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## THE SMALLHOLDER IN TROPICAL EXPORT CROP PRODUCTION\*

In tropical countries that seek some form of economic development, attention is being given to the most appropriate form of organization for agricultural production, especially of export crops. The traditional plantation system, at one end of the scale, is being re-examined along with peasant-type farming at the other end, in view of changing social and political conditions. In recent years there has been a tendency to consider the compatibility of the two systems and, since the war, to experiment with alternatives such as a partnership between foreign capital, the peasant farmer, and local government.

The 20th century story of the quest for the most suitable organization for tropical export crop production, and the relative merits of the plantation and the plantation system in future development plans have received recent review (1). In many areas the smallholder, practicing peasant-type farming, is favored, mostly for noneconomic reasons. The purpose of this article is to examine the role of the smallholder over recent decades in order to determine how he has fared economically, and, at the same time, to consider some specific crops in the light of their apparent suitability for small-scale as against large-scale, and more heavily capitalized, production.

But just what is meant by peasant agriculture?

*Peasant-type farming and farmers.*—For lack of a better term, “peasant-type farming” may be applied to all forms of small-scale agriculture in tropical countries from the most primitive type of shifting cultivation to the more sophisticated forms of permanent, intensive culture as exemplified by rice-growing in a number of Asiatic regions. The meaning of a small holding is relative. The smallholder in one part of the tropics might be considered a fairly substantial operator in another, depending upon the existing local agricultural pattern, the crop or crops involved, and the amount of available arable land. The number of acres held or cultivated by the typical tropical farmer is not a reliable guide to classification. Under shifting cultivation in Africa, for example, many acres may be needed to produce as much as a few acres in Eastern or Southern Asia under intensive methods.

In some countries with plenty of arable land a farmer is still “small” by

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official definition if he cultivates under 100 acres; in others, less favored, the dividing line between the peasant farm or small holding and the plantation or estate is about 10 acres. In many tropical countries the typical peasant holding seems to be 3 or 4 acres. Professor W. A. Lewis suggests 10 to 12 acres as an economic minimum in the West Indies, "but experiments at the Imperial College of Tropical Agriculture [Trinidad] have shown that it is possible for a farmer to obtain a living above the average on a holding of less than 5 acres. There is insufficient land in the British Caribbean to provide all small farmers with individual holdings of as much as 10 or 12 acres" (2, p. 70).

In some countries and for some crops, size is measured in terms of production rather than area cultivated. This is also an unsatisfactory yardstick because the output per acre obtained by some smallholders may be ten times that of others, and yields of different crops vary widely. Distinctions become further blurred when a smallholder employs outside labor to work his land.

Whatever their individual size or importance, smallholders throughout the tropical world have much in common. They generally lack capital and frequently hold the least accessible and least productive land. Their operations are highly seasonal—under-employment for extended periods followed by periods when they must employ extra labor for planting and harvesting. Poor distribution of the labor load may reflect a poor selection of crops; but it is often a result of physical limitations that cannot be offset because of shortage of capital that makes it difficult to eliminate seasonal bottlenecks by mechanization. The small farmer often fails to secure the advantages of meticulous attention to detail in small-scale operations because his marketing facilities are inefficient, his holdings too small or too scattered, or his right to use the land he farms poorly defined. Formidable though his handicaps are, the smallholder exists by the millions, and often thrives.

#### THE SMALL-SCALE PRODUCER

The peasant farmer of the tropics is primarily a producer of foodstuffs for personal and family needs; his production for local markets or for export is normally small. Nevertheless, the number of such farmers is so large that the sum of their modest surpluses may be substantial. These surpluses arise in different ways, as is illustrated in Indonesia: "On Java this surplus is obtained from annuals grown in rotation with rice, such as tobacco, peanuts, cassava, and maize . . . or from perennials, such as coconut, kapok, and tea, raised on house lots, along roads, or on tracts less suitable for field crops" (3, p. 35).

Peasant production of export crops commonly developed in imitation of plantation examples, and was frequently encouraged by government action. Smallholders have taken over many of the old sugar estates in the West Indies and now sell their cane to former owners for processing. Rubber production by peasant farmers in Southeast Asia has grown along with plantation expansion, and has become very important.

Sometimes peasant production of export crops is initiated by the indigenous population without much stimulus either from governments or from plantation operations. West African production of cocoa and oil-palm products are good examples of this type of development.

Just as improvements in transportation have led to the opening of plantations and the establishment of factories and trading companies in some areas, they have also promoted peasant production of export crops. An example is the groundnut production of Northern Nigeria which followed the opening of a rail link from Lagos to Kano.

Deliberately planned and implemented government or private action has also been responsible for growth in peasant production, e.g., cotton in Uganda. Apparently such crops as cotton, peanuts, and cocoa do not usually offer sufficiently promising rewards to interest capitalist enterprise under present conditions.

Some tropical crops once thought best suited for exploitation by plantation methods are now grown with varying measures of success by peasant farmers. Coffee and bananas are now produced by smallholders in important quantities, as are also rubber and oil-palm products. When production, processing, and marketing are adequately organized and managed, often with state aid or through cooperative institutions, the output of the peasant farmer can be of a quality comparable with that of plantations.

Before the war, controversy as to the better system of production was greatest in connection with oil palms. Plantation production of oil-palm products in Sumatra and in the Belgian Congo (in the latter on concession lands cultivated by European firms) became a threat to peasant production in Nigeria. Although maintaining a good lead in palm-kernel exports, Nigeria lost ground with the increased exportation of palm oil from the newer producing areas where estates were equipped with modern factories for processing. The resulting superior estate product found receptive markets at higher prices than the native product of West Africa. Lord Hailey considered the merits of peasant *vs.* the plantation system of production "one of the outstanding issues of African economics" (4, p. 1651), although he also stated elsewhere, somewhat inconsistently, that there was only a "limited" field within which the issue had any reality.

In the postwar period the earlier controversy over the most appropriate "system" of agriculture for underdeveloped countries has not by any means been fully resolved (see discussion in 1, pp. 63-77). Recent professional opinion seems to lean toward peasant agriculture as the preferred "system," with certain modifications which might eventually lead to realization of many of the acknowledged strong features of plantation enterprise. The 1953 conference of the International Institute of Differing Civilizations went on record in favor of peasant agriculture. Conferees apparently felt that development would be more rapid and benefits more widely distributed than under the plantation system, which was considered outmoded, especially if based upon a plentiful supply of cheap labor. It was felt that the organization of peasant agriculture by cooperatives or other associations would permit farmers to benefit from the economies of large-scale operations (5, pp. 305, 313, 326).

#### *Peasant Production of Export Crops*

For a number of commodities of world importance the output of the smallholder has become significant despite deficiencies in his methods of production and marketing, and in the quality of his product. The principal cash crop

of most smallholders is destined for the export market. Colonial powers have generally encouraged peasant production of export crops, sometimes in competition with plantation production, because a cash economy provides resources easily taxable for government services. Such services are necessary to the general welfare and for development of backward countries; for a long time funds for them were not available from metropolitan sources. While plantation development was encouraged initially, especially in sparsely populated territories, in time peasant production came to assume greater importance.

Only a few hundred of the thousands of different products of tropical agriculture enter into international trade. Of these, only a small number are of major importance to the Western world and of appreciable significance in the economies of the countries producing them. Many are tree crops and are, or have been in the past, plantation grown. These crops are well distributed throughout the tropical world but the tendency has been for a few countries to dominate the export outlets.

A glance at the accompanying table reveals some interesting facts about tropical export crops and provides a basis for selecting a few to illustrate certain points about the role of the smallholder in production and trade. The crops are listed in order of their importance in value of total exports during 1955-57 and in two categories: those exported chiefly from tropical countries, and those exported chiefly from nontropical countries.

According to data compiled by the International Monetary Fund, world exports (f.o.b.) averaged approximately \$93.3 billion during the period 1955-57. Of the 30 commodities listed separately, which accounted for roughly 30 per cent of the total, some 12 were agricultural products of the tropics. Of these, however, the trade originating from nontropical countries was the more important in four cases, i.e., cotton, tobacco, maize, and citrus fruit. Table 1 (p. 54) lists these commodities by volume of exports as well as by value and suggests the importance of exports in relation to production.

The basic cereals, rice and maize, far overshadow all other crops in production, but exports represent only a small fraction of aggregate output even though the volume of exports is large in absolute amount. These "bread and butter" crops of smallholders can be grown widely throughout the world, and therefore do not have the special characteristics of most strictly tropical crops. They will be excluded, as will be other crops exported chiefly from nontropical countries (cotton, tobacco, citrus fruit). Minor tropical crops (not tabulated), such as abaca, cinchona, kapok, pepper, pineapples, sisal, and henequen are, for the most part, mentioned only incidentally.

Seven major tropical crops remain, to which should be added oil-palm products, not included in the source used. All have characteristics of the tree crops which thrive primarily in the tropics and are exported to temperate-zone markets. The importance in world exports of these eight major tropical crops and in the external trade of the countries producing them is suggested by Table 1 (p. 56), which also indicates the countries which might yield significant information on smallholders' participation in trade. Except for bananas, exports of each crop came largely from only about two sources.

With tea, cane sugar, bananas, and, to a lesser extent, coffee, production

advantages for export are generally considered, under today's conditions, to lie with the plantation. In rubber and coconut cultivation the advantages are not clear-cut and may accrue either to small holdings or to plantations, depending upon environment and economic conditions. The peasant farmer is a low-cost producer of oil-palm products, and maintains the leading position in exports, but the quality of his output leaves much to be desired. His advantages over plantation production are greater in cocoa culture, although it must be conceded that frequently he could not maintain his position so well without assistance from his government or from traders in such matters as developing and supplying planting materials, and in disease control.

For reasons which will become apparent subsequently, cocoa is here selected as the chief representative of smallholder production for export, tea as least suited to smallholder production, and rubber to illustrate a productive pattern showing roughly an even division between peasant and plantation agriculture. The other five major export crops here considered (as well as some minor crops) are introduced as they bear upon the discussion.

#### TYPICAL SMALLHOLDER EXPORT CROPS

Cocoa and coconuts have been selected as the most important examples of production for export of major crops by small-farming methods. Cocoa is the most important of the tropical export crops dominated by smallholder production. Unlike coconut products, cocoa is generally little used domestically; but like copra the exportable product is fairly near the raw state. Fermentation of cocoa can be handled in small lots, as is true of the drying of coconuts to make copra. Quality is a matter of care and skill which can be developed by the native grower.

#### *Cocoa*

Perhaps only 5 or at the most 10 per cent of aggregate world cocoa production is plantation grown. Only to a limited extent have plantation enterprises been interested in cocoa, primarily because large-scale operations do not offer such outstanding advantages over peasant production as they do for a number of other tropical crops. Current maintenance of cocoa production and near-term expansion of world cocoa supplies are largely dependent upon thousands of small farmers. The spread of disease must be brought under control and methods of production improved. At the same time, the smallholder must be provided with appropriate incentives; and a satisfactory long-term system of agriculture for cocoa must be evolved.

The bulk of cocoa production is concentrated in West Africa, with secondary representation in Latin America, especially Brazil. Plantation production of cocoa is now of minor importance, although it may regain some of its former stature in future years. During the postwar period of short supplies, substantial new plantings were made on a plantation basis, especially in the Belgian Congo.

