The Medan (Sumatra) experimental center has done much work on the technical aspects of tobacco cultivation, while the A. V. R. O. S. station has undertaken research on rubber, oil palm, and tea culture.

The successful development of estate agriculture in Indonesia before the war was in large measure due to this high degree of cooperation among individual growers. Starting as it did with technical and scientific matters, it gradually extended to production and marketing. During the depression years, various restrictive measures were adopted to curtail output and maintain prices. Except for the sugar plantations, the estates were fairly successful in weathering the depression years.

The plantations were the largest and best organized economic force in the islands up to the outbreak of the Second World War, and in keeping with this role they exercised an important influence on government. There was always close collaboration between the various producers' associations and the Colonial Government, and official representatives of the associations served as advisors on a number of government commissions. But now, as a result of the transfer of sovereignty in 1949, the important role played by the estates in public life has come to an abrupt end.

X. PRINCIPAL COMMERCIAL CROPS

European-owned estate agriculture reached an impressive level of development in Indonesia during the interwar period. Although most of the export crops grown on the archipelago were products of estate agriculture, the long-run trend was in the direction of an increasing share from native cultivators. This trend is clearly apparent now. Products classed of smallholders' origin rose from 40 percent by value of total agricultural exports before the war to 68 percent during 1950, while estate agriculture dropped from 60 percent to only 32 percent. This sharp juxtaposition has been the result of unusual circumstances—the Japanese military occupation and the unsettled conditions that have prevailed in the islands since the war—rather than the continued working of a secular trend. The estates have not had a position secure enough to take full advantage of the recent high world prices for tropical export commodities, while native producers have capitalized on the difficulties of the estates by harvesting both their own and to a considerable extent estate-planted commercial crops as well.

Before the war, palm oil, sugar, cinchona, cacao bean, and hard fiber exports were almost exclusively estate products. The only change in these items is that sugar is no longer being exported in appreciable quantities. Tea and tobacco for export are primarily estate grown, though a considerable quantity of smallholders' tobacco is produced for home consumption. Rubber and coffee before the war were produced in approximately equal proportions by native and estate growers, but for both crops smallholders' production far surpasses estate output at the present time. Copra, kapok, and pepper and other spices are still predominantly native grown, as before the war.

Estate crops may be divided into two classes—the hill cultures such as coffee, tea, cacao, cinchona, and rubber, which are grown in upland areas unsuited for irrigated rice cultivation, and the field crops like sugarcane and tobacco, which must compete for space with native food crops. Because of the great pressure for smallholders' cropland, the future status of such estate products as sugar and tobacco in Indonesia is open to serious question.

Rubber

More than 95 percent of the world's supply of natural rubber is now grown in Southeast Asia, about three-fourths of it in Malaya and Indonesia. The major producing areas now rank as follows: Indonesia, British Malaya, Ceylon, Thailand, and Indochina. Only in the last 2 years, however, has Indonesia overtaken Malaya. Before 1914, Brazil was the world's leading rubber producer. Here rubber was obtained from several indigenous wild rubbertrees,

chief of which was the Para rubbertree *(Hevea brasiliensis)* common to the Amazon Basin. During the last two decades of the nineteenth century the increasing industrial demand for rubber inspired a number of attempts at commercialized production in other parts of the world.

The arrival on Java in 1882 of 33 seedlings of Brazilian *Hevea* marked the beginning of the plantation rubber industry in Indonesia. The very factors that had made Brazil the chief beneficiary of the rubber boom—limited supply and high price—gave tremendous impetus to the young plantation industry in Java and other parts of Southeast Asia. Whereas in 1907 plantation rubber supplied only 5 percent of the world's total production, by 1914 it had exceeded the production of wild rubber from all parts of the world.

In Indonesia, estate cultivation of rubber made sound progress due to scientific experimentation and active government assistance. As the number of private European estates on Java and Sumatra increased, smallholders' cultivation of rubber began to assume increasing importance. In the early 1920's native-grown rubber already accounted for one-third of the yearly output, and just prior to the war it had reached one-half. Of Indonesia's record 1950 and 1951 rubber production, estimated at 704,000 and 804,000 metric tons, respectively, nearly three-quarters was classed as smallholders' output.

As an export commodity, rubber is Indonesia's most important single product. Legal exports alone earned more than US$303 million in foreign exchange during 1950 and still more in 1951. During the immediate prewar period, rubber accounted for about 25 percent of the value of all exports. After the war it maintained approximately this position until 1950. Soaring rubber prices in 1950 resulted in a record year for smallholders' production, and legal exports of rubber, both native and estate produced, amounted to 42 percent of the value of all recorded exports in that year. Since estate and smallholders' cultivation of rubber differ from each other to a considerable extent, they will be treated separately.

Estate Rubber

Estate rubber is grown principally on East Coast Sumatra and Java, and to a minor extent in Borneo and East Indonesia. Since most of the arable land on the plains of Java is utilized for smallholders' cultivation, the majority of rubber estates on this island are located in the hills, at elevations from 500 to 1,500 feet. In Sumatra, on the other hand, with its lower density of population, there is no lack of land near the coast or along the rivers. Hence, most of the rubber plantations on Sumatra are found on flat or slightly undulating terrain at elevations of less than 300 feet. The trees require a warm, moist climate and deep soil of good physical texture. Optimum rainfall ranges from 70 to 100 inches a year.

Just before the war the planted area on rubber estates totaled about 1,557,000 acres, of which roughly 40 percent was on Java and at least 50 percent on Sumatra. This combined area had a yearly productive capacity of about 350,000 metric tons. During the 1930's, however, annual output was something under 200,000

tons because of the various restrictive schemes enforced by the growers to maintain the world price of rubber.

From 1942 to 1950, losses in estate area resulting from war, civil unrest, and other causes were an estimated 334,000 acres, thus leaving a potentially productive estate area of about 1,223,000 acres with a tapping capacity at present of about 560 pounds of rubber per acre—or a potential estate output of 311,000 metric tons annually. However, at the end of 1950 there were only 560 out of about 1,200 prewar rubber estates in operation, with a combined area of 1,018,000 acres, or 81 percent of the potential area. Of this, only 694,000 acres (56 percent of the productive area) were actually being tapped by their legal owners—hence, a recorded estate production of only 174,147 metric tons in 1950 and estate rubber exports, about 157,000 tons. As seen in table 5 this represented but slight improvement over the preceding year. Estimated 1951 estate output was somewhat better, but still only one-third the size of smallholders' production. The estate rubber is not being lost, however, since much of it is currently being tapped by squatters. This in large measure explains the phenomenal rise in native rubber production during 1950 and 1951. It is estimated that at least one-quarter of the current smallholders' rubber output is being obtained from estate plantings, many of them on Java.

TABLE 5.—*Production and exports of rubber, 1946–51, with prewar comparison*

Year	Production			Exports [1]
	Estate	Smallholder	Total	
	Metric tons	*Metric tons*	*Metric tons*	*Metric tons*
1935–39 average	186,850	167,513	354,363	338,860
1946	[2]	177,800	177,800	233,680
1947	12,940	269,458	282,398	291,577
1948	103,371	335,896	439,267	438,894
1949	170,678	268,073	438,750	428,829
1950	174,147	529,687	703,834	702,778
1951 [3]	216,205	588,283	804,488	751,508

[1] Includes illegal exports not listed in official trade statistics.
[2] No estate production recorded. Export of carry-over stocks.
[3] Preliminary estimate.

Source: Secretariat of the International Rubber Study Group, London.

In the past, estate rubbertrees were planted about 100 to the acre, to be thinned out to 70 or 80 of the healthiest trees in the first years of tapping. The modern tendency is toward a fairly thick planting of as many as 200 trees per acre with final stands of 100 to 150. Six or seven years are required for the tree to mature; trees under 5 years are seldom tapped. Maximum productivity of latex (liquid rubber) is achieved after about 10 years. Latex yields depend in large measure on the age of the tree; hence, if the price of rubber is low, it is not profitable to tap trees early.

The average per-acre yield for estate-grown rubber is currently calculated at about 560 pounds a year. Mature trees grown from

select seedlings or grafts yield an average of about 16 pounds of latex annually, while ordinary trees yield about 5 pounds. Smallholders' rubber gardens are planted with 350 or more trees to the acre. Because of this crowded condition and a general lack of care, native-grown rubbertrees seldom yield more than 2 or 3 pounds of latex annually.

Tree tapping to obtain latex is a delicate operation. A thin diagonal cut is made in the bark of the tree, extending in length about one-half of the circumference. The latex bleeds out from the tree and flows down the cut, through a specially placed spout and into a small cup attached to the trunk. Tapping usually begins at 5 or 6 a. m. and concludes at about 9 a. m., the flow of latex being greatest around dawn. An experienced tapper can cut 300 to 400 trees in that length of time, depending on the terrain. The average yield of latex per tree is about a teacupful per tapping. The trees are retapped every second day simply by cutting a fresh shaving of bark from the base of the old cut. About an inch of bark per month is consumed in this manner. When one side of the trunk has been tapped to within several inches from the ground, tapping is begun on the other side of the trunk, thus allowing the bark to renew itself.

The rubber planters of Java and Sumatra have their own producers' associations, which have pioneered in the field of scientific research. A great effort has been made to produce high-yielding trees. At first it was found that 30 percent of the trees in a planting yielded about 70 percent of the total latex output. Two methods were developed for improving rubber output: bud grafting from select high-yielding trees to the stocks of saplings, and the use of especially selected clones.

In general, every phase of the plantation rubber industry of Indonesia has been subjected to careful and scientific research—tapping, physiology and diseases of the rubbertree, clean weeding versus cover crops as a means of soil conservation, planting density and thinning, and rubber preparation. Widespread field experiments have ascertained that in only a few instances does fertilization affect the yield of *Hevea* plantings. In Sumatra, certain low-lying clay soils respond to nitrogenous fertilizers, and in Java there are some small areas with poor lateritic soil that needs phosphate and potash, as well as nitrogen, for satisfactory rubber production.

Smallholders' Rubber

Encouraged by the success of the European-owned rubber plantations, Indonesian smallholders started to plant the *Hevea* variety, chiefly in Sumatra and Borneo, but also in Java. In the Outer Islands, young trees were set out on ladang clearings, which were then planted with upland rice, corn, or sweetpotatoes for several years. In this manner the young rubbertrees obtained a head start, and when the ladang plots were abandoned the rubbertrees managed to hold their own against the encroaching jungle. Accurate statistics on the extent of native rubber gardens are not available, since individual holdings are usually fractional and widely scattered.

The smallholders' rubber area in the early 1920's was estimated at 300,000 acres; a decade later it was probably close to a million acres. A government survey in 1936 revealed nearly 800,000 formal holdings, totaling 1,806,500 acres—an average holding of 2¼ acres. Even this amount would be about 200,000 acres larger than the estate-rubber area, but since small plantings were overlooked, it is certain that the actual smallholders' rubber acreage was considerably larger, perhaps 2.5 million or 3 million acres in all just before the war. From a qualitative point of view, these smallholders' rubber plots were inferior to the plantation areas. According to the 1936 survey only 5 percent were classified "good" and 18 percent were "fairly good."

The methods of planting, maintaining, and tapping rubbertrees and of latex preparation on the native holdings are inferior to those practiced on the estates. Tapping is done by the owner and his family. The amount of rubber derived from a smallholders' plot depends chiefly on the current market price for rubber rather than on the availability of labor as it does in estate production. In some regions where coffee, pepper, or coconuts are also cultivated, rubber tapping is curtailed when these crops bring a better price.

The Indonesian farmer is never dependent on his rubber garden for a livelihood; he raises food crops as well. Rubber is simply a cash crop to augment his yearly income, which is for the most part derived in kind. If, as in the past 2 years, rubber prices are exceedingly high, the native cultivator may neglect his field crops and concentrate on rubber production, using the cash income so obtained to purchase rice for his family instead of growing corn and cassava, which he regards as inferior foods. But when the market price of rubber (or copra, pepper, coffee, etc.) tumbles, the peasant is secure from the type of economic crisis that develops on the European-owned estates. He abandons his commercial crops and returns to the full-time cultivation of his family's food supply.

For the native farmer, rubber production is a simple endeavor. The *Hevea* tree is easy to grow and harvest. There is plenty of land in the Outer Islands, and the climate is suitable to rubbertree cultivation. The average peasant grower pays relatively little attention to the maintenance of his rubber garden; and, considering the crowded planting and the thick underbrush that is allowed to grow up, the low yield he obtains is satisfactory. To a certain extent the smallholders have received, without expense to themselves, the benefit of long years of rubber experimentation carried on by the Dutch Colonial Government, as well as by the plantations. They have been aided by the distribution of selected seed, by schools for tappers opened in some of the principal rubber districts, and by the development of improved methods of latex preparation.

Rubber prices before the war fluctuated widely. The New York market price went as high as $1.23 a pound in 1925, gradually declining to an all-time low of less than 3 cents a pound in 1932. During the war and immediate postwar period, the selling price was pegged at 22.5 U.S. cents a pound by international agreement. Between 1947 and 1949 the price fluctuated narrowly. Competi-

tive defense buying and United States stockpiling, which got under way in 1950, forced the price up from 18 cents at the beginning of the year to 85 cents a pound in November of 1950. After that the United States adopted a policy of bulk purchasing, with the General Services Administration (GSA) operating as exclusive American buyer on the open market. As a result the spot price for rubber gradually declined, so that it averaged 58 cents per pound during 1951.