While the typical cocoa grower is a smallholder by almost any definition, there is nevertheless considerable range in the size of "smallholders." In Brazil, for example, where everything seems to be on a scale commensurate with the size of the country, a smallholder of cocoa land is one producing 7.5 tons or

TABLE 1.—SELECTED TROPICAL CROPS: WORLD TRADE (EXPORTS) AND PRODUCTION, 1955-57 AVERAGE\*

Commodity	Exports, value		Production	Exports, quantity		Explanation for columns 3-5
	Million U.S. dollars	Per cent of trade in all commodities	Million metric tons	Million metric tons	Per cent of production	
	(1)	(2)	(3)	(4)	(5)	
COMMODITIES EXPORTED CHIEFLY FROM TROPICAL COUNTRIES						
Coffee, world .....	2,189	2.35	2.81	2.22	79.0	Beans
5 countries .....	...	...	1.88	1.48	78.7	Brazil, Colombia, Fr. West Africa, Mexico, Uganda
Sugar, world <sup>o</sup> .....	1,179	1.26	35.74	13.87	38.8	Beet and cane, raw basis; centrifugal sugar
5 countries .....	...	...	8.89	8.18	92.0	Cuba, Philippines, Australia, Taiwan, Dominican Rep.
Rubber, world .....	1,145	1.23	1.93	2.50	... <sup>b</sup>	Natural, including latex
4 countries .....	...	...	1.58	2.05	... <sup>b</sup>	Malaya-Singapore, Indonesia, Thailand, Ceylon
Rice, world .....	568	.61	210.83	5.37	3.9 <sup>o</sup>	Production of paddy; trade milled equivalent
3 countries .....	...	...	15.42	3.85	38.4 <sup>o</sup>	Burma, Thailand, United States
Tea, world .....	545	.58	.82	.49	59.8	
3 countries <sup>d</sup> .....	...	...	.54	.40	74.1	India, Ceylon, Indonesia
Cocoa, world .....	454	.49	.83	.76	91.6	Beans
4 countries .....	...	...	.58	.54	93.1	Ghana, Brazil, Nigeria, French West Africa
Bananas, world .....	296	.32	12.70 <sup>o</sup>	3.42	26.9	Production: approximate, mainly commercial only
5 countries .....	...	...	6.50	1.71	26.3	Ecuador, Honduras, Costa Rica, Panama, Brazil
Coconuts and products, world ....	269	.29	2.11	1.44	68.4	Copra and coconut oil in oil equivalent
4 countries .....	...	...	1.54	1.11	72.2	Philippines, Indonesia, Malaya-Singapore, Ceylon
COMMODITIES EXPORTED CHIEFLY FROM NON-TROPICAL COUNTRIES						
Cotton, world .....	1,948	2.09	8.07	2.75	34.1	Lint
5 countries .....	...	...	4.35	1.93	44.4	United States, Mexico, Egypt, Pakistan, Brazil
Tobacco, world .....	695	.74	3.42	.69	20.2	Unmanufactured
5 countries .....	...	...	1.50	.46	30.7	United States, Turkey, Rhodesia-Nyasaland, Greece, India
Maize, world .....	244	.26	158.83	5.95	3.7	
3 countries .....	...	...	92.73	5.00	5.4	United States, Union of South Africa, Argentina

\* Values of exports are averages for 1955–57 based on data in International Monetary Fund, *International Financial Statistics*, October 1959, pp. 24, 28. See *ibid.*, October 1953, pp. ii–iii for brief description which indicates that the country coverage for individual commodities is more limited than the coverage for total values of world trade; hence the figures shown above may be somewhat understated. Commodity specifications are not given, and may not be in agreement with the quantity data shown in columns 3–5.

Quantities of production and exports are averages for 1955–57 from FAO, *Production Yearbook 1958*, and its 1957 predecessor, and FAO, *Trade Yearbook 1958*. Explanations apply to these figures only. Countries are listed in the order of their importance as exporters.

Both sets of trade figures are gross exports and exclude USSR, Eastern Europe, and Mainland China. Production figures exclude the USSR, but may include Eastern Europe and Mainland China.

<sup>a</sup> Excluding shipments from Hawaii and Puerto Rico to the United States. Important European beet-sugar exporting countries included in the totals have been disregarded in the selection of countries. Production for years beginning the preceding September.

<sup>b</sup> According to the Rubber Study Group, as reported by the Commodity Research Bureau, *Commodity Yearbook 1959*, pp. 285–86, net exports of rubber were 96.7 per cent of production for the world, and 98.4 per cent for the four listed countries.

<sup>c</sup> Production converted to milled equivalent at 65 per cent.

<sup>d</sup> Unofficial estimates for Mainland China (not included in the world total) exceed exports from Indonesia.

<sup>e</sup> Quantity data shown only to tenths of million tons in the source cited.



TABLE 2.—PRINCIPAL EXPORTERS OF EIGHT SELECTED TROPICAL CROPS, 1955-57 AVERAGE\*

Commodity	First exporter	Second exporter	Third exporter	Per cent of total trade from countries listed
Sugar	Cuba . . . . . 33 (71)	Hawaii <sup>a</sup> . . . . . 6 (51)	Puerto Rico <sup>a</sup> . . . . . 6 (34)	45 <sup>b</sup>
Bananas	Ecuador . . . . . 18 (53) <sup>c</sup>	Honduras . . . . . 9 (54)	Costa Rica . . . . . 8 (39)	36 <sup>d</sup>
Coconut palm products <sup>e</sup>	Philippines . . . . . 46 (35)	Indonesia . . . . . 13 ( 4)	Malaya-Singapore . . . . . 10 ( 3)	70
Oil-palm products <sup>f</sup>	Nigeria . . . . . 39 (26)	Belgian Congo . . . . . 22 ( 9)	Indonesia . . . . . 14 ( 3)	75
Cocoa	Ghana . . . . . 31 (64)	Brazil . . . . . 16 ( 5)	Nigeria . . . . . 15 (20)	62
Coffee	Brazil . . . . . 40 (63)	Colombia . . . . . 14 (80) <sup>g</sup>	French West Africa . . . . . 5 (26)	60
Tea	India . . . . . 41 (20) <sup>h</sup>	Ceylon . . . . . 33 (64)	Indonesia . . . . . 7 ( 3)	81
Rubber <sup>i</sup>	Malaya-Singapore . . . . . 40 (53)	Indonesia . . . . . 33 (41) <sup>h</sup>	Thailand . . . . . 5 (26)	78

\* Per cent of world commodity trade by volume and (in parentheses) per cent of countries' exports by value; both measured by gross exports. Data for volume from FAO, *Trade Yearbook 1958*, for value from UN, *Yearbook of International Trade Statistics, 1957*, except as noted. World exports exclude USSR, Eastern Europe, and Mainland China.

<sup>a</sup> Shipments to the United States only; data for value from CEC, *Plantation Crops, 1958*, p. 26, average for 1955-56.

<sup>b</sup> The addition of Philippines 5 (23), Australia 5 (4), Formosa 5 (50), Dominican Republic 4 (46), Mauritius 3 (99), and Peru 3 (13) is necessary to bring the total to 70 per cent of world exports of sugar, including United States trade with Hawaii and Puerto Rico. Important European beet sugar exporting countries included in the total have been disregarded in the selection of the above countries. See Table 1 for data excluding United States trade with Hawaii and Puerto Rico. Values for Taiwan and Mauritius are for 1955-56 only.

<sup>c</sup> Data for the value of banana exports for Ecuador and coffee exports for Colombia from International Monetary Fund (IMF), *International Financial Sta-*

*istics*, October 1959, to take account of the undervaluation of bananas and coffee as officially reported. Data for the value of tea exports from India also from this source.

<sup>d</sup> The addition of Panama 8 (72), Brazil 6 (1), Colombia 6 (4), Canary Islands 6 (25), Jamaica 5 (13), and Guatemala 4 (14) is necessary to bring the total to 70 per cent of world exports of bananas. Data for the value of exports for Panama and Guatemala are from the IMF as in Note c; for the Canary Islands, 1955-56 from CEC, *Fruit 1957*, p. 89. Values for Honduras are 1956-57 only, for Colombia 1955-56 only.

<sup>e</sup> Copra and coconut oil, in oil equivalent.

<sup>f</sup> Palm kernels, palm oil, and palm-kernel oil, in oil equivalent.

<sup>g</sup> Includes balata and similar related gums.

<sup>h</sup> Recorded shipments only; the quantity figures include estimates of unrecorded shipments from Indonesia which averaged 148 thousand metric tons per year and represented 6 per cent of the adjusted world total.

less of dry cocoa annually. It is unofficially estimated that 88 per cent of the 26,000 cocoa farmers in the state of Bahia (second only to Ghana as a producer and exporter of cocoa) operate small farms and account for 27 per cent of the total Bahian crop (6, p. 15), which represents most (96-97 per cent) of Brazil's production.

These "small" farms of Brazil, however, are large by comparison with those of West Africa, where about half the growers of cocoa produce only 1 ton or less. Individual "farms" in West Africa (estimated at over 250,000 in number) average less than a hectare in size. Yields from peasant farms seldom exceed 400 kg per hectare; the average is "probably" around 350 (7, p. 26).

*The West African cocoa grower.*—Factors responsible for the development of the cocoa industry in West Africa over the past half-century include favorable climate and soils, a system of food farming into which cocoa can be introduced as a cash crop with little extra expense or labor, and an enterprising peasantry. Urquhart observes (8, pp. 104-05):

Whatever criticism may be levelled against some of the methods by which the African grows his cocoa, there is no doubt that it fits admirably into the economy of the country. . . . Cocoa is more suited to the forest area and much more profitable than any other crop that could be grown there. There are risks attached to growing one crop. . . . But there is no other cash crop which would give such good returns for the labour involved. . . . [If] science can find practical ways of meeting the troubles which beset cocoa at the present time, the African farmer will take full advantage of them.

Troubles were few in the West African cocoa industry until the low prices of the 1930's, the spread of disease in the 1940's,<sup>1</sup> and the rehabilitation problems of the postwar period.

Although cocoa yields on European plantations in Africa are generally at least twice as large as on peasant farms, estate acreage is relatively so small that it cannot be counted upon to maintain world cocoa supplies. In Ghana, the world's leading producer, "astonishingly" little has ever been known about the size of operation of the cocoa farmer; various surveys, however, suggest that farms typically range between 2 and 6 acres, which may yield from 20 to over 200 loads (of 60 pounds) of cocoa, depending upon location (9, pp. 85-91).

Because of the large number of smallholders involved in West African cocoa production, the problem of maintaining and improving the industry is extremely difficult and complicated. Pests and diseases (especially "swollen shoot," but also capsids and black pod) have been the most important factors in limiting production, but not the only ones. Since cocoa production is exclusively a native enterprise in the chief producing areas, this means that

unless aided by a competent and effective extension service, production is bound to be deficient in flexibility to adapt itself to new circumstances, which demand new techniques and scientific knowledge and practice. Production is not a rational system of resource management, but a kind of continuous strip-mining (7, p. 15).

<sup>1</sup> As in Africa, disease has been a problem in the producing countries of the Western Hemisphere, especially middle America.

The area of closed forest is rapidly disappearing, so that there are no longer unlimited amounts of good land for cocoa. With the planting of cocoa trees, which may occupy the same land for 20 to 40 years, the traditional system of rotational land use by short-term cultivators was destroyed. It is necessary now to change from shifting cultivation to permanent farming and to learn how to maintain fertility on existing holdings. Furthermore, replanting is in order as "the overwhelming majority of trees are over 20 years of age and their productivity has therefore begun to decline" (7, p. 22).