In response to the inflated market price, smallholders' rubber output in Indonesia reached record levels during 1950 and 1951 (table 5). In 1950, 530,000 metric tons of smallholders' rubber was produced, and during 1951 nearly 590,000 tons. When this quantity is added to estate production, the 1950 output totals 704,000 tons, and for 1951 more than 800,000 tons, the highest level ever achieved in Indonesia. This record output had a significant effect on a number of aspects of the national economy. The most obvious consequence was on the balance of payments: the 1949 trade deficit was converted to a substantial surplus in 1950. The high export price for rubber also had a pronounced effect on the domestic price structure. Recent studies have shown that a close correlation exists between rubber prices and the movement of commodity prices in the local village markets. Prices on foodstuffs have risen not only because of the increased money income resulting from record rubber sales, but also because production of food crops, especially those considered inferior—corn and cassava—has declined. Labor has shifted from food to rubber production.

It has been calculated that annual rubber production above the level of 400,000 or 450,000 metric tons in Indonesia depends on labor being attracted from other fields of customary employment. In 1950 and 1951, production surpassed this limiting point by 300,000 to 400,000 tons but this was achieved only by a purposeful reallocation of the labor. The potential production level is even higher, but cultivation of secondary food crops might suffer as a result.

The fluctuating market price for rubber has reacted seriously upon the Indonesian economy, not only in recent years but before the war as well. The current situation has been the cause for considerable dislocation. With this in mind the government announced the formation of an official Rubber Study Group in July of 1951. This body will make a detailed study of recent developments in the rubber field and their significance to the agrarian structure of the economy, especially as it concerns the smallholder, and they will make appropriate policy recommendations to the government.

Tobacco

For many years, Indonesia was among the leading tobacco-producing and exporting countries of the world. As a producer, it ranked in fifth place before the war, after the United States, British India, China, and the Soviet Union. As an exporter, Indo-

nesia was surpassed only by the United States. But the war years and the ensuing economic dislocation have adversely affected tobacco culture and it now seems unlikely that Indonesia's highly specialized tobacco industry will again regain its prewar position. This is especially true because tobacco growing requires the type of lowland fields ideal for crop cultivation. The pressure of population in Indonesia, especially on Java, has put this land at a premium, and government policy is no longer sympathetic to its extensive use for export crops. As in the case of rubber, the cultivation of tobacco is divided between estate growers and smallholders.

Sumatra Estate Tobacco

Indonesia is justly renowned for its high-quality plantation-grown tobacco, certain types of which are acknowledged as being among the finest cigar tobaccos in the world. The principal estate regions are on East Coast Sumatra and in the Vorstenlanden and Besuki districts of Central and East Java. The famous Deli cigar wrapper produced on East Coast Sumatra is considered superior to all other types of tobacco grown in Indonesia. Within a radius of about 25 miles around the town of Medan, capital of Sumatra, tobacco cultivation has reached its highest development in the Indies. There are few places in the world better suited by soil and climate for producing cigar leaf with the characteristics and quality of Deli wrapper, and there are a few places where more painstaking care and scientific research have gone into the cultivation of tobacco. Before the war, there were 89 tobacco plantations in Indonesia, 48 of which were on Sumatra and the remainder on Java. The number of plantations, however, did not correspond to the number of owners. In Sumatra, for instance, 7 companies controlled the 48 tobacco plantations; and of these, the "Big Four" headed by the Deli Maatschappij concern controlled about 95 percent of the total output.

The first European concessions for the cultivation of tobacco on Sumatra were obtained in the 1860's from the ruling Sultan of Deli. East Coast Sumatra was quite thinly populated at that time and European planters were soon able to acquire from the various native princes large land holdings on long lease, ranging from 50 to 100 years' duration. In all, nearly 2.2 million acres—30 percent of East Coast Sumatra—had been leased to the tobacco, rubber, and oil palm estates before the war. Tobacco concessions alone accounted for 645,000 acres. However, due to the method of fallowing adopted by the tobacco planters and the desire to maintain high prices through restricted output, only a small fraction of this estate area was utilized at one time. The maximum acreage ever planted with estate tobacco on Sumatra was only 8 percent (51,800 acres) of the concession area, in the year 1929. During the decade 1930–39 the planted area averaged about 5.5 percent of the total leasehold held by the tobacco planters.

The unique fallowing system adopted by the Deli planters requires an 8-year cycle. The timber growth is cleared off the land by burning, the soil prepared for planting, and the young tobacco seedlings transferred from their nurseries to the fields in Decem-

ber or January, some 40 days after the original planting. By the first of June, all the estate tobacco is harvested, and then the native cultivators are sometimes allowed to plant a single rice crop on the fields. After the rice crop, the land is left in fallow for 7 years and it rapidly becomes overgrown with jungle again. Practically the entire process of tobacco cultivation used to be by hand. Animals or tractors were used only for clearing the land and making ditches between the fields. But now, an increasing amount of mechanization is being used for soil preparation. Fertilizers are extensively used in spite of good soil fertility and long periods of fallowing. A small amount of guano fertilizer is placed in each hole when the young plants are set out. Phosphate and potash fertilizers are also used.

TABLE 6.—*Estimated area, yield, and production of tobacco, 1947–48 to 1950–51, with prewar comparison*

Year	Sumatra estate			Java estate			Java-Madura smallholder [1]		
	Harvested area	Yield per acre	Production	Harvested area	Yield per acre	Production	Harvested area	Yield per acre	Production
	Acres	*Pounds*	*1,000 pounds*	*Acres*	*Pounds*	*1,000 pounds*	*Acres*	*Pounds*	*1,000 pounds*
1935–39 average	31,000	988	30,715	69,000	976	67,672	349,000	402	140,298
1947–48	3,044	950	2,900	15,000	450	6,800	(1)	(1)	(1)
1948–49	12,355	946	11,600	25,000	575	14,300	(1)	(1)	(1)
1949–50	10,000	900	9,000	38,000	578	22,000	125,000	360	45,000
1950–51	9,000	833	7,500	18,000	389	7,000	140,000	357	50,000

[1] Not available.

Source: Compiled from official publications.

Estate owners have insisted that anything less than 7 years of fallow is inadequate to maintain the quality of their product. High yields and superior-quality leaf attest to the success of their methods but do not necessarily exclude the possibility of more intensive land utilization. And with the increase of population on this island it has been necessary to devote more land to food crops. Sumatra is no longer self-sufficient in food production. During the Japanese occupation, practically the entire tobacco estate area was turned over to native cultivators, who planted it to food crops.

Since the war the Republican Government has taken the official point of view that a great part of the reserve area uncultivated by the plantations is not necessary for their continued existence and, hence, should be legally distributed to the many native squatters whom the estates have been trying unsuccessfully to evict ever since the end of the war. Since a number of the long leases have expired, and others are approaching their terminal date, the estate owners have agreed to a reduction in their concession area in return for positive assurance of new leaseholds.

It is now proposed to redistribute up to one-third of the area leased by East Coast Sumatra estates, perhaps 740,000 acres in

all, of which 300,000 or 400,000 acres would come from the reserve area held by the tobacco estates. The European tobacco planters at first agreed to relinquish 213,000 acres of concession land nominally under their control, but actually being cultivated by native squatters. At last report, the Deli planters had agreed, under considerable pressure from the government and labor unions, to turn over 321,000 acres for redistribution to peasant farmers.

By the end of the crop year 1949–50, 32 East Coast Sumatra tobacco estates were back in operation, and some 10,000 acres were under active exploitation. As seen in table 6, this was about 20 percent less than the area harvested the preceding year and less than one-third of the prewar acreage and production. Since then continued labor unrest, strikes, and lack of security have further reduced the planted area. The 1950–51 tobacco harvest on Sumatra is estimated at only 7.5 million pounds, one-quarter of the average prewar production.

Java Estate Tobacco

Estate production of cigar leaf tobacco started in the Vorstenlanden district of Central Java before it did in Sumatra, but since 1874 the output has been below that of the famous Deli wrapper. Only 40 percent of the prewar estate production of tobacco on Java was in the Vorstenlanden district.

Some 20 estates owned by 8 companies hold land on 50-year lease from the 2 native sultanates of Surakarta and Jugjakarta. In contrast to the 7-year fallowing system used on East Coast Sumatra, permanent rotation is used, with the estates growing one tobacco crop on them every 2 or 3 years. During the interval the estates pay no rental, and the fields are returned to the local inhabitants for cultivation of rice or corn.

In years when natural rainfall is insufficient for growing tobacco, the fields are irrigated. Due to the natural fertility and high mineral content of this volcanic soil, little or no artificial fertilization is required. In spite of permanent cultivation, average yields before the war for Vorstenlanden leaf were 50-percent higher than on East Coast Sumatra, where the land is given 7 years rest between crops. Deli tobacco yields about 950–1,000 pounds per acre, while the Vorstenlanden variety averages 1,450–1,500 under optimum conditions. However, the quality of the latter is not quite as fine as the famous Deli wrapper.

The other principal estate area on Java is in the Residency of Besuki, at the extreme eastern end of the island, where the soil is also quite fertile due to its volcanic origin. Here, about 50,000 acres were devoted to estate-controlled tobacco before the war, in contrast to the only 15,000 acres planted yearly in the Vorstenlanden region. Cigar wrapper, binder, and filler are grown in Besuki, but the wrapper is of inferior quality and only used for cheap cigars. The largest share of yearly tobacco production in this region is krossok, a native-grown leaf used for pipe tobacco and the domestic manufacture of cigarettes.

Leaseholds and labor contracts are considerably different here from those in the Vorstenlanden and Deli tobacco-growing regions.

Land in the Besuki district is almost entirely in the hands of native cultivators rather than of hereditary princes or sultans. Irrigated rice lands are leased from local farmers once every 2 or 3 years for a nominal rental, usually equivalent to the land tax. By contract the native owner then becomes a share cropper on his own land and is supplied with tobacco seedlings by the estate operator. He performs all the labor of cultivation, and after the harvest the green leaf is delivered to the company barns for air curing and fermentation. The native grower is allowed a monetary share of the harvest, at a predetermined price, but he must shoulder any normal loss such as that resulting from drought, flood, or insect blight.

In other parts of Central and East Java, some 2,000 to 3,000 acres of estate tobacco were planted annually before the war. Banjumas, in Central Java, produces a small quantity of leaf tobacco for export and for use in domestic cigars. The Rembang district of East Java used to produce the only American-type flue-cured leaf grown in Indonesia, but the cultivation of this kind of tobacco is now much more extensive. Some estate tobacco is grown in the adjacent Kedu district. However, most of the tobacco found in the above-mentioned regions is grown by smallholders and will be discussed in the next section.

Since the end of the war, estate tobacco production on Java has been plagued with great difficulties. Estate cultivation in the Vorstenlanden, Rembang, Kedu, and Banjumas districts has been slight. Continued civil disturbances, banditry, and labor unrest in these areas have made it virtually impossible for the European-owned estates to resume production on any large-scale basis. Most of the Vorstenlanden tobacco fields have been planted to other crops. In the Besuki region, tobacco planting was resumed in the latter part of 1947 and by the spring of 1949 a fairly good crop was harvested, amounting to about one-half the prewar output. Most of the 1949–50 estate controlled acreage and production listed in table 6 for Java came from the Besuki district. Indonesia's 1950 tobacco exports totaled just over 27 million pounds, only one-quarter the prewar volume.

The original 1950–51 forecast for Besuki tobacco envisioned a 50-percent increase in production over the preceding year. However, starting early in 1950 the native landowners who had been short leasing their rice lands to the European estates began pressing for higher rents. A number of demonstrations occurred, climaxed by the violent outbreak of November 1950 during which more than 400 European-owned tobacco-drying sheds were burned. The estates suffered a loss of more than 6 million pounds of superior leaf tobacco that, according to a trade source, was valued at about US$7 million and drying sheds worth about $1.5 million. Because of the rainy climate, tobacco drying cannot be satisfactorily accomplished out of doors; hence, the loss of these drying sheds has temporarily curtailed estate tobacco production in the Besuki region. About 20,000 people were put out of work as a result, and the 1951 exports of Besuki tobacco were considerably reduced.

Smallholders' Tobacco

Native tobacco is grown throughout Indonesia on unirrigated hilly land or as a secondary crop following the sawah rice harvest. Some dry land of good quality can be cropped with tobacco for two successive years, but as a rule it is fallowed for a year after producing one crop of corn and one of tobacco. Yields are low in comparison with the plantations, averaging from 350 to 450 pounds per acre. The total area under smallholders' tobacco in Indonesia is not known. Prior to the war some 323,000 acres were harvested in Central and East Java and 30,000 acres in Madura, yielding about 140 million pounds annually. As seen in table 6 present acreage and production for Java and Madura is less than 40 percent of prewar, though slightly higher than 1949–50. Prior to the war, estimated annual production of smallholders' tobacco was 10 million pounds on Sumatra, 1.7 million pounds on Bali, and 0.3 million pounds on Lombok. Present production on Bali and Lombok has improved slightly. No information is available for the other islands.