In addition to defective cultivation methods there is still widespread insecurity of title, and a tendency for the land to fall under the control of money-lenders and absentee landlords. The peasant cocoa grower's livelihood is threatened by the spread of diseases, but is said to be "almost equally affected by the disease of the money-lender." A decade ago most observers of the West African scene, and of the spread of "swollen shoot," agreed with Viscount Swinton's statement: "You have to cut out the money-lender at the same time as you cut out the diseased trees. It must be done drastically" (10, p. 451).

More recently, and under changed conditions, indebtedness, moneylenders, and similar problems bemoaned by agricultural experts and outside observers seem less formidable. For example, Galletti and associates found from an economic survey of Yoruba cocoa farming families in Nigeria (conducted in the early 1950's—a period of high cocoa prices and "a certain amount of inflation") that the burden of debt in comparison with their possessions

may be judged to be moderate . . . [The] situation . . . in 1951/2 appears to have been comfortable. . . . Though money-lenders are not so numerous and do not provide as much of the money borrowed in rural areas as they do in some Asian countries they are as a source of credit something of a danger . . . [The] problem presented by money-lenders' credit does not appear to affect any large proportion of cocoa-farming families (11, pp. 512-13, 529-30).

The problem of indebtedness and the role of various types of credit agencies vary with the prosperity of the farmer. Galletti and associates concede that their inquiry on this subject "was one of the most important, interesting, and difficult. . . . For the historical background we have to use information of various kinds, some obtained from farmers, traders, and officials who were in a position to know what was happening in earlier decades . . ." (11, p. 494). The authors would probably be the first to admit that generalizations based upon a period of high prices and profits, when growers are in a favorable position to pay off earlier debts, or to avoid incurring new ones, are inconclusive.

Another problem considered to affect the development of the West African cocoa industry adversely is the growth in absentee ownership during recent years.

The causes are complex and no single solution can be devised . . . many urban employees . . . have invested their savings in cacao. . . . Other, and perhaps more powerful, causes of absentee ownership are the desire to live in town, to avoid as much as possible the drudgery of farm work, or even to develop alternative sources of income. . . . All agricultural officers are of the view that hired laborers or tenants are even more lackadaisical in main-

taining productivity, when special effort is required, than owners . . ." (7, p. 43).

In West Africa generally, where land is held under a variety of conditions of tenure, producers frequently have little incentive to exert maximum efforts toward the maintenance of productivity. Finances of the cocoa industry have not been adequately organized or adjusted to the changes in the character of land tenure which development of the industry itself brought about. As land, once plentiful, became scarcer and increased in value, and as imported hired labor led to nonworking absentee owners, individual ownership began to replace the communal right of occupancy. The chiefs were in a position to enrich themselves by selling tribal lands, a practice contrary to customary native law and unknown in the days of shifting cultivation. As indebtedness piled up, moneylenders secured a control over the industry which undermined the security of the native cocoa grower. The credit system remains inadequate to existing agricultural needs.

Yet a number of advances have been made toward stabilization and improvement of the West African cocoa industry. The much discussed marketing organizations (now regional Boards) that have operated to control exports in Ghana and Nigeria have been subject to criticism (led notably by P. T. Bauer in citations given in 7, p. 33), but considering the events before and after their establishment (7, pp. 33-42; 10, pp. 322-27) they have succeeded in their major objective of stabilizing growers' incomes. Although farmers since 1940 have received a smaller share of the world price of cocoa than ever before, the Boards were able to build up sizable reserves in the postwar period of high prices. From the funds thus derived they have been in a position not only to iron out extreme fluctuations in prices to growers but to finance research on disease, schemes for future cocoa production, or general welfare. The need for replanting areas devastated by "swollen shoot," and the realization that cultural practices must be improved if the cocoa industry is to survive and prosper, have inspired various types of state-directed schemes in both countries.

Indirect benefits to the cocoa industry, made possible by Marketing Board funds, must be weighed against the failure of new planting to expand as much as might have been expected with the postwar rise in world cocoa prices. It has been argued repeatedly in policy-making circles that higher prices to growers do not stimulate greater effort and production owing to the high value African cultures place on leisure. The authors of the cocoa survey in Nigeria, mentioned above, make the general observation that their data suggest that "the Yoruba farmer and his wives are not prepared to maximize income in cash or kind at the cost of leisure time, social life, and their accustomed tempo of work" (11, p. 292). However, it has been said elsewhere: "That the economic incentive is not as powerful in Africa as in most industrialized Western countries is unquestionably correct. But the facile judgments about laziness and lack of ambition were only partly true in the past and are much less true today" (7, p. 37).

During the several decades of spectacular development of the cocoa industry in West Africa (until the 1930's), the British faced the alternatives of allowing European capital to develop the plantation system or of protecting the native

cultivator. The choice of policy was almost always in favor of the latter. But the native cultivator has been frequently handicapped in processing and in marketing; he has commonly lacked the advantages of the plantation system as found, for example, in the Cameroons. His cocoa holdings are frequently too small to yield sufficient ripe pods to permit proper fermentation. As the yields of his trees have declined he is confronted with the need for adopting scientific methods. Under the peasant system of production, changes in techniques of this order are not readily or quickly made. However, in 1955 it was announced that the Agricultural Development Corporation of the Gold Coast would establish a "cocoa estate farm" which would involve the pooling of many small holdings in a partnership with a managing corporation (1, pp. 67-68). Such schemes may not always prove out financially, but potentially they can be of great educational value in demonstrating scientific cocoa cultivation for the benefit of neighboring independent growers.

The primitive farmer is also in a highly vulnerable position when he depends solely on one export crop. Mixed farming has been advocated, or at least the growing of food for his own needs where not now done. But systems of mixed farming are not easily worked out, and it is sometimes held that the places where cocoa grows best are not the places where food can be produced to best advantage. Furthermore, agriculture in any tropical area is so closely identified with the social life of the people that changes may produce more harm than good. Farmers not only are reluctant to adopt improved cultural methods until their merits can be positively demonstrated, but often resist changes that involve the acceptance of outside labor into the self-contained family and tribal community.

Official concern with maintaining adequate food supplies on a highly localized basis is no doubt a reflection of experiences of the war period. It is especially during or following some grave disruption of trade such as is occasioned by a severe world depression or war that weaknesses of a monocultural economy are recognized and stressed. Yet it may also be contended, and has long been argued by economists aware of the general gain from division of labor, that specialization, where advantages for production are pronounced, is the only sensible course to follow. With cocoa the question has been raised whether or not, because of its heavy dependence upon soil type, production should be concentrated in the few places in the world where it will thrive, and leave food production for the native population to others. Of course, in the early stages of establishing new cocoa, various food crops are commonly grown to provide shade.

The rapid rise of the peasant cocoa industry in West Africa in the decades before the 1930's, ultimately forced government action in the field of marketing, but it was only after the serious threat to world supplies in the 1940's that official attention was turned to the longer-term problems of production. These are now recognized as of basic importance to the future welfare of the industry and the producing countries involved. (Equally important tropical crops, e.g., tea, have been confronted with production or marketing problems which have been solved largely by the enterprise of producers with little more than the consent of the state. See pp. 63 ff. below.) Despite current problems, it seems likely that smallholders will dominate world production and exports of cocoa for many years to come.

*Coconut Palm Products*

Although only half as valuable an export as cocoa (Table 1), products of the coconut tree (mostly copra and coconut oil) are nevertheless of major importance in the international trade in tropical crops. They are the leading export (in terms of oil) in the vegetable oils and oilseeds group of commodities, accounting for 25 to 30 per cent of the total. Coconuts are of chief interest here, however, as another crop especially suited for smallholder production.

The coconut palm has been cultivated, and the oil of its fruit used in cooking, from time immemorial, especially in the Far East. It has always been predominantly a peasant crop, indispensable to primitive economies in warm humid coastal regions. So diversified are the uses of the palm and its fruit that a small grove may supply the elementary food, drink, shelter, fuel, clothing, and implements needed for survival.

But beyond its basic role in the lives of peoples living in relatively narrow belts within the tropics, the coconut is a principal source of vegetable fat for the temperate zones of the Western world. There it is used mainly in the manufacture of soap, because of its lauric acid content (promotes lathering), but also extensively in the production of margarine and, to some extent, of compound cooking fat.

Simplicity of growing and ease of preparation, storage, and shipment of the dried kernel (copra), together with the multitude of family uses of the coconut tree and its fruit, make the crop ideal for small-scale growing and processing. Like cocoa, copra may be prepared in small as well as large quantities without prejudice to quality, given equal care. Furthermore, it does not generally compete for land with crops such as coffee, tea, cocoa, or rubber.

The bulk of coconut production is concentrated in Southeast Asia with smallholders the principal growers in the Philippines, Indonesia, Ceylon, India, and Malaya. The 20th century growth in Western demand for vegetable oils encouraged natives to extend their groves, but also led to the establishment of plantations by Europeans, Hindus, and Chinese, notably in Far Eastern islands, as well as to a minor extent in some parts of Africa. The smallholder and the plantation frequently exist and thrive side by side.

The coconut palm is now plantation-produced in the Philippines, the world's leading exporter (Table 2), and in some minor producing countries such as Mozambique and a few South Sea Islands, e.g., New Guinea. Yet even in the Philippines the 1948 Census of Agriculture showed that large plantations of over 1,000 acres accounted for only about 1 per cent of the coconut area; and only .53 per cent of the total number of farms (estimated at 233,000) were 50 hectares (123.5 acres) and over in size, although they accounted for 15.6 per cent of the total area (1,082,028 hectares).

The industry in most countries remains in the hands of smallholders. In Indonesia, the second most important exporter, production is almost entirely by smallholders, and in Ceylon, India, Malaya, and many minor growing areas the smallholder is responsible for the bulk of production. In Ceylon 68 per cent of the total coconut palm area of 921,000 acres in 1946 was in small holdings, "about the broadest based of the major plantation industries"; although the 1952 census

was less complete, it suggested that coconut cultivation was almost exclusively in Ceylonese hands (12, pp. 6-7). In the Federation of Malaya, smallholders accounted for a little over four-fifths of the area planted to coconut palms during 1954-56 (503,400 acres) and about 75 per cent of the copra production (154,100 long tons) (13, p. 6).

In what is described as the first serious attempt to carry out a survey of small coconut holdings in Malaya, a study was made in Johore, the state with the largest acreage of such holdings in the Federation. Holdings on strictly coconut lands were found to average 3.1 acres, those areas containing coconuts but not specifically reserved for them to average 3.5 acres, and holdings which did not contain coconuts although allocated to them to average only 1.5 acres (14, p. 7). Of the 49,092 holdings specified for coconut, which covered 152,600 acres, 82 per cent were under 5 acres, with another 17 per cent 5 but less than 10 acres (14, p. 11).

World acreage and production of coconuts are poorly and incompletely reported. The export record shows only a modest expansion during the past few decades and a relative decline in comparison with other edible-industrial oils, i.e., palm and palm-kernel. Between 1924-28 and 1934-38 exports of coconut palm products increased 21 per cent while oil-palm products gained 57 per cent. The war caused a decline in both. It was not until 1949-51 that exports recovered to exceed 1938 levels: palm and palm-kernel oil in 1949 (840,000 long tons, oil equivalent, *vs.* 797,000 prewar) and copra and coconut oil in 1951 (1,288,000 *vs.* 1938 production of 1,170,000 tons). By 1956, exports of coconut palm products at 1,299,000 tons were about 10 per cent higher than in 1938, and oil-palm products at 938,000 tons were 18 per cent higher. The slower growth of demand for coconut products may be partly explained by the relative higher prices they commanded; in 1957 copra and coconut-oil prices were 6 to 8 times above those of 1938, while palm and palm-kernel prices were 5 to 7 times higher.