The bulk of native-grown tobacco is home cured and then shredded into what is known as kerf, a product used for the domestic manufacture of cigarettes. The higher-quality krossok, air dried and then fermented, was exported in considerable quantities before the war. However, due to the shortage of cigarette tobacco since the war, exports of krossok have been forbidden. Some tobacco, primarily Virginia types, has always been imported by the local cigarette companies for blending purposes.

A considerable quantity of smallholders' tobacco is used for hand-made cigarettes of two types: kreteks, which frequently contain cloves and are rolled in ordinary cigarette paper; and strootjes, which may also contain cloves but are rolled in dried corn leaves. A blend of native and imported tobacco is used for the manufacture of machine-made European-type cigarettes. The domestic cigarette industry has been operating at about one-half capacity since the war, due to the shortage of local tobacco and scarcity of foreign exchange.

Sugarcane

Sugarcane is one of the oldest, best known, and, throughout the interwar years, most important export crops of Indonesia. Its production has had a profound effect on the economic development of Java, where the industry is concentrated. Estate-grown sugarcane was first introduced into Indonesia more than a century ago. At the peak of its development, during the period 1928–31, there were nearly 200 plantations in operation, half a million acres under cultivation, and an annual production of about 3 million metric tons of raw sugar. Capital then invested in the industry amounted to $318 million, 40 percent of the investment in estate agriculture at the time; exports of sugar accounted for 25 percent of the value of all Indonesian exports: and the local wages and land rentals paid by the industry constituted about 10 percent of the total income of the Javanese population. During these years Java produced approximately 15 percent of the world's cane sugar output.

The Great Depression wrought havoc with the industry. Planted acreage and production dropped to about 15 percent of that achieved during the peak years. Recovery was just getting under way during the late 1930's when it was abruptly halted by the Japanese occupation. After the Japanese had taken over the Philippines and Java, they had at their disposal far more sugarcane area than was required for the "co-prosperity sphere." Production was initially cut by more than one-half, and the surplus land was utilized for food and fiber crops. The political disturbances and labor unrest that came in the wake of the Japanese defeat made the industry's recovery still more difficult. Rehabilitation depends on substantial capital outlay for the reconstruction of damaged sugar mills, and postwar conditions in Indonesia have not been conducive to new investment.

TABLE 7.—*Estate acreage, production, and exports of sugar, 1946–50, with prewar comparison*

Year	Number of plantations	Planted area	Raw sugar production	Exports
		Acres	*Metric tons*	*Metric tons*
1937–39 average	99	219,000	1,463,000	1,186,000
1946	(1)	(1)	18,000	500
1947	[2] 3	[2] 3,300	23,000	2,000
1948	[2] 10	[2] 16,000	75,000	65,000
1949	28	54,400	221,400	43,000
1950	33	68,200	277,200	2,500

[1] Not available.
[2] Estimate.

Source: Compiled from official publications.

In 1950, about 30 percent of the prewar estate acreage was planted, and production of raw sugar was 277,200 metric tons, about one-fifth of the prewar level and a 25-percent increase over the 1949 output (table 7). Exports were sharply curtailed in order to meet domestic requirements. Consumption during the year probably amounted to between 370,000 and 400,000 tons, with the difference between this figure and recorded estate production being supplied by native-grown sugarcane, which is home ground in crude wooden mills. The preliminary estimate for 1951 is 110,000 acres of estate production and about 422,000 metric tons of raw sugar output.

With few exceptions sugarcane on Java is grown in the central and eastern districts of the island on irrigated land obtained by short lease from the native farmers. Each crop is planted in rotation with food crops in such a way that the same ground is occupied by the cane once every 3 years. The area utilized by an estate, therefore, is at least three times larger than the planted acreage in a given year. Cane is planted in August or September, at the beginning of the wet monsoon, and harvested and ground by the sugar mills the following year from April through November during the dry monsoon, the average time between planting and harvesting

being about 14 months. The land is usually fertilized with sulfate of ammonia. As a result of research at the experimental station at Pasuruan, a type of cane known as POJ 2878 was evolved—frequently referred to as the wonder cane of Java. It produces a high yield and is immune to practically all cane diseases.

Like tobacco, sugar must be grown on the lowland plains that are in increasing demand for cropland as population grows. Neither sugar nor tobacco are currently being produced in sufficient quantities to satisfy both home consumption and export demand; yet the future of both these crops as estate enterprises is open to serious question at the present time. Labor difficulties are becoming increasingly serious, and the estate owners insist that any further increases in land rents or wage rates will be economically impossible. Rents are now 30 times the prewar rate for sugar lands, and new wage increases are constantly being demanded by the left-wing labor unions. Occasional violent outbreaks result in destruction of mills and pillaging of estate property. Though some of the older sugar estates are just now resuming operation, others are closing down permanently and their managers leaving the country.

Copra

Perhaps the most versatile of all tropical plants is the coconut palm *(Cocos nucifera)*. It has a score of important uses in the native village besides its prime value as a commercial export crop. The coconut itself is a popular local food, and the pressed nut meat yields the most important vegetable oil in the native diet. The plaited leaves of the coconut palm are used for hats, baskets, and roof thatching. The fibrous husk, called coir, is woven into matting and cordage of all types, while the hard shell is cut up into cups, bowls, spoons, and buttons. When the young inflorescence of the palm is tapped, it yields a sticky juice that is variously processed as wine, distilled spirits, vinegar, or sugar.

Before the war, Indonesia was considered the world's largest producer of coconuts and ranked next to the Philippines as a leading exporter of copra (dried coconut meat). Today copra is the third leading export of Indonesia by value and volume, ranking after rubber and petroleum. About as many coconuts are used domestically as are exported, though no statistics on this point are available. Coconut cultivation in the islands is almost exclusively in the hands of smallholders; estate production of copra plays an insignificant part in the economy. Coconut production for export is centered in East Indonesia—Celebes, Moluccas, the Lesser Sundas, and other small island groups in the eastern part of the archipelago, where roughly three-quarters of the population are at least in part economically dependent on coconut cultivation. Java raises sufficient coconuts for domestic needs in normal times, while Borneo, Sumatra, and East Indonesia have an export surplus.

During the prewar period 1935–39, copra exports from all of Indonesia averaged slightly more than 515,000 metric tons a year. Roughly 60 percent of this copra came from East Indonesia, 26

percent from Sumatra, and 13 percent from West Borneo. Of the 315,000 metric tons exported from East Indonesia in 1939, about two-thirds came from Celebes. Since 95 percent of the coconut crop is planted by native cultivators scattered throughout the islands, it is impossible to calculate the total acreage. Nor is it possible to make any accurate estimate of over-all production, since a very substantial part of the coconut harvest of Indonesia is locally consumed.

The only available statistics on coconut production in Indonesia concern that part of the crop that is sold to the government-operated Copra Foundation either for export or for resale to the commercial oil pressing mills. The Copra Foundation (originally the Copra Fund) was established in the summer of 1940 by the Dutch Colonial Government as a central purchasing, storing, and export organization aimed at supporting a vital Indonesian industry that was hard pressed by the closing of Europe to world trade as a result of the war.

TABLE 8.—*Exports and purchases of copra by the Copra Foundation, 1946–50, with prewar comparison*

Year	Total purchases	Official exports
	Metric tons	*Metric tons*
1935–39 average	(1)	515,532
1946	119,204	54,098
1947	181,158	152,639
1948	352,230	242,245
1949	426,208	315,922
1950	395,551	284,004

[1] Copra Foundation not established until July 1940.

Source: Compiled from official publications.

During the Japanese occupation of the islands there was little demand for copra, and native cultivators turned instead to the production of essential food crops. After the war, the Copra Foundation was charged with the responsibility for reviving coconut production in Indonesia. In spite of these efforts, the recovery of the industry has been sporadic. Of the 426,000 metric tons of copra purchased by the Copra Foundation in 1949, 335,000 tons, almost 80 percent, was obtained from East Indonesia. This figure represented a small increase over the prewar purchases in this region in spite of the slow recovery rate of the Minahassa, the rich producing area in northern Celebes. However, official collections in Sumatra, normally the second largest source of copra, totaled only 3,392 metric tons in 1949 because most of the surplus was smuggled to Singapore.

As seen in table 8, Foundation purchases declined by 7 percent in 1950, and recorded exports by 10 percent. Foreign exchange earnings remained constant, however, because of the price rise. The fall in export volume was partly due to unsettled conditions in the copra-producing areas, and partly to increased domestic consumption as a result of higher incomes from rubber production.

The Copra Foundation was not able to purchase any copra in Java and Sumatra during the second half of 1950. Therefore, deliveries of copra to the commercial oil pressing factories was slightly curtailed.

The Foundation, which has an official monopoly on foreign trade, has been widely criticized for the low purchasing price it sets for Indonesian copra. Smuggling of copra to Singapore and the Philippines has been encouraged by both the higher prices prevailing there and the possibility of profiting through black-market currency operations as well. Estimated illegal exports of copra from Sumatra to Singapore totaled 100,000 metric tons in 1949, and to the Philippines an additional 25,000 tons. During 1950 the illicit trade between Celebes and the Philippines probably increased.

A study of buying in 1948 indicated that 82 percent of Copra Foundation purchases were from middlemen (predominantly Chinese traders), 11 percent from individual growers, and 7 percent from native producers' cooperatives, located mostly in the Minahassa region. The Netherlands continues to be the principal importer of Indonesian copra, taking 67 percent of the export supply in 1948, 58 percent in 1949, and 74 percent in 1950. The balance of copra exports have been in small quantities to a number of countries. Since Philippine-grown copra receives tax preference in the American market, United States imports of copra from Indonesia have been negligible.

The coconut palm requires an abundance of tropical sunshine and is best suited to an average annual temperature of 78° F. The tree bears fruit less rapidly as the temperature falls with increased elevation, and it cannot be cultivated at altitudes above 3,000 feet. It thrives on the alluvial coastal plains, where the loamy soil is light and porous but covered with a good layer of humus. The trees require much water, but good drainage is essential. Rainfall should be fairly evenly distributed, with a minimum annual requirement estimated at about 80 inches. A lesser amount will suffice if irrigation is available. With the exception of the northern lowlands of West Java, parts of East Java, and some regions of the lesser Sunda Islands, most of Indonesia has sufficient average annual rainfall for coconut cultivation.

Smallholders' production accounts for about 95 percent of the annual coconut crop. Estate production with its scientific methods and intensive cultivation brings higher yields, but in general the plant is well adapted to smallholders' cultivation. Seed coconuts are hung on rafters in the farmers' huts and left to sprout. After 3 months the first leaf sprout will appear and, by this time, roots will have just pushed through the bottom of the fibrous shell. At this stage the nuts are usually set out in nurseries, spaced about 20 inches apart and only half buried in the soil. They remain in the nurseries for 9 months and then, at the beginning of the wet monsoon, the young palms are transplanted to their permanent location. A careful cultivator will prepare holes about a yard wide, long, and deep. These pits are filled with a mixture of loose earth and stable dung or vegetable humus and the trees placed in the center. They are usually set out in long straight rows. The Indo-

nesian smallholder tends to plant his trees too close together to provide sufficient light and air for full-grown trees. Native cultivation seldom includes any great degree of maintenance after the trees are planted, but on the larger plantations the trees are carefully pruned and attended.

Under normal conditions the coconut palm bears its first fruit in the seventh or eighth year and reaches full maturity between the tenth and fifteenth year of its life. After maximum productivity is reached, the yield remains fairly constant until the tree is 70 years old, after which time productivity slowly declines. The life span of a carefully tended tree is roughly 100 years. The number of nuts to a cluster varies, the average being about 8 medium-sized coconuts. The tree will bloom and bear fruit the year around provided there is ample rainfall. Native farmers having but few trees will harvest them at will, but on larger plantings the trees are generally plucked at regular intervals. An untended tree will yield barely 20 nuts a year, but the trees on a well-maintained plantation average 50 to 60 nuts annually, and it is not unusual for a choice, well-fertilized tree to yield from 80 to 100 coconuts in a year's time. An acre of well-tended trees spaced 26 feet apart will yield about 3,500 nuts annually from the 64 trees growing there.

Copra preparation is fairly simple. The husk and shell of the ripe nuts are split open and the white meat pried out and placed in the sun for about 5 days to shrivel and harden. This drying should be as rapid as possible; interruptions due to cloudy weather reduce the quality of the meat. Kiln drying at a temperature of 158° F. is an alternate method, requiring only 24 hours. Kiln-dried copra is darker in color, however, and less valuable because it has a smoky odor. Approximately 5,000 coconuts are required to produce a metric ton of copra. For a native grower, this amount is the yearly harvest from about 3 acres of trees.

Palm Oil

The first oil palm plantations were laid out in Indonesia in 1914. This palm is not indigenous to these islands but came originally from tropical West Africa. Cultivation of the crop increased rapidly in Indonesia and, in the 15-year period before World War II, acreage tripled. This area produced about 24 percent of the total world output and 40 percent of the palm oil entering world trade just before the war. Indonesia ranked second only to Africa in this respect. The uses for palm oil are many, but its primary commercial demand is for the manufacture of soap and margarine.