The oil palm is considered the most efficient crop for satisfying the world's vegetable oil demands because of the low cost per unit of oil produced, but it requires a relatively heavy investment in processing equipment (15, pp. 427-48). It appears unlikely that the traditional place of the coconut in native agriculture will change even though other vegetable oils may serve increasingly to supply Western markets. However, unlike a number of other important oil-bearing crops, there has been no significant expansion of coconut culture in new areas during recent years (16, p. 8).

The future course of copra and coconut-oil exports is clouded by the postwar decline in soap output as detergents became increasingly popular, and by the substitution of cottonseed, peanut, and soybean oil in margarine manufacture. About one-fourth of United States consumption of coconut oil (60,000 tons annually) goes into industrial and military uses (16, p. 43). Over a period of years the relative importance of end-uses of the oil has changed, sometimes from year to year, and usually from one importing country to another, owing to price instability and price relationships with competing or substitutable fats, and to government-imposed obstacles to trade such as quantitative controls, tariffs, and import and export taxes.

FAO experts see "little prospect of more general mechanization in coconut

growing or copra preparation," but feel that "the scope for improvement in yields and productivity in the coconut industries probably offers greater opportunities of over-all gain than would any conceivable movement of land and capital from one export crop to another" (16, pp. 16, 19). It seems likely that a strengthening of the competitive position of coconut oil will come only with such improvements as will lower unit costs and permit reduction in the high price level that has prevailed since the war. Whatever happens, copra and coconut oil will doubtless continue to dominate the trade in vegetable oils for some time to come, and remain representative of the type of crops especially well suited to peasant cultivators.

#### CROPS LEAST SUITED TO SMALLHOLDER PRODUCTION

If a tropical export crop must be planted on a large scale to provide a marketable bulk or quantities sufficient for economic quality processing, it is clearly better suited to large-scale plantation enterprise than to smallholder production. Few tropical export crops are salable in their raw state: most require factory-type processing before they are exportable. Cocoa and copra, as previously noted, may be readied for shipment quite simply and without loss in quality, on a small or a large scale, by peasant or plantation, and with a minimum of capital equipment. A crop like tea, on the other hand, which becomes "commercial" in international trade almost entirely as it is made into "black" tea, presents altogether different problems of production and preparation for market. It is the major crop least suited to smallholders and is, therefore, selected as suggesting one of the less favorable environments for the peasant farmer.

Although a minor crop, sisal is usually singled out, along with tea, as a least likely prospect for smallholder production. The reason: this is another crop that must be grown on a large scale in order to provide a marketable bulk in quantities sufficient for economic machine processing.

#### *Tea and the Smallholder in Ceylon and Java*

Fermented "black" tea requires machine manufacture and this, together with the strict requirements of successful cultivation, makes the crop eminently well suited to plantation production (10, pp. 161-63, 178-81). Careful withering and fermentation are of prime importance in developing good flavor characteristics in tea. The capital equipment needed for processing and the technical skills involved are ordinarily beyond the resources of the peasant farmer.

In large-scale production necessary for the economic tending, harvesting, and processing of tea, there is need for many workers, easy access to the factory for processing within a few hours after plucking, and skilled supervision. Except for blending and packaging in the country of consumption, tea is a finished product when exported, unlike such commodities as coffee, cocoa, and rubber, which must undergo additional processing after overseas shipment. As evolved under the plantation system and foreign capital, the black-tea industry is based upon ample labor, scientific cultural practices, an efficient transportation network, more than an ordinary amount of machinery, and marketing facilities and contacts—all difficult for small growers. While smallholders are of some im-



portance in Ceylon and Java, in world exports of tea the smallholder's share is perhaps only 2 or 3 per cent of the total.

As with sugar, bananas, and coffee in many countries, the tea smallholder may succeed in growing an export crop requiring careful processing or special handling and marketing facilities when he is located near an estate which is willing to absorb his output (in the form of wet leaf, i.e., freshly plucked but undried tea). Unfermented "green" tea, on the other hand, remains predominantly the product of peasant farmers in China and Japan, but is now of trifling importance in international trade. It is simple to prepare, the main operation being steaming or drying in order to kill the enzyme responsible for fermentation. There is little demand for green tea in Western markets today owing to the long rise of the modern industry under European auspices in India, Ceylon, Indonesia, and British East Africa, and because of the strenuously cultivated and organized world markets for the more flavorful black tea.

After India, Ceylon is the most important producer of tea for the export market. Only about 73,000 out of a total of approximately 570,000 acres under tea (12.8 per cent) were cultivated by smallholders in 1956. (The Census of Agriculture 1952 had reported small holdings at 111,181 acres, or 19.6 per cent of total tea acreage; 17, pp. 5, 7.) The view of J. Lamb, then director of the Tea Research Institute of Ceylon, was, however, that "far too many tea small holdings are in a state which disgraces even the generally low standard of peasant agriculture" (18, p. 206). He gave two main reasons for this condition: 1) traditions of shifting cultivation persist despite comparatively dense and settled populations, resulting in "the disastrous system of cropping soils to their exhaustion point"; and 2) improper plucking prevents sound growth and maintenance of foliage, yields a poor quality product, and results in successively lower outturn through over-cropping. He believed that the peasant farmer was not sufficiently skilled to manage a tea garden and that "peasant agriculture should be restricted to the growing of crops which do not require continuous attention, for the average peasant will not apply himself to such tasks" (18, p. 207). Without sufficient foliage (as a result of over-plucking) no response from fertilizers occurs. Not mentioned, except in connection with the prospects of cooperatives, is the processing of the smallholder's harvest.

Although smallholders have some 13 to 20 per cent of the tea acreage of Ceylon, their share in production and exports is certainly much smaller because of the low yields they obtain. The Census, which enumerated about 93 per cent of total production, reported a total of 304.7 million pounds of manufactured tea in 1951 of which only a little more than 1.8 million were "bought leaf," i.e., supplied by smaller estates and smallholders (17, p. 8). From the experience in Java, where small native holdings are more numerous than in any other important tea-exporting country, it appears unlikely that smallholder representation in Ceylonese exports could have been much higher than in production.

Indonesia remains the third ranking tea exporter of the world, but on a greatly reduced volume. Between 1939 and 1957 total Indonesian tea production fell from 183.6 to 103.5 million pounds of "made" tea, and exports from 162.1 to 85.7 million pounds. The industry is concentrated in West Java. Peasant holdings of tea were officially estimated at about 185,000 acres in 1940 or 35 per cent of total tea area of all Indonesia. Since 1940 there have been no

estimates available on peasant holdings (there is no Indonesian record of any peasant areas outside Java), but their production and share in exports have been reported. Inasmuch as Indonesian estate holdings declined from 345,700 acres in 1939 to only 190,100 in 1957,<sup>2</sup> it would seem reasonable to suppose that the peasant proportion of total production increased. However, the official production and export record does not confirm this, for the share of smallholders' "bought leaf" has declined since the early 1950's. The chief explanation seems to be that indigenous tea growers were not able to combat the destructive forces of "blister blight" disease as successfully as the estates.

When the peasant farmers of Java held 35 per cent of the total tea acreage of Indonesia in 1940, they accounted for 18 per cent of the volume of tea exports. Disregarding extreme fluctuations occasioned by the war and the early postwar period of adjustments, the smallholders' share in 1954 was still 18 per cent on a considerably reduced volume of total exports, but thereafter the proportion fell rapidly to 12 per cent in 1955 and to 8 per cent in 1956 (*19*, p. 6), while estate output and exports remained steady.

The decline in output and exports of Indonesia over the longer term reflects the extensive destruction of tea estates and factories during and following the war. Postwar civil strife and high labor costs discouraged the reopening of tea estates. Some were divided into small holdings which subsequently supplied estate factories. According to Allen and Donnithorne: "This tendency towards vertical disintegration by which growing was separated from processing was encouraged by the government in this industry as in the sugar industry. . . . So far, however, government activity . . . has not provided any adequate compensation for the decline in private enterprise" (20, p. 105). Nor does it seem likely that it will be able to do so. At the same time, with the tendency toward separation of growing from processing, the statistical decline of the smallholder may be fictitious, as leaf bought from native growers but processed and sold (exported) by estates may be credited to estate production.

In any event, there is no evidence of an upsurge in smallholder tea production for the export markets of the world. In fact, generally throughout the tropics, the outlook for the smallholder in the commercial tea industry does not seem promising. Aside from his lack of technical knowledge and capital equipment needed for successful production, he has little appreciation of consumer tastes in overseas markets, and he lacks the trade contacts which might compensate for such deficiencies. Government efforts to assist growers seem likely to be inadequate.

Furthermore, with the prospect of increased mechanization of the industry in order to combat constantly rising labor costs, e.g., mechanical instead of hand plucking, the small grower may well encounter new circumstances tending to undermine whatever competitive advantages he may have enjoyed in the past. New techniques in the field and factory (*10*, pp. 435-40), some of which are still to be perfected, tend to favor the plantation system of production over that of smallholders. Timing of cultural and processing operations are far more important with tea than with a crop like cocoa.

<sup>2</sup> According to statistics compiled by the International Tea Committee, the area planted by estates in Java in 1939 was 263,600 acres, and in Sumatra 82,100 acres. By 1956 these figures were down to 150,900 and 39,200 acres respectively.

*Sisal: a Minor Crop Mostly Plantation-Grown*

In the opinion of Sir Alan Pim, who in 1946 published an able review of the respective contributions made by native peasants and by foreign enterprises to colonial agricultural production:

A lesson to be learned from the history of commercial and industrial agriculture . . . seems to be that no definite or permanent line can be drawn between agricultural products as regards suitability for plantation or peasant methods of production. Except sisal—and in most countries tea—there is no important crop which is monopolized by plantations . . . (21, p. 177).

However, since Sir Alan made his observations even sisal has been cultivated and processed by peasants in Kenya on a modest scale as the result of a government subsidy and high prices.

Sisal is grown primarily in East Africa (chiefly Tanganyika), but also in West Africa and Central and South America (especially Brazil). British East Africa produces 50 to 60 per cent of the world sisal supply. The greatest expansion in hard fiber output, inspired originally by the wartime shortage, has been in sisal. Because sisal requires 3 to 4 years from planting to fiber production, world supplies in 1941-45 of 512 million pounds were not much greater than the prewar (1934-38) average of 507 million; but thereafter, as shortages continued, sisal output grew until in 1955 it was about twice the prewar volume. Indonesian production, which was second only to British East African before the war, declined drastically, but this was more than compensated for by the notable increase of output in Brazil (now the second leading producer) and by substantial extensions in Angola, Mozambique, Haiti, Madagascar, and Venezuela.

There may be some lessening of importance of the plantation system in the production of abaca and henequen, but the predominance of sisal in the hard fiber group is now so great that it is probably still accurate to define the hard fiber industry, as did an FAO report in 1947, as "almost entirely a large-scale plantation industry involving substantial investment in plant equipment and transport facilities."