The center of oil palm cultivation in Indonesia is East Coast Sumatra, where production is on large, well-equipped, foreign-owned plantations averaging about 4,000 acres each. By 1940, 260,000 acres were planted to oil palms in Indonesia, 183,000 of which were being harvested. This area comprised 64 estates; 8 were on Java and most of the rest in Sumatra. The volume of smallholders' production was negligible. During the Japanese occupation and the subsequent military action against the Dutch,

many of the oil palms were uprooted, and most of the plantations were neglected. Actual planted acreage declined by about 20 percent, and the area actively cultivated was reduced to almost nothing. Recovery was seriously hindered at first by lack of skilled labor, and it was necessary for the Sumatra estates to recruit workers in Java. Some of the oil pressing factories also suffered heavy damage, but by the end of 1950 most of them had resumed operation.

The economic recovery of the palm oil industry has been somewhat better than the average for other export industries taken as a group. In 1950, palm oil production stood at 63 percent of the 1935–39 average and palm kernels at 73 percent. As seen in table 9 this was only a slight improvement over the preceding year but more than double the 1948 output. Exports during 1950 did not fare as well as production; less than 100,000 metric tons of oil and about 24,000 tons of palm kernels were shipped, the bulk of it to the Netherlands and Great Britain. The United States, which before the war imported 60 percent of Indonesia's palm oil, took only 10 percent in 1949 and less than 1 percent in 1950.

TABLE 9.—*Acreage, production, and exports of palm oil, 1946–50, with prewar comparison*

Year	Number of operating estates	Harvested area	Production		Exports	
			Oil	Kernels	Oil	Kernels
		Acres	*Metric tons*	*Metric tons*	*Metric tons*	*Metric tons*
1935–39 average	45	173,444	198,676	42,185	192,947	40,038
1947	8	(1)	576	60	1,568	1,590
1948	16	85,499	56,508	13,909	39,907	11,079
1949	24	142,853	118,777	29,373	101,861	28,654
1950	27	148,260	126,476	30,774	97,096	24,095

[1] Not available.

Source: Compiled from official publications.

The soil and climate of Sumatra are well suited to the oil palm, which is found in every section of the east coast region at altitudes varying from 30 to 1,500 feet. The number of palms usually set out to an acre is about 60. They begin to bear fruit in the third year and reach maximum yield in the eleventh or twelfth year. A palm in full fruit gives 8 to 12 bunches of fruit a year, each weighing 40 pounds or more, 50 to 75 percent of the weight being the actual fruit and the rest stem. The bunches take 6 months to ripen on the tree after the fruit has developed.

The fruit itself consists of a nut surrounded by fleshy oil-containing pulp. Palm oil is extracted from the pulp around the nut, and palm kernels are obtained by cracking the nuts. These kernels are likewise oil bearing, but they are usually exported as kernels for extraction in the importing countries. Palm kernel oil is quite distinct from the oil obtained in pressing the pulp. There is considerable variation in types of oil palms, but the principal variety

grown in Sumatra has a fruit containing about two-thirds pulp and one-third nut. The pulp yields about 50-percent oil in the extraction process, and the palm kernels likewise have about a 50-percent oil content. The yield of oil per acre from the oil palm is greater than from any other oil-producing crop, and in Sumatra the average prewar yield was close to 3,000 pounds of oil per acre of mature trees.

Coffee

Coffee was first introduced into Java by the Dutch in 1699, and the subsequent development of the industry there made "Java" a household word and a synonym for fine-quality coffee throughout the world. *Coffea arabica* was the original variety grown on Java, and more than 90 percent of the world's coffee production is currently of the Arabian type. However, in the 1870's when leaf diseases almost exterminated the *C. arabica* plant on Java, *Coffea liberica* was imported from Liberia. This too gradually succumbed to leaf diseases, and in 1900 the hardy Robust variety was brought in from the Belgian Congo. *Coffea robusta* proved to be ideal for Indonesia, and in recent years nearly 90 percent of the coffee grown in the Indies has been of the Robust type, which combines high productivity with resistance to leaf diseases. *C. arabica* is still grown in South Sumatra and on Java at elevations over 3,000 feet.

TABLE 10.—*Area, production, and exports of coffee, 1946–50, with prewar comparison*

Year	Estate planted area	Production			Exports [1]
		Estate	Smallholder	Total	
	Acres	*Metric tons*	*Metric tons*	*Metric tons*	*Metric tons*
1935–39 average	134,197	51,030	66,630	117,660	81,420
1946			[2]	[2]	1,166
1947	53,900	3,400	[2]	[2]	230
1948	71,660	8,200	15,800	24,000	2,220
1949	77,840	11,100	20,100	31,200	5,340
1950	94,000	18,500	40,000	58,500	13,560

[1] Not including illegal exports.
[2] Not available.

Source: Compiled from official publications.

Just prior to the war, total coffee production in Indonesia was averaging about 124,000 metric tons a year, 37 percent of which was estate grown on East Java, 7 percent estate grown in Sumatra, 6 percent native grown in Java, and 50 percent native grown in the Outer Islands—primarily South Sumatra, Bali, Lombok, and Celebes. Some 400 European estates devoted about 134,000 acres to coffee growing (table 10). The smallholders' acreage is unknown. By 1950, 122 estates with a total area of 94,000 acres had resumed operation. Nominal output from this area was about 18,500 metric

tons, but between 6,000 and 7,000 tons are reported to have been stolen from the estates and marketed as native-grown coffee. In addition, more than 40,000 tons of smallholders' coffee was produced during 1950.

In that year, Indonesia's recorded exports of coffee were only one-sixth of 1935–39 shipments. An estimated 20 percent of yearly production has been smuggled out of the country, however, mostly to Singapore, because sales can be made there for dollars, which bring a high black-market rate when exchanged to rupiahs. Currently half of the coffee is being sold in this way.

Current domestic consumption of coffee is estimated at between 35,000 and 40,000 metric tons; the balance is being exported, legally and illegally. Local retail prices are high because of scarcity. Potential demand would probably reach 70,000 tons annually if the price were somewhat lower. The estates could be counted on to raise production considerably if stable conditions return to the rural areas. At the present time, however, they are doing little to expand output because of the unsettled state of affairs.

Both in smallholders' and estate cultivation, coffee is often interplanted with another crop, chiefly rubber. Coffee grows best on well-drained land; hence, it is usually planted on sloping or hilly ground, about 730 bushes to an acre. It requires considerable rainfall, with a yearly minimum of 70 inches. Three years are necessary for a new planting to yield fruit, and then only 175 pounds per acre. Maturity is reached in the fifth year, with yields between 500 and 700 pounds to the acre. Harvesting is during the months of June, July, August, and September.

Tea

Before the war Indonesia was the third largest producer and exporter of tea in the world. Three-fourths of the crop was planted in West Java and the remainder on East Coast Sumatra. Tea is essentially a plantation crop, although a considerable acreage has always been planted by smallholders. By the end of 1950, native production had regained its prewar position, while estate output was little more than one-third the 1935–39 average.

Tea plantations are found at elevations from 1,000 to 6,500 feet above sea level, in regions where rainfall is plentiful and evenly distributed throughout the year. The number of bushes planted per acre ranges from 2,300 to 3,000. After the third or fourth year, picking may begin; the economic life of a tea bush is normally about 50 years. The Chinese variety of tea, which was first introduced into Java in 1826, has gradually been replaced by the Assam tea shrub. This type yields more and has won greater popularity in the chief importing countries. Average yields are now about 400 pounds per acre. Application of fertilizers, planting of legumes for green manuring, intensive cultivation of the soil, and careful selection of healthy strains have all contributed to improvement of the crop.

Before the war (1939), 338 plantations had in production an

average of about 1,000 acres each, yielding a total of 156 million pounds of tea. In the same year, native growers harvested about 162,000 acres with a recorded output of only 28 million pounds. However, some of the smallholders' production is estate processed and subsequently recorded as plantation tea. The Japanese occupation of Indonesia adversely affected tea just as it did all other export crops. On some estates the entire tea plantings were uprooted. To a great extent food crops were planted instead, but large areas were assigned to ramie, castor beans, and pyrethrum.

Since the war, resumption of tea planting and harvesting has proceeded slowly, but with a steady improvement. Nearly 200 estates have now resumed operation, and exports during 1950 totaled 70 million pounds, 46 percent of the 1935–39 average (table 11). Estate production reached 50 million pounds during 1950 and smallholders' production 28 million pounds. The Netherlands continues to be the leading purchaser of Indonesian tea, having taken more than 29 million pounds in 1950. Other large shipments went to the United States, Great Britain, Egypt, and Australia during 1950.

TABLE 11.—*Area, production, and exports of tea, 1946–50, with prewar comparison*

Year	Number of operating estates	Planted area	Production			Exports
			Estate	Smallholder	Total	
		1,000 acres	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*
1935–39 average	335	346	143	28	170	153
1946						[1] 6
1947	30	55	2.5	0	2.5	[1] 9
1948	165	176	15.0	13	28.0	19
1949	180	182	39.0	21	60.0	53
1950	193	190	50.0	28	78.0	70

[1] Including export of old stocks.

Source: International Tea Committee, *Bulletin of Statistics*, London, June 1949, and other official publications.

The outlook for continued recovery of tea production in Indonesia is not as promising as it appeared to be a year ago. An outbreak of blister blight occurred in West Java during June of 1951 and has not yet been brought under control. A very large share of current production cost is taken up by wages, which are a relatively bigger item now than before the war. Even so, labor unrest continues and there is lack of personal security in outlying areas.

Cacao Beans

Cacao bean production in Indonesia has never been of great importance to the economy. Total exports during the period 1935–39 averaged 1,550 metric tons a year (table 12). The major portion of this, however, was the famous Edelcacao hybrid, a premium-grade cacao bean developed by crossing the more common Fora-

stero variety with the rare Criollo found in West Africa and Brazil. Nearly all the cacao bean cultivation of Indonesia is carried on by large estates, the majority of which are located in the Pekalongan and Semarang districts of Central Java. Smallholders' production averaged only 26 metric tons per year during the period 1935–39.

Cacao cultivation in Indonesia started about 1880 as a replant crop on old coffee estates, and since then the practice of interplanting cacao with other estate crops, especially kapok, has continued. During the war, about one-fifth of the acreage planted to cacao was lost through neglect and plant diseases. Production in 1950 was 866 metric tons, 54 percent of the prewar average. Exports during 1950 were about double the volume in 1949 but, considering production, much less important than before the war. This has been due to the postwar expansion of the domestic candy industry occasioned by the shortage of foreign exchange, which has curtailed imports of confectionery. By the end of 1951 it is expected that the cultivated estate area will be about 15,000 acres, with an annual production of 1,000 metric tons—two-thirds of the prewar level.

TABLE 12.—*Acreage, production, and exports of cacao beans, 1946–50, with prewar comparison*

Year	Number of estates producing	Planted area [1]	Production	Exports
		Acres	*Metric tons*	*Metric tons*
1935–39 average	29	15,719	1,612	1,550
1946	(2)	(2)	69	0
1947	(2)	12,355	8	0
1948	16	12,953	548	1
1949	10	12,360	851	163
1950	11	12,449	866	299

[1] Includes both wholly planted and interplanted acreage.
[2] Not available.

Source: Compiled from official publications.

Hard Fibers

The principal hard fibers grown in Indonesia are sisal *(Agave sisalina)*, cantala *(Agave cantala)*, and abaca *(Musa textilis)*, the latter sometimes called Manila hemp. Sisal comprised about 90 percent of prewar hard fiber production, cantala 6 percent, and abaca 4 percent. The sisal plantations are located in Java and Sumatra, the cantala plantations are limited to Java, and the abaca plantations are all in Sumatra. In addition to these three hard fibers, the Indonesian plantations have in years past produced small quantities of the soft fibers roselle *(Hibiscus sabdariffa)* and "Java jute," or kenaf *(Hibiscus cannabinus)*. Smallholders' production of fibers is limited to some small amount of cantala grown in Madura. During the period immediately prior to the war, Indonesia produced about one-third of the world's export supply of sisal.

During the prewar period 1934–38, Indonesian hard fiber production averaged 84,000 metric tons a year from a planted area estimated at roughly 149,000 acres, about 75 percent of which was being harvested. Virtually the entire annual output was exported. During the Japanese occupation, fiber acreage was increased by converting sugar and tea estates. The estate plantings were completely neglected for several years after the end of the war, however, and when active cultivation was resumed in 1948 only one-eighth of the prewar acreage could be brought immediately into production.

Current statistics on hard fiber production in Indonesia are meager and may be considered as rough estimates at best. As seen in table 13, the cultivated area was expanded in 1949 with several thousand acres of new plantings, but production dropped because of the exhaustion of old plantings. At the end of 1949, about 90 percent of the abaca area under cultivation in Sumatra had been planted since the war. As for sisal and cantala, new

TABLE 13.—*Estimated area, production, and exports of hard fibers, 1946–50, with prewar comparison*

Year	Sisal and cantala		Abaca		Total area	Total hard fiber production	Total exports
	Planted area	Production	Planted area	Production			
	Acres	*Metric tons*	*Acres*	*Metric tons*	*Acres*	*Metric tons*	*Metric tons*
1934–38 average	133,000	80,740	16,000	3,629	149,000	84,369	83,915
1946	(1)	6,800	(1)	45	(1)	6,845	----------
1947	(1)	(1)	(1)	(1)	7,608	(1)	3,700
1948	10,650	2,900	7,500	2,450	18,150	5 350	5,798
1949	17,125	1,360	10,865	1,135	27,990	2,495	2,939
1950	24,000	5,700	(1)	1,320	(1)	7,020	5,371

[1] Not available

Source: Compiled from semiofficial publications.

plantings totaled 50 percent of the cultivated area on Java and 70 percent on Sumatra in 1949. The wartime plantings are now almost completely exhausted. The first harvest from the new fields was obtained in 1950, and production should increase rapidly in the next several years if stable conditions prevail. Considerable labor difficulties are being experienced at present on the estates. The leading importers of Indonesian hard fibers since the war have been the Netherlands and the United States. Domestic consumption is slight.