In British East Africa it was estimated that before the war the cost of planting, equipping, and bringing into production a one-unit estate was about £60,000; in 1950 the cost was estimated at 50 to 75 per cent higher (22, p. 187). Acreage requirements for supporting the necessary processing equipment were about 2,700 per decorticator. V. Nash estimated the minimum economic output for a decorticator at 1,200 tons annually. On the basis of a yield of 1 ton of fiber per acre per year over a productive period of four years (allowing three years to come to maturity) he calculated acreage requirements for 1,200 tons of fiber as follows: mature sisal, 1,200; immature, 900; annual planting, 300; fallow, 300; a total of 2,700 acres (22, p. 186).

A more recent estimate placed capital requirements for an economic sisal estate at £75,000 to £120,000 before the war and £250,000 to £300,000 in 1950 for a minimum unit producing 1,000 tons annually (23, pp. 7-8). A minimum area of 2,700 acres was considered necessary to keep one unit of machinery employed.

However considered, there is no question about the desirability of truly large-scale operations in the economic production of sisal. Only 2 to 5 per cent of fiber is obtained from a given weight of leaf; it is therefore apparent that great quantities must be conveyed to the processing machines—preferably within 48 hours after cutting in order to prevent plant juices from becoming gummy and thus complicating fiber extraction—and that almost equally large residues must be transported somewhere and disposed of. These circumstances place a premium on transportation, on level land for plantations, and also upon adequate water resources to supply the heavy water requirements of the decorticating process. If decortication could be done in the field, the transportation burden could be reduced, say, from 100 tons of leaf to 3 tons of fiber daily, but thus far no method of field processing has proved successful (22, p. 184).

Sisal is grown from sea-level up to 6,500 feet in East Africa, but there are obvious limits to the number of large level tracts needed for easy field transportation, whether by rail, truck, or cart. These tracts must be cleared by the most economical methods. Machinery is being increasingly used as labor costs rise, and plant spacing is also being adjusted for mechanical cultivation. In addition to the growing area itself, a sizable drying area must be provided if drying is by sun, which is the usual method. (A few estates dry artificially and produce a better product than that resulting from ordinary sun-drying.) Factory waste may be used as manure, fuel, a source of alcohol, or sometimes in building materials. However used, transportation is again involved, and this requires volume operations if unit costs are to be kept low. Volume operations dictate the organization of a sisal estate: it must be virtually a self-contained community of perhaps 1,000 persons.

Thus, sisal will probably continue to be a heavily capitalized large-scale plantation industry, not only because of the waiting period involved for plants to reach maturity, but because of the need to clear land and to provide a factory, transportation facilities, and a good water supply. The complexion of the industry could change radically if field-operated decorticators were perfected, but these would undoubtedly still involve capital expenditures beyond the means of smallholders. Cooperative arrangements might be worked out, however, as in sugar where one factory sometimes serves the needs of numerous small growers located in the immediate producing area.

Clearly the area necessary to cultivate in order to secure marketable bulk and the capital investment involved would seem to discourage peasant production of sisal. However, in the 5-year (1954-58) "Swynnerton Plan" to intensify the development of African agriculture in Kenya, United Kingdom loan funds were made available for peasant production of sisal, as well as coffee and tea. Native production increased from about 156 tons in 1951 to 536 tons in 1954 before a recession in the industry set in which had not been reversed by 1957-58, according to the annual reports of the Land Development Board.

Sisal fiber was processed by hand and sold to plantation companies for export, but the preparation and quality of product was sub-standard. Control by the Kenya Sisal Board was instituted with effective results, and a factory was built by the smallholders. By 1955 the East Africa Royal Commission was able to report on the Machakos African Sisal Scheme as "producing an excellent quality

of sisal marketed under its own trade symbol," and added that there seemed to be no reason why this success could not be repeated in other areas (24, p. 321).

Small sisal growers were soon to learn more about the economics of sisal production as output in 1955 fell to only 258 tons, or less than half that of the previous year. *African Land Development in Kenya* (1955-56) reported that the native industry could continue without subsidy only if the factory could be kept working at a rate of 100 tons per month. It was not until July 1956 that this target was reached for the first time. Meanwhile, it was reported that some 19 raspadores (small hand-operated machines for extracting the fiber) were in use, but women were still hand-decorticating "a fair quantity."

Minute as smallholder production of sisal is at present, future developments may tend to make the crop more appropriate for peasant farmers. This is not, however, an early prospect.

#### SATELLITE PRODUCTION BY PEASANT FARMERS

The term "satellite production" is used here to describe the output of those crops which can be grown, processed, and marketed successfully by the smallholder only because of proximity to existing large-scale enterprises engaged in the same business. A number of tropical export crops are generally suited to the smallholder only if he receives some form of outside assistance. This assistance may take several forms, but usually it involves a sort of pace-setting by more experienced and knowledgeable agencies, private or public.

With such crops as sugar cane and bananas, however, the smallholder has achieved importance by adopting some of the traditional plantation production procedures. With both crops, assistance in growing may be provided—ranging from selected planting materials to cultural practices such as spraying—by the neighboring plantation which purchases the smallholder's output, by government agencies, or through grower cooperatives, frequently state-sponsored. The most important outside service supplied the small-scale sugar grower, however, is the central factory for processing his crop while still at its prime—say within 24 hours after cutting. Likewise, the most essential outside service for the peasant banana grower is the provision of marketing facilities which will permit his perishable product to reach consuming centers in salable form.

#### *Dependence in Sugar Cane Processing*

Sugar cane, long a plantation crop, is grown in many scattered places throughout the tropical world. Cane accounts for most of the sugar entering into international trade. (Beet sugar is grown primarily for domestic consumption in nontropical countries.) The bulk of world trade in sugar today is within a framework of special marketing arrangements between exporting and importing countries. The smallholder has a place in production, but it is similar to that of the peasant grower of tea in that he is dependent upon estate agriculture for central processing facilities. Although the importance of the smallholder varies widely, depending upon the production pattern of a particular sugar-growing country, his contribution to over-all output for export purposes is substantial—certainly far more so than that of the tea smallholder.

In terms of the role of plantation agriculture in various cane regions of the

world, Timoshenko and Swerling present an interesting tabulation showing a wide range (in terms of acreage or production) from 3 per cent plantation representation (Fiji and Queensland) to 90 per cent and above (Hawaii, British Guiana, Java), with a 40 to 85 per cent range in the Caribbean islands (25, p. 72). The plantation system of producing cane sugar has certain obvious advantages, not the least of which is the high yields obtained in contrast with the smallholder who tends to neglect or ignore proven cultural techniques. (Yields of smallholders are about one-half those secured by estates.) Where the smallholder accounts for the bulk of output it is usually found that social adjustments have been made in a manner that places him in a relatively independent position quite different from hired estate labor.

In Hawaii, the second-ranking exporter, where the sugar industry is dominated by fewer than 30 plantations, there is nevertheless some smallholder production. Such a grower is there known as an "adherent planter," cultivating 10-12 acres on the average.

Adherent planters are able to succeed only with the plantation's backing and the use of its heavy equipment, which is available to them without any investment on their part. . . . The adherent planter . . . is a small-scale operator who could not exist were it not for the magnitude of Hawaii's sugar operations (26, p. 34).

The adherent planter system originated during the early part of the present century when some plantations, mostly on the island of Hawaii, offered land to employees interested in growing cane for themselves. The Hawaiian Sugar Planters' Association records (26, p. 33):

It was a mutual undertaking. The employee had the opportunity to become a planter during his spare time and earn extra income, while the arrangement helped to promote stability in the plantation's labor force.

The adherent planter, however, did not work as an employee. He was an individual acting as a kind of contractor. The plantation, in effect, set him up in a side business by furnishing land and the use of its equipment. It also gave him financial assistance. The adherent planter, in return, helped the owner to increase production and shared with him the proceeds from the cane grown on the plantation land.

The Hawaiian sugar planter's view and attitude are expressed by this summary paragraph from the source cited above:

More than a century of experience has proved that the individual plantation in Hawaii to survive must be large, in order to take advantage of the economies possible only in large-scale operation, with costly and heavy field equipment. An attempt was made several decades ago to break up a large plantation into small units and mill cooperatively. The experiment proved a complete failure. . . .

The Hawaiian record of accomplishment in efficient cane-sugar production is outstanding. The "adherent planter," however, is probably responsible for no more than about 5 per cent of the cane acreage. Although this system appears

to be of minor importance in the sugar-production pattern of Hawaii, it is essentially the formula worked out over recent decades in a number of Caribbean sugar islands, where independent farmers (*colonos*) have increased their contribution to total cane output.

The first- and third-ranking sugar exporters, Cuba and Puerto Rico—and several lesser ones—are in the West Indies. The sugar industry in the Caribbean has been described as “a study of contrasts.” Great progress has been made in disease control and the appropriate use of fertilizers, but “only limited” progress in “mechanization of cultivation and centralization of production” (27, p. x). The Caribbean Commission noted some advances in centralization of processing over recent decades, increasing the efficiency and importance of the factory at the same time that small producers were taking the place of large plantations in growing the crop, but did not consider such progress impressive.

Generally the sugar central has become the economic and social core of the entire community in many producing countries “to the point where the manufacturing enterprise was on a par with the constituted political authorities as an instrument of local government. This was not an environment in which relationships between growers and laborers, on the one hand, and the mill, on the other, might be expected to work well on a purely market basis” (25, p. 71). Adjustments have been made, with a tendency for the corporation to do less growing and depend more on the smallholder for supplies necessary to keep mills operating at seasonal capacity. Eric Williams observes (28, p. 5):

Today the importance of the sugar industry in the British West Indies would be jeopardised if the small scale farmer was eliminated. In 1942 there were nearly 9,000 cane farmers in Jamaica; in 1948 there were nearly 10,000 in Trinidad. The cane farmers supplied 37% of all the cane produced in Jamaica and 35% in Trinidad.

In Barbados there were 18,000 holdings under 1 acre in size and another 3,900 between 1 and 3 acres (27, p. ix).

Sugar cane is grown on more than half the cultivated area of Cuba by about 40,000 independent farmers (*colonos*) who produce around 90 per cent of the annual crop. The remainder is “administration” cane grown by the companies operating the sugar mills. The *colonos* usually contract to sell and deliver to the 161 centrales (as of the mid-1950's). One-fourth of these are owned by United States interests and account for something over two-fifths of Cuba's sugar output.

The percentage of sugar cane grown by *colonos* in Cuba has increased from about 70 in 1905 to the present 90 per cent (29, p. 99). These farmers' holdings are generally described as “relatively small.” However, in comparison with the more typical 8 to 12 acres held by small farmers in other cane-growing countries they are fairly large.<sup>3</sup> Land is abundant and comparatively cheap in Cuba.

<sup>3</sup> Summary data presented in the *Anuario Azucarero de Cuba 1949* (Havana) on the distribution of cane production by growers (p. 167) reveals that 68.5 per cent of the total number of *colonos* produced 10.1 per cent of the cane, another 22.2 per cent produced 15.1 per cent. In other words, of some 40,000 independent cane farmers, about four-fifths of the total number produced about one quarter of the cane. Their output ranged from under 30,000 to 100,000 arrobas. Translated (an arroba = 25.358 pounds, and cane yields in the mid-1950's were about 20 short tons per acre), this suggests holdings up to about 60 acres in size—certainly not tiny in comparison with small holdings in other

hence the industry tends to be characterized by extensive cultural methods and low yields. In 1945-55 sugar yields in Cuba averaged 2.0 long tons per acre compared with 2.7 in Puerto Rico, 9.0 in Hawaii, 6.0 in Indonesia, and 2.4 tons in the Philippines.