Sisal is the principal hard fiber raised in the islands. This distinctive plant with long, swordlike leaves grows best under semiarid conditions and in open sunlight. However, when planted in well-drained soil it endures moderately heavy rainfall without ill effect. Cantala likewise is more suited to semiarid conditions, while abaca requires considerably more moisture.

Sisal is hardly ever grown from the seed, since this manner of propagation requires 10 years for the plant to reach maturity.

Sisal grown from flower stalk bulbils is ready for harvest after 4 or 5 years, and that propagated from suckers requires only 3 or 4 years. In the second or third year the mature sisal plant begins to put out subterranean suckers that form individual plants about 3 feet from the mother plant. When they reach 1½ to 2 feet in height, they are cut off from the mother plant and transplanted directly to a new growing area, or sometimes they are removed while still quite small and first set out in nursery beds.

After the sisal plant reaches maturity, the fiber content of the long outside leaves is about 3 percent dry fiber. These leaves, measuring from 2 to 6 feet in length, are cut from the stem of the plant 2 or 3 times annually during its life span, which averages seven harvest years. About 30 leaves may be taken from a single plant in the course of a year, and a well-cultivated acre will yield approximately 1,800 pounds of fiber annually. Special machines are used for fiber extraction on most estates today. On an occasional small plantation the fiber is extracted by hand after the leaves have set in water long enough to rot the binding material.

Kapok

Prior to the war, Indonesia exported more than 70 percent of the world's supply of kapok, amounting to about 20,000 metric tons annually. An estimated additional 2,000 tons of kapok was utilized domestically each year. About 90 percent of this total production was grown by smallholders, the bulk of it on Java. Great numbers of these tall hardwood trees were cut down during the Japanese

TABLE 14.—*Production and exports of kapok, 1946–50, with prewar comparison*

Year	Estimated total production [1]	Estate production	Exports	
			Total	From Outer Islands
	Metric tons	*Metric tons*	*Metric tons*	*Metric tons*
1936–40 average	22,454	2,780	20,454	1,633
1946	4,000	----------	2,037	----------
1947	6,000	93	3,900	----------
1948	8,000	1,434	5,796	----------
1949	6,000	980	8,261	224
1950	5,000	1,000	7,198	191

[1] 1936–40 calculated by adding an estimated 2,000 metric tons for local consumption to the official export figures; 1946–50 calculated by adding 1,000 metric tons for local consumption to exports after allowances for carry-over stocks.

Source: Compiled from official publications.

occupation for firewood and construction purposes, an estimated 30 percent in all. The Agricultural Service has just recently begun an ambitious 5-year program to replant several million seedlings in East and Central Java. As indicated in table 14, postwar recovery has been slow. Prolongation of the wet monsoon in 1949–50 retarded flowering and seed-pod development, and unsettled con-

ditions in the major producing areas of Central Java prevented marketing. Hence, output has fallen since the relatively good 1948 crop.

Kapok exports of 7,200 metric tons in 1950 were 13 percent less than in 1949. Even this volume was only possible because of carry-over stocks from 1948. Total production in 1950 is estimated at 5,000 metric tons of cleaned fiber, of which 20 percent was estate grown. During the period 1936–40 the United States took about half of Indonesia's kapok exports, Australia and New Zealand, combined, about one-quarter, and the Netherlands 15 percent. Since the war the Netherlands has been the principal importer of the commodity, taking about one-half, the United States one-quarter, and New Zealand about 15 percent. This decline in American demand for kapok has been attributed to the increased use of fiber-glass in the United States.

Kapok itself is a fleecy white fiber obtained from the seed pods of the kapok tree, sometimes known as Bombax. The fiber is popular because of its resiliency, lightness, water resistance and buoyancy, and its heat-insulating and sound-absorbing qualities. It is used as a stuffing for mattresses, pillows, furniture, and life preservers and as an insulation to absorb heat, sound, and vibration. When floated in water, it can carry 30 times its own weight. Only half the content of these pods is fiber, the other half being small, black seeds from which a yellowish-colored edible oil is extracted, similar in many respects to cottonseed oil. The extraction rate is about 24 percent by volume. Statistics on domestic consumption of this oil are not available, but exports of oilseed in terms of oil equivalent averaged 2,419 metric tons during the period 1937–39, with Japan taking the major share.

The kapok tree, a frequent sight throughout Java, is easily distinguished by its gaunt height (50 to 100 feet) and sparse branches extending at right angles from a trunk that averages 2 feet in diameter at the base when full grown. The tree requires a tropical climate, with a pronounced wet and dry season, year-around warmth, and soil preferably of volcanic origin. At the advent of the dry season the tree loses its foliage and begins to flower. Shortly afterwards the seed pods begin to form, and at maturity they are brown in color, 4 to 7 inches long, 2 inches in diameter at the middle and tapering at both ends. The trees are commonly found in single rows along the rivers and roads, between the fields, and clustered in the farmers' compounds. The number of individual native growers is large, while the productive estate area covered only about 40,000 acres before the war.

Kapok may be propagated either from the seed or by cuttings, but the latter method is more common since an earlier harvest is obtained. The cuttings are first set out in nurseries, where they remain for about a year. Then at the beginning of the wet monsoon, they are transplanted to their final location. Estate plantings averaged about 10 trees to an acre, while smallholders' plantings, if concentrated in one grove, generally consisted of double this number. After the trees are transplanted, the first harvest is normally obtained in 3 years and full production achieved after

6 or 7 years. The average yield is about 11 pounds of cleaned kapok fiber per tree.

During the dry season the tree blooms several times, consequently the seed pods do not all ripen simultaneously. Two or three pickings are necessary, since it is essential to harvest the seed pods just before they are ready to split open. Pods are generally harvested with the aid of a long pole having a sharp hook on the end. A great amount of hand labor is required to remove the contents of each pod. Separation of the lustrous kapok fiber from the small black seeds is performed either by hand or by crude ginning machines.

After the fiber has been sun dried, it is pressed into light bales by hand-operated screw presses and shipped to a major port. Here the bales are prepared for overseas shipment by hydraulic compression, which reduces them to one-half their original size. The present hydraulic pressing capacity is more than adequate to service the current volume of exports.

Cinchona

Before the war, 90 percent of the world's supply of cinchona bark, from which quinine is extracted, was produced in Indonesia. Of an estate area approximating 43,000 acres, 89 percent was located in the mountains of West Java and 11 percent on the southwest coast of Sumatra. Smallholders' production of this crop is negligible. Some 110 small estates, almost all members of the Cinchona Producers' Association, exercised a monopolistic control over the world market before the war. Actively supported by the Dutch Government, the industry operated under a tight restrictive policy that maintained high prices through allocation of yearly production quotas. Very little change in the cultivated acreage took place during the interwar years.

Cinchona growing was probably less affected by the war than any other commercial export crop. The Japanese were eager to continue quinine production, and vigorous efforts were made to maintain output. The Bandung Quinine Factory was increased in size, and two new processing factories were built on Java, at Garut and Sukahumi. In consequence, at the end of the war the planted area and estate installations were, for the most part, in good condition and ready to be exploited by their former owners. However, in marked contrast to other plantation industries, cinchona production has declined in planted area and output during the past several years. Aside from abnormal domestic conditions, two important factors have been responsible for the decline: (1) the increasing importance of the Belgian Congo cinchona industry and (2) the wide range of synthetic antimalaria drugs now being manufactured, such as atabrine, plasmochine, paludrine, chloroquine, and the newly introduced primaquine.

Estate production of cinchona bark during 1950 was 5,562 metric tons, 15 percent less than in 1949 and 20 percent less than in 1948 (table 15). Exports of bark have likewise declined, and at the end of 1950 stocks on hand at the estates totaled nearly 3,000 tons—

20 percent more than the amount that had been exported during the entire year. However, exports of processed quinine increased sharply during the latter part of 1950 as a result of large shipments to Communist China via Hong Kong. During the first half of 1951, Hong Kong buyers for Chinese account continued to dominate the market. Exports of dry cinchona bark during 1950 went principally to the Netherlands, Great Britain, and Italy, with the United States importing only 5 percent.

TABLE 15.—*Acreage, production, and exports of cinchona, 1947–50, with prewar comparison*

Year	Number estates producing	Planted area	Cinchona production	Exports	
				Cinchona bark	Quinine
		Acres	*Metric tons*	*Metric tons*	*Metric tons*
1935–39 average	110	43,250	11,200	7,040	170
1947	(1)	32,000	(1)	3,615	33
1948	42	27,200	6,921	4,236	57
1949	54	27,000	6,501	2,598	16
1950	52	25,190	5,562	2,456	63

[1] Not available.

Source: Compiled from official publications.

Cinchona, one of the hill cultures, is usually grown in conjunction with tea, coffee, or rubber. Only 10 of the prewar estates produced cinchona exclusively. The tree thrives best on alkaline soils at elevations between 4,000 and 6,000 feet. The preparation of the ground, the seeding and spacing of plantings, the fight against cinchona disease, the grafting so essential to the pure botanical strain, the pruning, the fertilizing, and the methods of harvesting —all these call for a great deal of careful work based on extensive scientific research and experimentation. The number of trees planted per acre ranges from 1,000 to 1,200. At 6 years of age the bark of the tree is richest in quinine. The quinine content decreases as the tree reaches 12 years and then remains constant. The life of a cinchona tree is from 15 to 20 years. For the bark, 5 or 6 percent quinine content by weight is about average, with an acre yielding around 750 pounds of cinchona bark per year, or 35 to 45 pounds of quinine.

Spices

Before the war, Indonesia was the source of 85 percent of the world's pepper supply. The Lampongs region of South Sumatra accounted for about 70 percent of the total production of these islands, Banka another 20 percent, and Borneo, Java, and the Achin district of North Sumatra for the remainder. Black pepper cultivation is centered in the Lampongs and white pepper on the island

of Banka off the south tip of Sumatra. Smallholders' cultivation accounts for 99 percent of the annual output.

During the Japanese occupation, extensive areas of pepper vines were uprooted to make way for food and fiber crops. In Banka the area under white pepper cultivation was almost completely destroyed and new plantings are not expected to bear fruit before 1952. The Lampongs region of Sumatra lost two-thirds of its acreage through destruction and neglect, and in Borneo the losses were correspondingly high. Since the war the only area to make any appreciable recovery has been the Lampongs, where production reached about 16 percent of the prewar level in 1950. Total pepper production through 1949 was somewhat higher than the postwar export volume shown in table 16; rapid price rises and a continued distrust of the local currency have combined to cause substantial speculative holdings of this valuable commodity. White pepper production in 1950, however, was about 250 metric tons; the balance of exports was obtained from some 2,000 tons of accumulated stocks.

TABLE 16.—*Exports of spices, 1946–50, with prewar comparison*

Year	Black pepper	White pepper	Mace	Nutmeg	Cassia
	Metric tons	*Metric tons*	*Metric tons*	*Metric tons*	*Metric tons*
1938	44,199	11,350	834	3,977	2,505
1946	637	2,640	131	935	137
1947	894	1,743	410	2,301	446
1948	975	829	494	2,752	531
1949	2,726	83	451	2,938	1,380
1950	[1] 6,313	926	457	2,689	4,840

[1] Plus estimated 800 tons smuggled from Sumatra to Singapore.

Source: Compiled from official publications.

Cassia bark, from which a product commonly marketed as cinnamon is obtained, is a product of the cassia tree *(Cinnamomum burmanni)*. Production of this bark is centered in the Padang Highlands of western Sumatra. Cultivation is almost exclusively by native farmers. Cassia trees are planted in the woodland areas between 2,000 and 3,000 feet above sea level. In their sixth year the trees are cut down and entirely stripped of their bark, which is then sun dried, sorted by size and thickness, and sold to the spice traders. Twenty percent of the world's cassia supply originated in Indonesia prior to the war. The high level of production and export achieved in 1950 declined somewhat during 1951.

Mace and nutmeg are native products gathered from the forests of East Indonesia. Both are derived from the seed of the nutmeg tree *(Myristica fragrans)*. Seventy percent of the world's output formerly came from this region. Political unrest in the area since the war has prevented rapid restoration of the old export level, and production has risen relatively little since 1947. Before the war, Indonesia also exported a small quantity of vanilla beans, but this cultivation has not yet been revived. Cloves are the only domestic

spice for which there is considerable local demand. Native production is centered in western and southern Sumatra and the northern Celebes, but not even approximate estimates on postwar output are obtainable. Local production has not been sufficient since the war to meet the demands of manufacturers of native cigarettes. Therefore, cloves have been imported—5,671 metric tons in 1948, 6,893 tons in 1949, and 10,626 tons in 1950.

XI. AGRICULTURAL PRACTICES

Irrigation

On Java, irrigated land accounts for 40 percent of the total cultivated area—8.1 million acres. Outside of Java, relatively little land is irrigated: on Madura, about 183,000 acres; on Bali, 232,000; and on Lombok, 231,000. Some irrigated rice cultivation exists on the north and south coast of Sumatra and in scattered parts of South Celebes. Where population pressure is great, irrigation is needed to assure an adequate food supply, for occasional fluctuations in monsoon rainfall could have disastrous consequences on the harvest. Too, a dependable irrigation system permits more widespread double cropping than would otherwise be possible. For these reasons, and because the cultivation of wet rice requires great amounts of water, irrigation of croplands has been practiced on Java for centuries.

Irrigation water is secured from various sources: rivers and mountain streams, reservoirs, and wells. The most common practice is river-water irrigation of the gravity-flow type. The advantage of this system is that silt, carried by tropical rivers in large quantities, is deposited on the soil and remains there as a fertilizer. Irrigation, formerly left to native farmers, is now to a considerable extent under government supervision and control. A notable feature of the government's irrigation policy in the past has been supplying water free of charge.

A number of ambitious irrigation projects have been proposed and studied by the government in the last several years, but as yet none of them have progressed beyond the blueprint stage. An example of this planning is the multipurpose development project proposed in 1949 for West Java involving dams, reservoirs, hydroelectric power generation, and a network of navigable irrigation canals designed to furnish sufficient water for double cropping of sawah (irrigated) rice on 1,250,000 acres. Other irrigation schemes currently being planned on a long-range basis would provide water for 375,000 acres in Sumatra, 500,000 acres in Borneo, and 250,000 acres in East Indonesia. But to date, actual government activities have been confined to repairing and servicing existing irrigation systems on Java and Madura. For the year 1951, about 5 million rupiahs was allotted to this work. The Agricultural Service has been emphasizing self-help among the farmers to improve the water distribution channels at the local level.

Cropping Pattern

As a consequence of the great variety of crops, particularly on Java, the crop rotation system is complex. It is built around rice,

with other food or industrial crops completing the picture. About 45 percent of the irrigated sawah area and 25 percent of the dry-field tegalans on Java were double cropped before the war. The balance was permitted to lie fallow until the next wet monsoon, either for reasons of fertility or lack of sufficient water. Present statistics on land utilization in Indonesia are not sufficiently detailed to determine whether this pattern has changed. After the wet monsoon rice crop of 1951, 17 percent of the sawahs (1,400,000 acres) were replanted with rice. It is not certain what portion of the remaining acreage was utilized for polowidjo (secondary) crops. Corn, cassava, sweetpotatoes, peanuts, and soybeans are grown on dry field tegalans during the wet monsoon, or as a secondary crop on sawahs during the dry monsoon if sufficient water is available.

While on Java the prevailing pattern is irrigated rice followed by polowidjo, in the Outer Islands a single cropping system prevails. Padi gogo (dry upland rice) is grown in many areas, while corn, cassava, and sweetpotatoes are also found. About 90 percent of all cultivation in the Outer Islands is of the shifting ladang type. No reliable statistics are available on this type of farming. In some few parts of the Outer Islands cultivation of rice along river banks is practiced (lebak), the irrigation water being supplied by seasonal overflow from the river. About 114,000 acres of rice in South Sumatra, around Palembang, are grown in this manner.

Fertilizers

Prewar consumption of commercial fertilizer in Indonesia totaled about 165,000 metric tons annually for all types, of which 20,000 tons was ground phosphate rock mined locally near Cheribon, and the balance imported. Among the imports, ammonium sulfate was the largest single component, amounting to about 100,000 metric tons per year. Since the Cheribon mine is not back in operation, postwar consumption has depended on imports exclusively, which reached only one-half the prewar level during 1950. Of the 72,000 metric tons of fertilizer imported in 1950, 57 percent came from the Netherlands, 14 percent from the United States, and 11 percent from Canada. More than 53,000 tons of ammonium sulfate and 5,000 tons of superphosphates were imported.

The principal demand for chemical fertilizers in the past has been on the larger European estates. The sugar plantations were the largest single users before the war. A characteristic feature of native agriculture in Indonesia, particularly as it affects production of the main food crops, is that little use is made of fertilizer. The capital outlay for fertilizer made by the average Japanese, Formosan, or Korean farmer is virtually unknown to the Indonesian. On rare occasions the native cultivator will spread some stable manure on the land during the dry season, but he seldom uses chemical fertilizers. Fortunately irrigation helps maintain soil fertility by depositing alluvial sediment on the fields. In addition, much of the irrigation water receives considerable

quantities of nitrogen through the drainage of various villages along the course of the canals and streams supplying water. This does not, however, sufficiently compensate for the lack of fertilizers, both natural and artificial; hence, average crop yields are lower in Indonesia than in Japan, Korea, and Formosa in spite of the relatively fertile volcanic soil.

At present the Agricultural Service is trying to encourage peasant cultivators to use chemical fertilizer. Research findings indicate that proper application of phosphates will increase rice yields as much as 25 percent the first year. This fact is of critical importance for a country now forced to import large amounts of rice annually. The United States Government is giving assistance to this objective of increased rice production through its MSA-STEM mission in Indonesia. MSA imported 5,100 metric tons of double superphosphates in 1951 for distribution at half-price to Javanese rice farmers. Numerous demonstrations of phosphate application on rice paddies are being made by the Agricultural Service to stimulate local use of chemical fertilizer.

Farm Implements

Smallholders' agriculture in Indonesia is carried on primarily with human labor, utilizing crude plows, wooden harrows, heavy hoes (patjols), bush knives, and sickles. Clearing and cultivating the land and harvesting crops are slow, laborious tasks. However, the small size of native holdings, together with a general reluctance to depart from traditional procedure, greatly retard the adoption of improved agricultural equipment.

Since the war, even the simple implements now used have been in short supply due to the scarcity of sheet iron. The number of local blacksmiths is sufficient to handle normal demands for plow points, knife blades, and hoes when sheet iron is available; however, imported hand tools are generally preferred to those produced locally. About 200,000 patjols were imported annually before the war. In the Outer Islands, where primitive fire farming is practiced, the only instruments of cultivation are often a sharp-pointed stick and a machete. The ground is prepared for planting by simply burning off the forest cover; then a small hole is made in the ground with a stick, and seed is planted.

Buffaloes and oxen furnish the draft power for native agriculture. Simple iron-tipped plows are pulled across the rice fields by one or two water buffaloes, or by an ox. Buffaloes are almost exclusively used in West Java, while oxen are more numerous in East Java. Horses are almost never used on the land. In some parts of the Outer Islands, where the farmers have not yet acquired the habit of using a plow, the soil is prepared by chasing water buffaloes over the inundated rice fields. Plantation agriculture is likewise largely dependent on draft animals and human labor. Among the estate owners there is great interest in mechanization, but actual possibilities are limited.

Mechanization

Estate agriculture in Indonesia is large-scale and utilizes land of varying types and fertility, depending on the requirements of the crop grown. Hired labor is used and advanced agricultural practices are followed. On the whole, these factors are favorable to expanding the use of farm machinery; however, the culture of many estate crops is not susceptible to mechanization. There were not more than 200 tractors in Indonesia before the war. Few, if any, of them are still in service, but some new ones have been imported since the war. According to a recent survey by the Ministry of Agriculture, there were 250 tractors in Indonesia at the end of 1951, most of them on private estates. Of these, about 210 were crawler-type 60–80 horsepower, and the balance wheel-type 40-horsepower tractors.

Agricultural tractors in Indonesia are now used principally for land clearing on rubber, oil palm, and hard fiber estates, and for soil preparation on the East Coast Sumatra tobacco and East Java sugarcane estates. Some wheel-type tractors are used for cultivation on fiber, tapioca, and tobacco estates in East Java. A few Javanese sugar estates have, in the past, plowed and cultivated with tractors the rice fields of farmers from whom land is subsequently rented for sugar production. This insures an early harvest for the rice and, consequently, an early release of the land for growing cane. One tobacco estate near Medan, East Coast Sumatra, is currently experimenting with mechanized rice cultivation in an effort to assure a home-grown food supply for its workers. (Sumatra is a rice-deficit area.) The only cooperative use ever made of farm machinery in Indonesia is that in connection with recent government experiments in mechanized farming on Timor and South Celebes.

All of the above-mentioned efforts at mechanized rice cultivation have met with great difficulties; and, except for the Medan project carried out by the Deli Maatschappij tobacco enterprise, they could hardly be called successful. Present transmigration schemes anticipate the use of farm machinery for clearing farm lands and later for assistance in cultivation. A better choice of mechanical equipment in the future may yield more satisfactory results.

Livestock

Although crop cultivation is the principal means of livelihood in Indonesia, livestock breeding is also important in the economic life of the indigenous population, especially in East Java and Madura. In contrast to conditions prevailing in Western countries, native cattle breeding consists chiefly of rearing draft animals for either agricultural or transportation purposes. The production of meat is of secondary importance. Before the war, over-all meat production on Java and Madura was estimated at 164,000 metric tons per year, or about 8 pounds per capita annually exclusive of poultry.

The drastic decline in livestock numbers during the war seriously

curtailed meat production in the immediate postwar years. By the end of 1948, slaughtering had climbed to approximately the prewar level, but livestock herds were still substantially smaller in size. Commercial dairying is practically nonexistent among the native farmers. The existing small-scale dairy farming is largely in the hands of Europeans and Chinese, and it is carried on for the benefit of the Western population.

TABLE 17.—*Estimated number of livestock, 1940, 1947, 1950*[1]

[In thousands]

Animal	Java			Sumatra			Borneo			East Indonesia		
	1940	1947	1950	1940	1947	1950	1940	1947	1950	1940	1947	1950
Horses	219	175	190	36	29	30	0.5	0.4	0.5	456	331	375
Cattle	3,588	2,691	2,703	382	284	351	31	27	30	600	590	621
Buffaloes	1,925	1,636	1,636	391	332	316	34	24	30	827	683	682
Goats	5,161	4,387	5,106	337	286	304	19	18	18	433	316	292
Sheep	1,780	1,513	1,602	43	37	40	2	.5	2	65	90	97
Pigs	166	151	187	356	302	355	154	141	130	591	568	562

[1] Figures cited are for January of each year.

Source: Netherlands Report to the FAO (1948), and Indonesian Bureau of Livestock.

At the beginning of 1950, combined herds of livestock in Indonesia were about 11 percent less than in 1940 (table 17). By the end of 1950 the total number of goats, sheep, and hogs is thought to have equaled the prewar count, while there were still about 16 percent fewer horses and cattle than in 1940. The government is taking numerous steps to increase the size and quality of herds. Plans have been made for establishing a General Research Institute for livestock breeding and four government veterinary centers to augment the three currently in operation. The Indonesian Veterinary Service pays a special premium of 90 rupiahs a year to the owner of any high-quality bull kept at stud for public use. Total premiums paid out in 1950 amounted to 225,000 rupiahs. The Veterinary Service also maintains about 500 of its own carefully selected stud bulls. In addition, special government prizes totaling about 200,000 rupiahs a year are awarded to the owners of champion bulls and cows exhibited at native cattle shows.

XII. FOREIGN TRADE

Source of Exports

At the turn of the century, estate growers had a virtual monopoly on agricultural exports from Indonesia. The only important native-produced commodities that entered world trade were the various spices—pepper, mace, nutmeg, etc. But the long-run trend in agricultural exports from Indonesia has been unmistakably in the direction of a decreasing share from the plantation sector of the economy. This trend has resulted from the gradual awakening of the peasant farmer to the possibilities of producing for the export market. The hard task of pioneering was done by the estates. European planters were the first to introduce many of the present commercial crops cultivated in Indonesia—rubber from the Amazon Basin, tobacco from South America, oil palm from tropical West Africa, coffee from the Belgian Congo, cacao from Brazil, etc.

Protracted scientific research produced new varieties of these plants suited to local climate and soil. Costly experimentation developed better methods of cultivation. Through the prewar extension service of the Colonial Government's Department of Agriculture, the knowledge derived from this specialized experience was disseminated to the benefit of the rural areas. It took hold slowly, but with each succeeding year more peasant farmers planted commercial crops as well as their traditional rice, cassava, and sweetpotatoes.

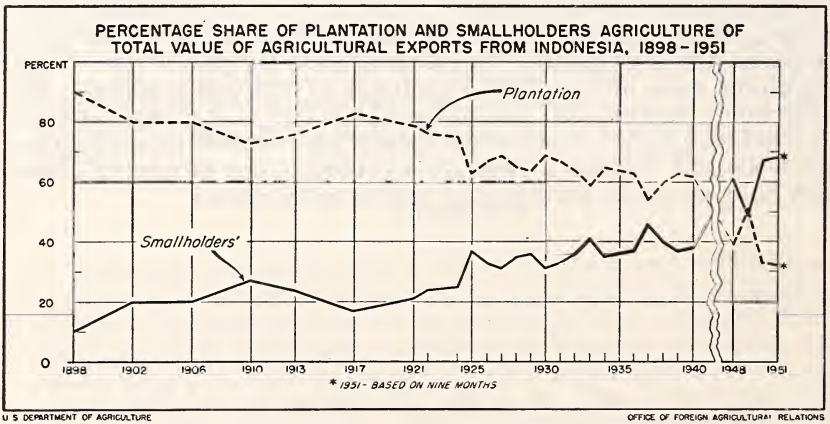


FIGURE 3.—During the past 50 years the Indonesian smallholder has gradually obtained a larger share of the export market for agricultural products.