The production pattern in the Philippines, the fourth ranking sugar exporter, is also one where sugar-cane cultivation has always been and remains chiefly in the hands of native smallholders, reflecting Spanish colonial rule and later American policy limiting the size of land holdings. Legislation adopted in 1902 by the Congress of the United States was an effective curb on large-scale plantation agriculture, and explains the relatively small foreign investment in agricultural schemes in comparison with countries like Indonesia, Malaya, and Ceylon. However, small mills were gradually replaced by large factories, the centrals, a development which did attract foreign investors.

According to Charles Robequain (30, p. 358), direct cultivation of the soil by the owner of the central is exceptional in the Philippines, while in Java it is the rule. The refinery owner has a contract with the proprietor of the cane-fields, often a *mestizo* who lets out his land to be worked by tenant farmers. Sugar cultivation in the Philippines, in short, is in the hands of more than 20,000 native tenants.

According to the 1948 Philippine Census of Agriculture there were 12,522 sugar-cane farms, about 42 per cent of which were under 5 acres in size, 51 per cent 5 to 25 acres, and only about 7 per cent over 25 acres. The average sugar-cane farm area, however, was calculated at 9.9 hectares, 7.1 of which were cultivated.

From the above brief review of the leading sugar-cane exporting countries and the organization of the industry in several of them, one may conclude that although no hard and fast lines can be drawn as to suitability or desirability of peasant *vs.* plantation type of production, the outstanding fact remains that speedy processing of newly cut cane requires facilities beyond the resources of the individual small grower. However, government agencies or farmer cooperative groups may in time perform the function of the central factory which is now generally operated and controlled by corporate-type enterprise.

Since sugar-cane cultivation and processing call for entirely different types of technical management, a system has developed whereby large factories obtain a portion of their raw-material supplies by contract with small growers. Quality is maintained by government or factory supervision of cultural operations. This is a far cry from the original plantation system of producing sugar using slave or, later, hired labor. Despite the mechanization of factory operations, similar advances in the field have been slow in developing (except in the Hawaiian Islands where irrigated fields can be dried out, thus permitting the use of heavy machinery), leaving the labor costs for cultivating and harvesting sugar cane one of the highest proportions of total costs of any tropical crop.

The range in size of so-called small holdings in sugar cane also suggests that

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Caribbean islands. Over two-thirds of the farmers apparently cultivated less than 20 acres. Much larger holdings by colonos—more than about 1,000 acres—are indicated as accounting for 22.8 per cent of cane production. Administration, or mill cane, accounted for only 8.9 per cent of cane output for the year cited, presumably 1948 or 1949.



official classification of peasant and plantation cultivation may commonly be based upon nationality of ownership rather than upon form of organization for production. As central sugar mills have grown in capacity they have needed many thousands of acres of cane to draw upon for economical operation, whereas a few hundred acres were sufficient when mills were smaller.

*Bananas: Dependence upon Large-Scale Integrated Organization*

Bananas are grown in most tropical countries, but production for export is confined largely to a number of small countries in Latin America. Owing to the vicissitudes of weather and disease, leadership in exports tends to shift frequently, e.g., from Jamaica (1934-1938) to Honduras (1946-1951) to Ecuador (since 1952).

Cultivation of bananas in Middle America has been based upon a relatively impermanent system of agriculture. The problem of banana disease largely explains the shifts of operations from one area to another, and the need for large holdings. Banana-growing for the export market has long been considered almost exclusively a plantation enterprise.

Few tropical food crops have sufficiently high and valuable yields to justify the capital investment that is involved in banana production and marketing. The establishment of a modern banana division of 20,000 acres "can easily cost from \$20 million to \$25 million in initial capital investment, or from \$1,000 to \$1,250 per banana-producing acre" (31, p. 90). Such a division will be divided into farms of up to 1,000 acres, each of which will be organized as a separate producing unit with its own operating and living facilities.

A checkerboard of roads, ditches, and bridges covers each farm, and all farms are interconnected with roads and narrow-gauge tramways or railroads along which steam, diesel, or gasoline powered rolling stock carries in materials, fertilizers, equipment, supplies, and work force, and over which the harvested fruit moves out. All are interconnected, too, by power, electric light, and telephone lines. The transport and communications network binds the several farms to the division center . . . a complex of central offices, staff headquarters, railway yards and shops, equipment depots and machine shops, power plants, commissaries, houses, recreation buildings, baseball and soccer fields, telephone and telegraph stations, schools, hospitals, churches, airstrip and terminal, slaughter house and dairy (31, p. 90).

Division headquarters constitute complete small cities, attracting other enterprises which use many of the companies' facilities. Such company-operated cities maintain the necessary contacts with the outside world.

The exceptionally heavy capital requirements for establishing and maintaining banana acreage, the encroachment of diseases that to date have forced successive shifts in the locale of growing areas, the recurrent blowdowns and floods that dictate multiple sources of supply as safety insurance, and the exceptionally demanding logistics of distribution for an almost uniquely perishable major trade commodity—all of these unite to make large-scale vertically integrated organization a condition of successful operation (31, p. 244).

Certain hazards are inevitable in operating an institution of the size and scope of the United Fruit Company, the dominant factor in the banana business. Some political and competitive risks may be anticipated and influenced; while others, such as weather, cannot be controlled. These considerations were undoubtedly fundamental in United Fruit's development, and preceded its entrance into political matters in the countries in which it operated. Disease control became a major problem, adding incentive toward spreading risks.

For several reasons, therefore, the structure of United Fruit's organization was bound to differ from other plantation enterprises. Tree-crop production, for example, in an environmentally favorable country with a stable government, which is also receptive to foreign investment, may be far less risky. In order to minimize such risks as weather, diseases, and political disturbances, diversification of operations geographically was a "must."

Experience provides a basis for planning, organizing, and minimizing risks of weather. The United Fruit Company figures that an average year will show losses of approximately 25 per cent of total production from blowdowns, floods, and diseases, even though it considers itself quite well hedged by the diversity in location of its producing areas (32, pp. 7-8). (Its principal banana holdings are in Costa Rica, Honduras, Panama, Guatemala, Ecuador, Colombia, Dominican Republic, and Jamaica).

Two banana diseases, Sigatoka leaf blight and Panama fungus disease, were largely responsible for the regular abandonment of old producing areas and the establishment of new ones. Sigatoka can be controlled even though the cost is sometimes high. In the 1930's scientists found that Bordeaux mixture (copper sulfate, hydrated lime, and large quantities of water) arrested the disease, but it was difficult of application on many scattered small holdings without ample water. Recently a new oil fungicide has been developed which "can be applied with a motor-driven knapsack mist sprayer. No pipeline system is needed and no water. In fact, the new fungicide cuts the cost of protecting a plantation from Sigatoka to a fraction of what it formerly was" (33, p. 7). Indications seemed to be that helicopter application on large plantations would prove even more efficient. However, a recent report by an official of the United Fruit Company indicates that "orchard oil" has a toxic effect on banana plants, and that it has been necessary (at greater expense) to return to the Bordeaux mixture treatment (34).

More destructive and difficult to control than Sigatoka is Panama disease. (It, however, attacks only the Gros Michel variety of banana—the popular type grown in Central America and Ecuador and marketed mostly in the United States.) The fungus cannot be controlled by usual measures. It infests the soil and remains virulent for many years, so that the reclamation of infected lands requires extensive flood-fallowing and silting for varying periods, at least for four months. "Apart from the requirement of an ample water supply, these measures are very costly and are not invariably successful. Moreover, they cannot be applied by owners of small plantations who have only the alternative of replanting with resistant varieties" (36, p. 12). Varieties resistant to Panama disease have been developed by selection from the Dwarf Canary banana, and belong to the Cavendish group. Cavendish bananas, however, have poorer com-

mercial and shipping qualities than the Gros Michel variety and hence do not enjoy the same market popularity.

Since Panama disease, unlike Sigatoka, has not been controlled, the time-span of banana production on a given piece of land varied from 5 or less to 25 years in the Caribbean lowlands. Eventually the period became so short, owing to the spread of Panama disease, that in the mid-1930's the United Fruit Company decided to shift its planting operations to the Pacific.<sup>4</sup> On the lands which it abandoned for banana production, such crops as cocoa, abacá, and rubber were planted, climatic and soil conditions being favorable for these crops. (Bananas are not soil exhaustive, their demand being for nitrogen, which is easily replaced.) Cocoa and also oil palms were equally suited to the Pacific side where some relatively new banana acreage was soon destined for abandonment as Sigatoka spread and unfavorably affected the quality of the fruit grown. In the newer areas in the Pacific, irrigation is needed for part of the year, facilities for housing and caring for labor must be provided, communications and shipping facilities must be established, disease control measures introduced, and similar matters attended to—all of which add to the cost of producing (and sometimes marketing) bananas.

The ramifications of the commercial banana business outlined above do not suggest great opportunities for the small grower, and explain why banana growing is still fundamentally a plantation business. Yet smallholders, by one means or another, have become increasingly important participants in such countries as Jamaica, Costa Rica, and especially Ecuador, now the leading banana exporter.

For different reasons in different countries a tendency for the large banana companies to shift growing responsibilities to small farmers gained momentum in the 1930's during depression years. But this did not mean that the smallholder could function without disease control and other services connected with growing and marketing, frequently including financing.

Today the usual arrangement is for the large operators to contract with local farmers to take all their acceptable fruit at agreed-upon prices. The companies set standards of quality, provide various services such as spraying for Sigatoka, and supervise handling and shipment, and are thus able to integrate and control all essential operations. So long as this arrangement works smoothly and farmers do not become dissatisfied with their bargain, the company may reduce its capital investment in growing and thereby minimize its risks.<sup>5</sup> Under the contract system, the small grower has supplied an increasing volume of fruit to the foreign companies operating in Central America. The smallholder and his country have profited from the presence of these outside interests, making liberal use of the services they provide. Such services—or many of them—may also be provided by government in conjunction with private enterprise. This is essentially the explanation of the phenomenal development of the banana industry in Ecuador since the early 1950's.

<sup>4</sup> See C. F. Jones and P. C. Morrison, "Evolution of the Banana Industry of Costa Rica," *Economic Geography*, January 1952, pp. 1-19. This article is essentially the story of United Fruit, which in 1955 had its largest banana holdings in Costa Rica—34,600 acres.

<sup>5</sup> Current policy of the United Fruit Company seems to be geared to obtaining supplies from supervised smallholders, minimizing plantation growing operations but accentuating scientific research on the crop and its problems (34).

*Bananas in Ecuador.*—Ecuador developed from a minor producer to the world's leading banana exporter in the short period of 1950-54. Unfavorable growing conditions in Central America provided the opportunity for many smallholders in Ecuador to go into bananas. The banana "fever" took hold in Ecuador about 1947, stimulated by high fruit prices, cheap agricultural credit, and a vigorous road-building program (35, p. 201).

Excellent tropical-forest soils exist along the coastal region of Ecuador, capable of growing a number of crops suited to the wet tropics. Rainfall of over 100 inches annually characterizes most of the area so that irrigation is not generally necessary. The region was rather inaccessible owing to lack of roads, and no large-scale agricultural developments had occurred before introduction of the banana. An extensive area of land was therefore in a virgin state, relatively free from plant diseases, and also from the wind-damage threat so common in the Caribbean area.