At the beginning of the twentieth century the large European-operated estates produced 90 percent of the value of all agricultural exports from Indonesia. By the beginning of the First World War the smallholders had increased their share from one-tenth to one-quarter, and during the 10-year period after 1925 their share averaged about one-third. In the few years just before the Second World War peasant cultivators furnished about 40 percent of the value of all agricultural exports from the Indies, and estates 60 percent. As shown graphically in figure 3, the long-run trend for native production has been distinctly upward, with increasing amounts of smallholders' copra, coffee, tea, kapok, and rubber being exported.

Since the war this trend has been accelerated as a result of powerful external forces at work in the economy. The Japanese occupation of the islands had a far more disruptive effect on estate agriculture than on smallholders' cultivation. The subsequent military action against the Dutch, the transfer of sovereignty, and the resulting civil strife have all reacted adversely on estate cultivation. In 1948, the first postwar year during which a fair volume of exports was achieved, the prewar relationship was reversed, and smallholders produced 60 percent of the value of all agricultural exports. In 1949 their share dropped to one-half, but during 1950 and 1951 it was more than two-thirds.

Recovery of Export Trade

Despite the 6 years that have elapsed since the end of the war, exports of most agricultural products from Indonesia have not come close to the prewar level. The total volume of agricultural exports during 1948 only reached 21 percent of the 1935–39 aver-

TABLE 18.—*Principal agricultural exports by volume, 1948–50, with prewar comparison*

Item	1938	1948	1949	1950	1950 as a percent of 1938
	Metric tons	*Metric tons*	*Metric tons*	*Metric tons*	*Percent*
Estate rubber	171,175	102,998	160,756	173,091	101
Smallholders' rubber	149,039	335,896	268,073	529,687	355
Palm oil	220,806	39,907	101,861	97,096	44
Palm kernels	47,628	11,079	28,654	24,095	51
Copra	565,483	242,245	315,922	284,004	50
Tapioca products	266,563	3,202	2,621	66,592	25
Sugar	1,091,853	65,000	43,000	2,500	2
Tobacco	50,309	1,212	6,627	12,374	25
Coffee	70,092	2,220	5,340	13,560	19
Tea	81,844	8,618	24,041	31,752	39
Cacao beans	1,600	1	163	299	19
White pepper	11,350	829	83	926	82
Black pepper	44,199	975	2,726	7,113	16
Mace	834	494	451	457	55
Nutmeg	3,977	2,752	2,938	2,689	68
Cassia bark	2,505	531	1,380	4,840	193
Cinchona bark	7,063	4,236	2,598	2,456	35
Quinine	182	57	16	63	35
Hard fibers	90,086	5,798	2,939	5,371	6
Kapok	16,344	5,796	8,261	7,198	44

Source: Compiled from official publications.

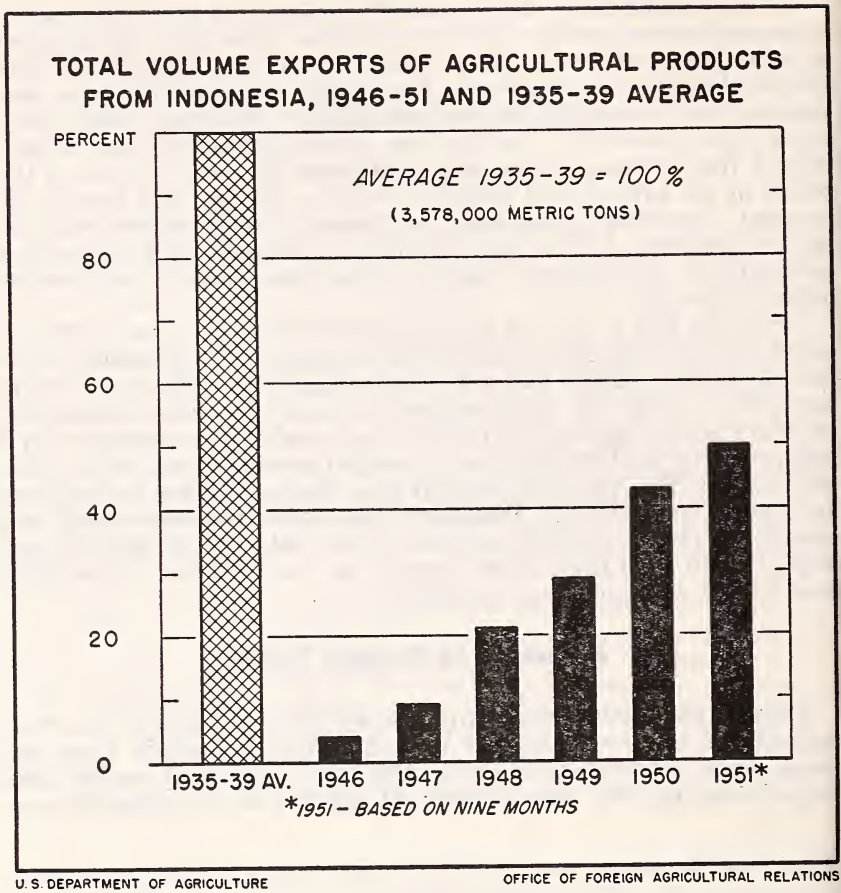


FIGURE 4.—Postwar recovery of agricultural exports from Indonesia has proceeded very slowly.

age, 29 percent in 1949, and 43 percent by 1950 (fig. 4). Preliminary figures for 1951 indicate that about 50 percent of the prewar volume was achieved in that year.

There has been, however, a considerable difference in the level of recovery achieved for the various commodities included in the above total. Table 18 lists the more important agricultural exports of Indonesia, and a study of this table indicates that after 1949 the composite picture is heavily weighted by the great upsurge in smallholders' rubber production, which occurred in response to a rapid price rise for this commodity. In 1950, for example, if rubber is excluded from the picture, the percentage of recovery is only one-half as great.

Total rubber exports during 1950, both legal and illegal, amounted to more than 700,000 metric tons, by value the most important export of the Indies. Legal exports alone were worth $303 million,

more than double the value of petroleum shipments during 1950 ($142 million). Copra came third, earning about $56 million in foreign exchange for recorded exports, and tin ore ranked fourth, with $49 million. Tea held fifth place, with exports totaling $27 million, while pepper, palm oil, and tobacco all earned about $21 million each. These eight commodities accounted for 90 percent of total export value. Agricultural products as a whole constituted 70 percent of the value of total Indonesian exports during 1950, as compared with 65 percent in 1938.

The varying rates of recovery noted in table 18 have been due in large measure to fundamental differences in methods of cultivation between the hill cultures and the field crops. During 1950 estate exports of the six principal hill culture crops—coffee, tea, cacao, cinchona, oil palm, and rubber—totaled 57 percent by volume of their 1938 level. These crops do not compete for land that can be used to advantage for basic food production. In contrast, estate exports of the four commercial field crops—sugar, tobacco, tapioca, and sisal—only reached 6 percent of the volume achieved during 1938. Under pressure of continued population growth, much of the land once devoted to these crops is now being utilized for rice cultivation and production of other basic food crops. It is extremely unlikely that any of these latter four commercial field crops will again achieve in Indonesia the level of production and export held before the war.

The directional movement of Indonesia's exports continues in much the same pattern as before the war. The three leading importers of Indonesian products have long been Singapore, the Netherlands, and the United States. However, Singapore functions as an entrepôt and most of Indonesia's exports there are transshipped to other destinations. In addition to the legal trade between Indonesia and Singapore, the latter served as destination for a large volume of smuggling trade variously estimated from 10 to 20 percent of the total recorded exports from Indonesia. Exports to the United States continue in third place. Rubber comprised 70 percent of the value of all Indonesian shipments to the United States in 1950 compared with 45 percent in 1949. The United States holds first place as a supplier of Indonesian imports.

Balance of Payments

Prior to the war, Indonesia consistently had a large export surplus in merchandise trade, which balanced the negative items on its current account—e. g., insurance, freight, interest and dividends on capital investment, pensions to Dutch colonial administrators retired to the mother country, etc. After the war, Indonesia developed a chronic import surplus, which, when coupled with the other deficit items on current account, created a sizable disequilibrium in the balance of payments. For example, the 1949 balance showed a trade deficit of 253 million rupiahs,[4] interest and

[4] Excluding exports and imports of petroleum companies, which by special arrangement neither yield nor consume foreign exchange.

dividend payments of 137 million (net), and outward invisibles of 414 million (net); for a total current account deficit of 804 million rupiahs, or approximately US$300 million. This sizable deficit was covered for the most part by Dutch and American loans and by MSA grants-in-aid.

Original estimates for the 1950 balance of payments envisioned continued substantial deficits for all items on current account. However, two factors served to change the entire picture. The lesser in importance was the introduction in March of 1950 of a managed multiple-exchange-rate system that had the effect of stimulating exports through *de facto* devaluation of the inward remittance rate, meanwhile discouraging imports by raising the outward remittance rate to triple the official exchange of 1 rupiah for US$0.26. As a result of this action the dollar volume of imports declined by about 25 percent, and a sharp drop in transfers of interest and dividends also took place.

However, the factor that was responsible for the more spectacular change in the Indonesian balance of payments during 1950 was the rapid price rise for basic commodities brought on by United States stockpiling and the Korean crisis. The MSA special index of Indonesian export prices (1938=100) shows a rise from 402 in January of 1950 to 810 in December of 1950. Price rises for some commodities were even more spectacular—for example, rubber increased nearly fivefold in price during the year. As a result of this meteoric rise in world market prices, exports of some items —notably rubber—increased greatly in volume over the preceding year, while almost all earned more foreign exchange than previously.

The net consequence of these events was a sharp reversal of the anticipated balance-of-payments situation. Foreign-exchange-earning merchandise exports totaled 2,199 million rupiahs, payments for imports totaled 1,349 million,[5] and total current account transactions showed a surplus of 528 million rupiahs (nearly US$140 million at the official rate) in comparison with the preceding year's deficit of 804 million. The net surplus for the year of current and capital account combined totaled 492 million rupiahs, and the total increase of gold and foreign exchange holdings by the government, including MSA grants valued at 139 million rupiahs, amounted to 655 million rupiahs, or the equivalent of US$172,265,000.

It should be emphasized that this favorable balance of trade is not so much an indication of a healthy national economy, as of abnormally high export prices, which have already declined in some instances, and of imports forced down below the actual needs of consumption and reconstruction by an artificial exchange rate that trebled the cost of imports. In common with other countries of Southeast Asia, Indonesia requires considerable capital and technical assistance to carry through its proposed program of economic development to raise the living standards of the people. Since per capita savings are negligible, there is little prospect of mobilizing

[5] Excluding approximately 543 million rupiahs of petroleum company exports and 177 million rupiahs of their imports that have no effect on the balance of payments.

sufficient domestic capital for the job. The current export surplus may be considered as rather transitory.

Thus, Indonesia will probably continue for some time to be in large measure dependent on foreign capital for economic development. It is therefore significant that in 1950 as in 1949 net disinvestment took place on private capital account. Aid from foreign countries, principally the United States, will likely continue for several years more, but in the long run the new Republic will need private foreign capital, which cannot be attracted unless internal conditions are secure and stable.

XIII. GOVERNMENT SERVICES TO AGRICULTURE

Ministry of Agriculture

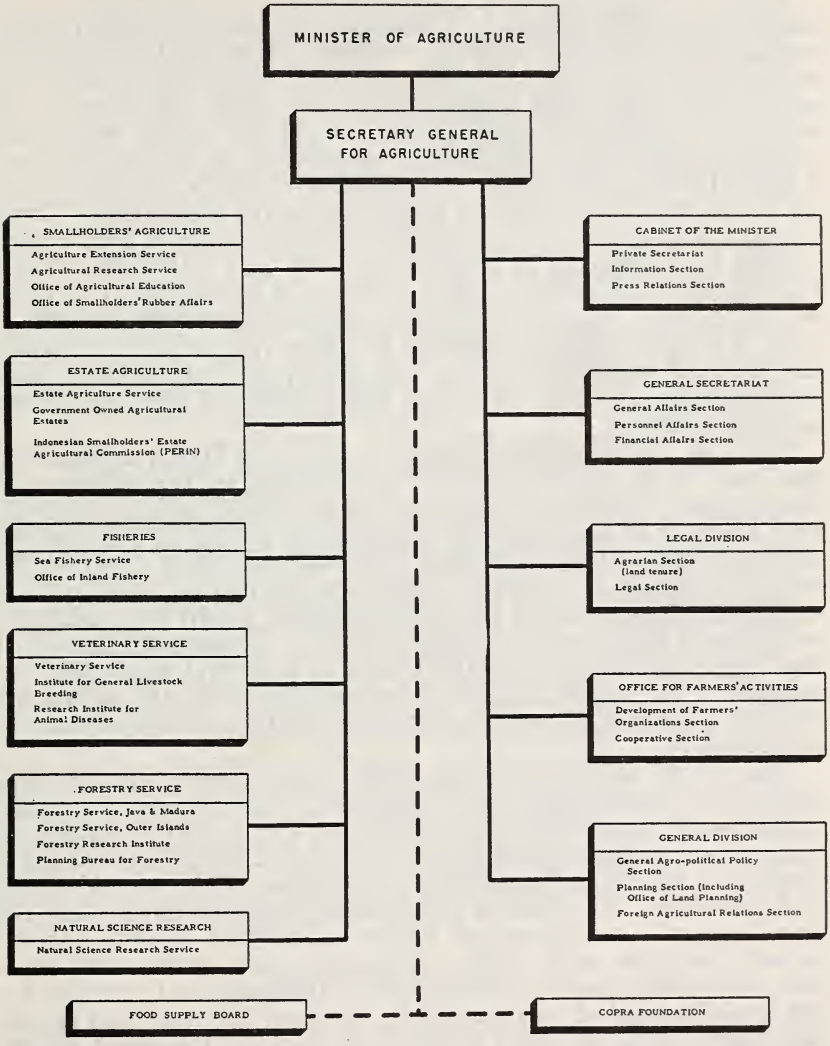
In 1905 the various activities of the Dutch Colonial Government in connection with agriculture were brought under unified control by the creation of a Ministry of Agriculture, whose primary function was stated as being the improvement of smallholders' agriculture. Economic progress and the growth of a wider concept of state functions led in 1911 to the merging of this ministry into one of broader scope—the Department of Agriculture, Industry, and Commerce, renamed the Department of Economic Affairs in 1934. Among the organizations subordinated to the agricultural branch or affiliated with it were the famous Botanical Gardens at Buitenzorg and its allied institutions; the General Experimental Station for Agriculture, with its several subdivisions; the Agricultural Information Service, which was in charge of local extension work; the Division of Agricultural Instruction, responsible for vocational training in agriculture; the Division of Agricultural Economy, primarily concerned with estate cultivation; the Horticulture Service; Veterinary Service; Irrigation Service; Forestry Service; and the Division of Fisheries.