Because bananas are easy to grow, a quick return in a small capital investment was possible if various facilities were supplied. This was done largely by the government. The road-building program opened up the area, easy credit was provided, and no tax was imposed on exports. Private enterprise in the form of ample shipping facilities at low rates rounded out the main services needed by the smallholder. By 1954 planted acreage had grown to 12 per cent of all cropland—284,000 acres. Most of the new banana farms range in size from 10 to 30 acres. Smallholders now account for the bulk of exportable production, the plantation share being probably less than 15 per cent (35, p. 203). Exports amounted to 23.8 million stems in 1955. These shipments provided almost three-fifths of Ecuadoran foreign exchange, whereas in 1950 bananas were relatively unimportant in the national economy. But the boom in bananas was in some respects artificial, and by 1956 the industry was faced with readjustment problems.

Good world demand and relatively short supplies from traditional sources created outlets for Ecuadoran bananas that they would not otherwise have enjoyed because of their relatively poorer quality. Handling methods left much to be desired, and with the advent of Sigatoka, the Ecuadoran industry was faced with some of the same production problems as the Central American countries. The development of banana-growing in the coastal lowlands of Ecuador by smallholders presents a case not likely to be repeated. It is a unique example of an especially favorable set of circumstances which were capitalized upon. It will not be easy for Ecuador to retain its newly won position of contributing about 20 per cent of world exportable banana supplies without the capital and technical assistance which the plantation system has provided in other countries.

A smallholder banana industry could develop in Ecuador under the favorable environmental condition and with the various forms of assistance extended by the government. With the threat to the industry of Sigatoka leaf blight, however, further assistance to the grower must be provided from some source. Because of the large number of small farms, control of the blight is difficult and expensive. Any factors tending to increase production costs in Ecuador will also make for a poorer competitive position in relation to countries already employing elaborate irrigation and disease-control facilities.

Inasmuch as statistics on the commercial banana industry are generally but

poorly developed, except for trade returns, it is not surprising that very little specific information is available on the role of the smallholder in production for export. Banana and plantain production for local consumption is immense and is almost entirely in the hands of peasant farmers. But the fruit grown for the export market remains largely the product of large-scale, highly integrated plantation enterprises, with smallholders participating to an important extent only in some of the countries where these companies operate. This is likely to remain so, for with bananas "every stage, from plantation to retail sale, requires meticulous planning and coordination, upon a time schedule far more precise than pertains to any other major commodity of world trade" (31, p. 36).

Because of his dependence upon the plantation's facilities (or equivalent services) the small-scale producer of bananas will probably progress at the rate of plantation growth and the extension of the practice of arranging buying contracts for its supplementary supplies.

#### MIXED PRODUCTION PATTERNS

In the tropical crops which have been discussed thus far, it seems abundantly clear that the smallholder's role in production for export depends upon such factors as simplicity in cultivation of the crop, ease of harvesting, simplicity of initial processing, and availability of shipping and distributing facilities. But there are some crops, notably rubber and oil-palm products, where the relative advantages of one producing organization over another are not clear-cut or necessarily permanent.

These mixed patterns of production are of two types: one (rubber) in which smallholders and plantations do essentially the same things in the same areas, with success measured by prevailing economic and market factors; and the other (oil-palm products) where smallholders prosper under special conditions in one part of the world, plantations under different circumstances in another, and both exist side by side in still other places, with each having advantages that depend upon the demand for the end-product of the oil-palm tree and the efficiency with which this demand is met.

#### *Estate and Native Rubber Production*

Different circumstances and conditions of successful production have made cocoa primarily a smallholder's crop and tea one best suited to plantations. For rubber, the advantages of one system of production over another are not so demonstrable. Growing of rubber and local processing prior to overseas shipment are now considered comparatively simple processes well within the capabilities of the peasant farmer. The smallholder is not burdened by heavy overhead costs or dependent upon a large number of hired laborers as is the estate; and it is contended that "the economics of scale can only play a relatively minor part in rubber production" (37, pp. 333-34). But it was only after large capital expenditures and many years of experimentation and research that the Western estates in Malaya and Indonesia successfully established the industry on a basis which encouraged and permitted the peasantry to engage in rubber planting with a ven-

limited expenditure of real resources (20, pp. 106-38). Rubber, in fact, provides a classic example of the development of peasant agriculture for export by emulation of plantation enterprise.

Over the past several decades native production of natural rubber has increased to such an extent that it probably now exceeds that of large estates. So-called "native production," however, is not smallholder output as generally defined for most crops. In the two most important rubber exporting countries—Indonesia and Malaya—any holding of less than 100 acres is considered native, small, or simply nonestate, although in Ceylon, the third producer, the dividing line is 10 acres. Elsewhere, native holdings are typically only 3 or 4 acres in size.

Because rubber is second only to coffee in export value, and because native-grown production is so important, it seems reasonable to conclude, by these measures at least, that smallholder penetration into a business developed largely on a plantation basis is perhaps more significant and important than for any other tropical export crop.

World production of natural rubber has averaged just under 1.9 million long tons in recent years, over 90 per cent of it coming from Southeast Asia, chiefly Indonesia and Malaya. Output of smallholders is substantial in both countries, as indicated by data compiled by the International Rubber Study Group. Since 1948 these two countries alone have generally accounted for 70-74 per cent of world production with the share of small holdings running 63-68 per cent of the output of Indonesia (the world's largest producer since 1950) and 42-44 per cent of the output of Malaya (38, p. 18). Other important but secondary producers of Asia are Thailand, Ceylon, Viet-Nam, and Cambodia. Thai production is largely by smallholders: over 90 per cent of the area devoted to rubber is in small holdings averaging about 5 acres each (39, p. 57). And in the plantation economy of Ceylon small holdings have steadily increased since the end of the war.

Outside Asia the only rubber-producing areas are in Africa and Latin America. Output has been growing in Africa and now accounts for about 6 per cent of the world total. In Liberia and the Belgian Congo plantation production dominates, but in Nigeria the smallholder has had the field almost to himself until recent years. Latin American rubber output, largely concentrated in Brazil, has shown little growth from prewar and accounts for less than 2 per cent of the world total.

The smallholder's costs of producing rubber are low, largely because of the frequently exclusive use of family labor upon which no monetary value is placed. Even when outside labor is necessary it is commonly secured on a share basis without cash expenditure. From his investigations, P. T. Bauer reports (37, pp. 318-19):

The purchase of coagulants, the hire of a mangle, and local transport to the market, may involve very small cash costs, but even these can, if necessary, be largely dispensed with. Thus, many smallholders could almost be referred to as no-cost, rather than low-cost, producers. The owners of the larger smallholdings or medium holdings very frequently rely on outside labour. But they generally require labour for tapping only (often paid on a share basis) and their cultivation costs and overhead cost are very small.

The increasing output of peasant farmers, especially over the past quarter of a century, has resulted in a roughly equal contribution by estates and native small holdings to the world's supply of natural rubber. Although the native producer may secure a lower yield of latex per tree, his output per acre tends to exceed that of estates because of greater planting density and a tendency to tap heavily, especially in response to high prices.

Even though the smallholder's acreage may be constant, his representation in production and exports may vary considerably from year to year. Native producers have been slower than the estates to replant with high-yielding stock, but their holdings continue to multiply. Some of the newer acreage credited to smallholders has been created from the breaking up of estates.

Total area under rubber in 1954 was estimated at nearly 12 million acres *vs.* less than 10 million before the war (according to *Plantation Crops*, 1956), with Indonesia accounting for roughly 37 per cent of the total and Malaya about 31 per cent. Only estate acreage figures are now available for Indonesia, but estimates quoted by the Commonwealth Economic Committee suggest that the area of small holdings is "some three times" that of estates, while the acreage of estates has been at a postwar level almost one-third lower than prewar. Total area planted to rubber in Malaya is given as 3.7 million acres in 1953, of which 1.7 million was in small holdings, or approximately 46 per cent of the total acreage of the Federation *vs.* about 40 per cent prewar. Of the small holdings, four-fifths were under 25 acres.

In total output native rubber production in Malaya is of essentially the same relative importance as is native acreage in the total rubber area; and export representation is about the same as that in production, since very little rubber is consumed domestically. Malayan peasant output was estimated officially by the Chief Statistician, Federation of Malaya, at 273,368 long tons (dry weight) in 1956, or 44 per cent of total production, and 231,675 tons or 40 per cent in 1953.

Comparable output figures are not available for Indonesia, but official estimates of native production represented in exports are made each year. These show the growing importance of the smallholder and the greatest lead over estate production of any country. From 41 per cent of the total quantity of rubber exported from Indonesia in 1929, the native proportion increased to 49 per cent in 1939, to 60 per cent in 1949, and stood at 63 per cent in 1957 (19, p. 6). Rubber has been by far the most valuable product of Indonesia, accounting for approximately half the value of *all* exports in 1951, although more recently, with lower rubber prices, the percentage has declined to 45.6 in 1955 and 40.1 in 1956.

In Ceylon the total area under rubber has shown little change in postwar years, but the proportion of small holdings has steadily increased. (Under the Rubber Control Ordinance, holdings of less than 10 acres are considered "small" and everything greater is classified as "estate" rubber.) With total acreage around 659,000 in both 1946 and 1954, small holdings increased from 165,762 to 178,609 acres, representing approximately 27 per cent of the total in the later year (40, p. 9). If small estates of under 100 acres (owned mostly by Ceylonese) are included in the category of small holdings, as in Indonesia and Malaya, the percentage would undoubtedly be increased to roughly the same proportion as found in Malaya.

The three countries discussed above are the only important ones for which sufficient information is available to permit estimation of the importance of the smallholder in world rubber production. But these countries alone are estimated to have accounted for three-fourths of all natural rubber harvested in 1957. If Thailand (which displaced Ceylon as the third ranking producer in 1954 and where production is known to be largely by smallholders) is also taken into consideration, it seems likely that native output today is as important in world natural rubber supplies as that originating on large estates. The trend has clearly been toward increasing importance of smallholders located in the same regions of production as the estates.

Small growers of natural rubber seem likely to maintain and possibly increase their participation in production but are unlikely to replace the estate company completely. Plantation leadership and government assistance will be essential for a long time in efforts to combat the common threat of competition from synthetic rubbers which are constantly being improved. In the leading market of the world, the United States, vehicles consume about three-quarters of total rubber supplies, natural and synthetic combined. Only truck and airplane tires use as much as 80 per cent natural rubber; until the past few years, automobile tires used only 17 per cent. Since then, however, there has been a tendency toward smaller tires with an estimated requirement of 25 per cent natural, owing to extra wear from more and faster revolutions.

Market characteristics differ in other countries, but the inescapable fact remains that plantation rubber faces strong competition from synthetics which can be met successfully only by lower prices. More competitive prices will no doubt be achieved primarily by replanting on an extensive scale with high-yielding stock,<sup>6</sup> and only secondarily by improved cultural techniques and further mechanization.

#### *Oil-Palm Products: Diversity in Uses, Markets, and Production*

Another type of mixed production pattern is found with oil palms, but here smallholder and plantation dominance are found in quite different regions of production, i.e., the smallholder in West Africa, especially Nigeria, and the plantation in Southeast Asia, especially Sumatra and Malaya. Only in the Belgian Congo is the regional distribution not distinct: here the smallholder and plantation exist side by side. Despite developments of the past several decades which have witnessed a more rapid growth in plantation production than in that of peasant farmers, it seems probable that the smallholder is still the leading producer of palm products.