After the transfer of sovereignty on December 27, 1949, the federal government (R. U. S. I.) as well as the provincial bodies went about the task of organizing departments of agriculture. With the formation of the unitary state on August 17, 1950, a new Republican Ministry of Agriculture was created. A great number of specific problems facing Indonesian agriculture are similar to those existing during colonial days, so that in many instances the new government's approach to their solution is based largely on a continuation of policy and programs initiated under the Dutch administration. It is apparent that in the future a stronger emphasis will be placed on the economic and social improvement of smallholders' agriculture than in the past.

Previous activities along the line of agricultural education, technical research and experimentation, rural extension work, and the improvement of crop and livestock production will be continued and expanded. New activities will include the development of credit and marketing facilities and the encouragement of the local cooperative movement. The organizational framework of the new Ministry of Agriculture is shown in figure 5. It will be noted that a Cooperative Section is included in the Office of Farmer's Activities.

The basic problem facing smallholders' agriculture is the production and distribution of a food supply adequate for the needs of an ever-increasing population. To meet this challenge the Min-

ORGANIZATION OF THE INDONESIAN MINISTRY OF AGRICULTURE



Source: Foreign Service Dispatch #298, Djakarta, January 5, 1950.

FIGURE 5.—A new government has come into being in Indonesia, but many of the old agricultural problems remain.

istry of Agriculture is placing primary emphasis on increasing rice production in the islands. Among the measures being adopted to achieve this goal are the conversion of estate lands to rice cultivation, improvement of irrigation, increased use of chemical fertiliz-

ers, development and use of improved seed, and various colonization schemes designed to utilize arable land in the Outer Islands.

As for estate agriculture, it is faced with many immediate problems such as rehabilitation of planted area and production equipment, procurement of supplies, changing labor relations, and the general lack of security. So far, the Indonesian Government has been able to give estate agriculture very little assistance. The long-term problem of estate leases, length of tenure, and conditions of contract are still under consideration by the government. A special commission has been established to study the whole matter of agrarian land policy as related to estate cultivation. There appears to be widespread opposition to many phases of estate agriculture as it operated in the past, and we may anticipate with a high degree of certainty that a number of fundamental changes will take place, tending to limit the importance of estate cultivation. Certain political questions are involved, which lie outside the scope of agriculture *per se*, but which will undoubtedly have an important effect on the future development of this part of the national economy.

Two specialized agencies inherited from the Dutch administration have been placed under the jurisdiction of the Ministry of Agriculture. The first is the Food Supply Board, which is charged with the task of assuring that an adequate supply of rice reaches the consumer at the retail level. To carry out this function the board purchases rice directly from the commercial rice mills in surplus-production areas, and it also operated (until very recently) as exclusive buyer on the foreign market. The second agency is the Copra Foundation, created to act as a central marketing organization for copra and now reconstituted with the additional function of providing for the economic welfare of the copra producing areas.

Prior to the adoption of the unitary state, three separate programs for encouraging and developing agriculture had been adopted—one by the Federal Government (R. U. S. I.) and two by the Jogjakarta Republic (R.I.). In August of 1950, all three of these plans were placed under the central direction of the new Ministry of Agriculture. The first of these is the Special Welfare Plan for Smallholders' Agriculture and Fisheries, adopted in 1949 but not actually initiated until 1950. The major part of this plan deals with the improvement of rice culture in Indonesia and provides for the establishment of 6 experimental stations, 200 new seed farms, 230 special demonstration farms, and for the increased use of phosphate fertilizer. The second of the plans, the Kasimo Plan, proposes the eventual establishment of 1,200 local Institutes for the Education of the Rural Community (Balai Pendidikan Masjarakat Desa). These village institutes, working in conjunction with the local cooperative movement, will become centers of educational and welfare work, emphasizing self-help among members. The Special Agricultural Plan—now completed—is the third of these programs, and it provided for the complete rehabilitation of the secondary irrigation systems on Java and Madura during the crop year 1950–51.

Agricultural Extension

Prior to the creation of the first Ministry of Agriculture in 1905, the application of improved agricultural techniques was mainly directed toward estate agriculture. The Agricultural Information Service of the Ministry of Agriculture was organized on a Provincial basis, with a number of regional inspectors and local extension representatives, known as Landbouw Consulants. These Dutch agricultural officers were assisted by a small staff of Indonesian technicians, trained in the local vocational schools and the Agricultural High School at Buitenzorg.

Among the various types of extension activity carried on were rural demonstrations, seed farms, special exhibitions, livestock and produce competitions, and sponsorship of various types of farmer and youth clubs. Leaflets and picture posters were occasionally used, the latter being more effective since few people could read. Scientific and technical research work needed by the Information Service was performed by one of the branches of the General Experimental Station. Just prior to the war, there were about 1,000 people engaged in extension activities under the colonial administration.

The present Agricultural Extension Service of the new Ministry of Agriculture is greatly handicapped by the lack of technical specialists. Most of the former Dutch staff members have returned to the Netherlands, leaving the work in the hands of inexperienced local personnel. The government realizes that the future of the extension service will depend on filling this void through the immediate expansion of facilities for training Indonesian students in agricultural science. A number of new schools have already been opened and old ones expanded, both at the intermediate and advanced level. Six-month refresher courses for local agricultural advisers are now being given at a special school in West Java, and many other advisers are in the process of being trained. Several United States agricultural specialists attached to the MSA-STEM Mission to Indonesia are at present helping the Ministry of Agriculture with the operation of the extension service, the experimental stations, and other activities.

Rural Education

Education in Indonesia has a rural flavor, but in the past it was not especially vocational at the primary level. After the first 4 years of elementary schooling, the village student could either quit his studies or proceed to a continuation school for 2 years, after which he could enter vocational training in an agricultural practice school, a trade school, a teacher's training institute, or he could take a hospital course for instruction as a nurse or medical technician. Judging by the high percentage of illiteracy prevailing in the country, few children before the war were able to take advantage of even the elementary 4-year program.

Under the new government, facilities for primary education are being expanded. Eventually, of course, the government hopes to

eliminate illiteracy. At the present time, further expansion of education at all levels is being seriously impeded by lack of trained teachers. As mentioned in the previous section, the educational and social program of the government is being built around the Village Institutes, or community centers, of which 120 were scheduled for completion during 1951. These institutes will be the focal point for the organization of adult education classes as well as for elementary instruction.

Specialized instruction in agriculture may be divided into four types:

1. Rural elementary training.
2. Rural adult education.
3. Intermediate vocational training.
4. Advanced technical instruction.

In the rural areas, supplementary instruction in the basic techniques of agriculture and horticulture is now given to the students of the village elementary schools. In addition, part-time adult education, often in conjunction with the Agricultural Extension Service, is offered in hundreds of villages. In these latter courses, both practical and theoretical work is stressed.

In the various urban centers, state secondary schools give more advanced training in farming techniques, agricultural science, farm management, etc. Upon graduation the student may obtain employment with the Agricultural Extension Service, or with the larger estates. (There are at present five agricultural high schools in Java, one in Sumatra, and one in Celebes offering this type of vocational training.) Or, the student who has finished his elementary education may take a teacher's training course at one of the several state normal schools and then return to his village as a primary school instructor.

For a limited number of qualified students, there is the further opportunity of attending the State Agricultural College of the University of Indonesia, located at Bogor (Buitenzorg), or the schools of veterinary science and forestry. This final link in the educational chain has been recognized by the government as being of key importance to the future development of the new Republic. The work of the State Agricultural College is currently being expanded, and a new building program is under way. Construction of new facilities costing 11.5 million rupiahs was initiated in the spring of 1951.

Rural Health

The usual problems of rural health are complicated in Indonesia by the tropical climate and by the fact that the masses are still in a primitive stage of development. The density of population on Java makes constant vigilance against epidemics doubly necessary. The most common diseases are intestinal such as typhoid fever, cholera, dysentery, and worm afflictions—diseases that are spread by the unsanitary disposal of human excrement. Of these, worm diseases are the most prevalent throughout the country. From the

point of view of public health, they are also the easiest to demonstrate and explain. The dangers of soil and water pollution are being stressed in order to quicken interest in hygienic habits. Various types of skin infections and malaria are also prevalent throughout the islands.

Since the number of private medical practitioners was small before the war, it was necessary for the Dutch Government to maintain an extensive Public Health Service in the islands. Many public clinics were operated throughout the Indies. In addition, a number of local government bodies and various European-operated plantations have for many years conducted their own medical programs. After the transfer of sovereignty in December of 1949, the Republican Government took over the operation of the Public Health Service, under the Ministry of Health. The present government hopes eventually to expand these vital activities. Its task is made more difficult by the present acute shortage of doctors in Indonesia. The number has never been great, but before the war there was one doctor for every 43,000 persons, while at the present time the ratio is roughly one doctor for every 60,000 inhabitants. (In the United States it is one for every 750.) This ratio should be more favorable in years to come because in 1947 the old Netherlands Indies Medical School at Surabaya was enlarged and elevated to the status of the Faculty of Medicine of the University of Indonesia with a branch at Djakarta as well as at Surabaya. The National University (Gadjah Mada) at Djogjakarta established in 1946 now has colleges of medicine, dentistry, and pharmacy.

To supplement its health program, the Republican Government is receiving technical assistance and special supplies from several international organizations. The United Nations International Children's Emergency Fund (UNICEF) has made material contributions to the government's child feeding program, and the World Health Organization (WHO) has been engaged in hygiene education and an anti-yaws campaign. The Food and Agriculture Organization (FAO) has dispatched two foreign nutrition experts to Indonesia to advise on technical matters and organize a nutrition survey of the country. It has also made available four overseas fellowships in nutrition and dietetics to Indonesian students. Meanwhile, under the United States MSA program in Southeast Asia, malaria control projects have been initiated, $3.5 million in medical supplies and equipment given to the country, six advanced medical fellowships for foreign study provided, and other such projects proposed.

Under the Dutch Administration the Public Health Service conducted a vigorous campaign of mass inoculations and vaccinations, which were fairly successful in reducing the number of deaths from epidemics. In addition, positive measures were taken, especially in the field of rural education. The work of hygiene propaganda was entrusted to a separate department of the Public Health Service, known as the Division of Public Health Education. This program was initiated largely through the efforts of Dr. John Lee Hydrick, an American who was sent out to the Dutch East Indies by the Rockefeller Foundation. His work was begun in close co-

operation with the Public Health Service and was later entirely absorbed by it.

For the decade 1931–41 the annual birth rate for the indigenous population of Java and Madura was estimated at 27.4 per thousand, the crude death rate 18.1 per thousand, and the rate of natural increase, 9.3 per thousand. This is a very low death rate for a Far Eastern, and especially for a tropical, country. It is partly explained by the low percentage of urbanization and the widespread activities of the Public Health Service under Dutch administration. The death rate in cities is somewhat higher, fluctuating between 25 and 40 per thousand. The death rate among Europeans is, of course, considerably lower. No recent information of a precise nature concerning vital statistics is available, but it is conceded that the death rate has risen since the war due to malnutrition, increasing urbanization, and the general state of disorder.

Notwithstanding the recent slacking off in the rate of natural increase due to economic distress, Indonesia does have a population problem, particularly on Java. The present government apparently proposes to relieve the pressure on that densely populated island by a threefold program of agricultural improvement, industrialization, and migration to the Outer Islands. In the long run, industrialization and urbanization can be expected to cause a decline in the birth rate. More immediately, however, all three of these measures, if successful, can do no more than alleviate the symptoms.

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