Table 2 (p. 56) lists the three major exporters of oil-palm products in 1955-57 as Nigeria, the Belgian Congo, and Indonesia, together accounting for 75 per cent of total world trade in these products. They are illustrative of three different production patterns: Nigeria, smallholders; the Belgian Congo, smallholders and plantations in the same region; and Indonesia (Sumatra), plantation production.

<sup>6</sup> The Firestone plantations in Liberia (reported to be the largest in the world) have been providing planting stock to local farmers since 1941. In this interesting case, private enterprise has assumed the role that government pursues in the principal producing countries. By 1958 there was enough smallholder acreage in production to provide Firestone with 4,500 tons, for which it paid over \$2 million. Thus, a pattern of satellite production was developing—long common with sugar cane and bananas.



Details of the exports of these countries by end-products point up the differences. Exports (in 1,000 metric tons) in 1955-57 averaged:

Item	World	Nigeria	Belgian Congo	Indonesia
Palm kernels				
Product weight . . . . .	764.3	437.1	32.8	39.7
Oil equivalent . . . . .	351.7	201.1	19.7	18.3
Palm-kernel oil . . . . .	65.7	...	44.4	...
Palm oil . . . . .	564.3	180.7	151.4	123.5
Total as oil . . . . .	981.7	381.8	215.5	141.8
<i>Per cent of world</i> . . . . .	<i>100.0</i>	<i>38.9</i>	<i>21.9</i>	<i>14.4</i>

Palm kernels were predominantly from Nigeria, palm kernel oil from the Belgian Congo, and palm oil from the three countries in order of ranking as exporters but with much less marked differences in the magnitude of shipments. Before the war Indonesia led in palm-oil exports but has not recovered its former position.

The palm kernels, which are easily shipped, go primarily to the United Kingdom and Western Europe where they are converted to oil. The United States and Germany are the principal importers of such palm-kernel oil as is processed in producing countries (mostly the Belgian Congo). Both French West Africa and Sierra Leone are more important exporters of palm kernels than is Indonesia but rank after Malaya (fourth) in oil-palm products as a group.

Oil-palm products are second only to coconut-oil products in the edible-industrial group of fixed or fatty oils (as distinct from volatile oils). Extraction of the oil, however, is more difficult. Palm oil is one of the world's leading vegetable oils, used extensively in the manufacture of edible fats (especially margarine), and also in the soap, candle, and tin plate industries. It is a rich source of vitamin A, important in the basic diets of West Africans. The nut or kernel of the palm fruit yields about 45 per cent oil which has similar end-uses although its properties differ widely. The residue (cake or meal) from the extraction of palm-kernel oil is used in livestock feeding.

The fresh fruit of the oil-palm tree thus yields two different end-products: palm oil and palm-kernel oil. Palm oil, obtained from the fleshy pulp of the pericarp, can be extracted by several simple hand methods, but the output is far less than that obtained from factory processing and the quality inferior. Like tea—and to a lesser extent, sugar—there is a premium on processing as soon as possible after harvesting to prevent the formation of free fatty acids which lower the grade and marketability of the oil produced. Extraction must be on or near the growing site—not a problem for the plantation, which is designed with this requirement in mind, but a real one for the smallholder with his scattered trees.<sup>7</sup> Palm oil of low fatty acid content can be used in the manufacture of edible fats and of tin plate, but lower grades (higher acid) go mostly into soap making.<sup>8</sup>

<sup>7</sup> For the smallholder and his scattered trees it is difficult to concentrate enough raw material rapidly to permit efficient operation of large, expensive mills. Smaller installations are being tried in Nigeria (Pioneer Mills) but they have not been outstandingly successful for essentially the same reasons. The general quality of Nigerian palm oil, however, has improved notably in recent years, owing to the exaggerated price premiums placed by the Marketing Boards on higher grades.

<sup>8</sup> Under the best conditions, free fatty acid content may be as low as 1 per cent, but under the worst conditions it may exceed 40 per cent.

The remainder of the fruit, the kernel, is not perishable and may be shipped abroad for processing in the country of consumption where the by-products, cake and meal, are valued for cattle feeding. Palm-kernel oil resembles coconut oil in chemical composition; both contain a large proportion of lauric and myristic acid which produces quite soluble soaps. Unlike palm oil, palm-kernel oil contains no vitamins.

The end-products of the oil palm differ in importance in the principal producing regions owing to the type of palm grown. The variety most common in Nigeria (*Elaeis guineensis*) has a thin pericarp but a relatively large endocarp which results in kernels, and ultimately palm-kernel oil, at the expense of palm oil. The trees—mostly wild—reach a height of 40 feet. Native growing, or more properly tending, is simplicity itself. On the other hand, the selected thick pericarp varieties cultivated on plantations in the Belgian Congo, Sumatra, and Malaya, give a high yield of oil relative to the tonnage of kernels produced, and require the attention given most tree crops. The cultivated trees are shorter, seldom exceeding 25 feet.

Palm oil produced by smallholders without expensive processing equipment, as in Nigeria, has a large domestic market for use in food, illumination, and other purposes. (Like the coconut palm the oil palm has many uses aside from the oil of the fruit.) That exported constitutes a true surplus after domestic needs are met. Kernels, on the other hand, are prepared only for the export market. In the plantation oil-palm countries, palm oil is the chief end-product and the main objective of the operation, although kernels and sometimes kernel oil are inevitable by-products.

The wild or semiwild oil-palm trees found in Nigeria occur either in scattered farmland plots, ordinarily owned by individuals, or in groves which are usually communal property. (Frequently cocoa is a competitive or alternative crop which has been more certain, easier to produce, and more profitable, especially in post-war years.)

The typical size of oil-palm holdings is small, apparently smaller than representative West African cocoa holdings. FAO reports on the 1950 World Census of Agriculture indicate that the Nigerian returns were not classified by size of holdings. A Nigerian census in 1931 gave the average area per cultivator as 2.7 acres in the Northern Provinces and 1.5 acres in the Southern. A special inquiry into the oil-palm industry in 1937-39 provides some details on smallholders which are undoubtedly applicable today.

The inquiry disclosed that in some densely populated areas the average acreage available per taxable male was as low as 2.18 for all purposes, i.e., houses, markets, roads, farmland, and including forest, river, and swamp. Four acres per taxable male was a more common and probably more representative figure. Small holdings in oil palms consist of a number of plots varying considerably in size.<sup>9</sup> In the Eastern Provinces, the most important producing area, they were much smaller than in the Western Provinces. "Approximately 50 per cent were under

<sup>9</sup> In cases cited by the author, A. F. B. Bridges (41, pp. 54-56), farmers owned or controlled under various arrangements as many as 5 to 7 plots, but these were so small that they might contain not more than 2 or 3 trees. In one case 13 plots with 20 trees belonged to individuals in the same family but not necessarily to the owner of the plot on which they stood. In probably an extreme case an individual owner held a single plot 6 x 20 feet!

half-an-acre, as against about 40 per cent of one acre and under in the West. There were moreover, in the Western Provinces, about 10 per cent over five acres, the balance being one to five acres" (41, p. 58).

The inquiry concluded that difficulties standing in the way of further development of the oil-palm industry in Nigeria were found to be mainly "physical and social—pressure of population on the land and native custom about the use and ownership of land and wild palms. In the Western Provinces there was also the economic difficulty of competing crops; the Eastern Provinces had the very doubtful advantage of being actively interested solely in the oil palm" (41, p. 54).

In an intensive study of 20 households in two villages of the oil-palm belt in 1952-53, Anne Martin observed (42, p. 7):

It is rare for one parcel of land to exceed half an acre, but one man may farm several parcels. They are irregularly shaped and often demarcated by a boundary line of cassava. The land immediately round the compound, . . . as distinct from "farm" land, is invariably cultivated and may contain raphia palms, citrus trees and coconut palms as well as plantains, okras, *ebre* yams, and fluted pumpkins. . . . Total holdings including compound land, averaged 1.4 acres, ranging from .2 to 4.9, and the average for the area is a whole is probably much the same. Each household farmed, on the average, four parcels of land, excluding compound land; the distance from one to the next might be as great as two miles. . . .

Clearly, such evidence as is available points to very small holdings as typical of the oil-palm economy of Nigeria.<sup>10</sup>

Few agricultural industries are based upon the exploitation of uncultivated wild plants such as the oil palm in Nigeria. Produce from the wild trees constitutes the main source of income for some 8 million people in the Eastern Provinces, but the tree is probably most important in the forest lands of the south where every part of it is utilized, much as the coconut palm is used in other parts of the world. For Nigeria as a whole, some 26 per cent of the value of all exports is accounted for by palm produce—kernels roughly 15 per cent and palm oil 11 per cent. With such an important stake in the industry it has been only natural for Nigeria to be concerned over the development of more efficient industries in the Belgian Congo, Sumatra, and Malaya.

The Nigeria Oil Palm Produce Marketing Board was established in 1949 and, aside from its buying and marketing functions, set out a program of fundamental research on the crop. Earlier efforts had been made to encourage replanting and replacement of wild palms with cultivated varieties, but for various reasons these efforts were not outstandingly successful. However, as competition from Sumatra threatened, some progress was made in establishing small native plantations. This was fairly simple, for the native producer dispensed with the cost of clearing. In

<sup>10</sup> Although of minor importance, there are some plantation enterprises in the thinly populated coastal districts of Nigeria and in the former German territory of Cameroons. Since World War II the Cameroons Development Corporation (a Nigerian government organization) has operated several types of estates, as has the United Africa Company, and a few individual Nigerians or European trading companies. In total, however, plantations in Nigeria are reported to have produced in 1956 only 12,000 long tons of palm oil out of a total of 189,000 (13, p. 114).

1928 there were only six of these "model plantations" with cultivated palms, but in 1935 there were 766, covering 609 hectares (43, p. 218). In any circumstance this could not be described as a large-scale operation, since holdings averaged under 2 acres.

In the Belgian Congo the development of the oil-palm industry originally depended entirely upon the processing of wild fruit from natural palmeries. Native-grown fruit is still the principal source of supply for the European-owned mills, but output of plantations of cultivated palms is growing in importance and is likely to be the chief means for further expansion of the industry. The *Huileries du Congo Belge*, under the control of the United Africa Company, has special rights of access to these palmeries under their various concession arrangements which, in turn, are controlled by the government, including the fixing of prices to be paid to native producers.

In the mid-1930's (1935) production of oil-palm products in the Belgian Congo by various methods of exploitation was as follows, in thousand metric tons (43, p. 221):

Palm oil		Kernels	
Palm oil from plantations.....	11.7	Plantation-grown kernels.....	5.7
Oil from fruits purchased		Kernels from fruits	
from natives.....	41.4	purchased from natives.....	23.7
Native palm oil.....	3.7	Kernels prepared by natives.....	35.5
	<hr/>		<hr/>
Total.....	56.8	Total.....	64.9

Twenty years later (1955) the production of palm oil had increased to 196,700 tons and that of kernels to 119,900 tons. Meanwhile the native share declined as plantation output increased. For 1954 the breakdown was, in thousand metric tons (44, pp. 45, 47):

Source	Palm oil	Palm kernels
Native produced.....	16.3	43.2
European produced.....	62.8	20.3
From native-grown fruit.....	115.5	55.4
	<hr/>	<hr/>
Total.....	194.6	118.9

Native participation in palm-oil production declined from roughly 79 to 68 per cent in the two decades, while kernel output declined from 91 per cent of the total to 83 per cent.

In the plantations of the *Huileries du Congo Belge* wild trees are being replaced by a cultivated variety known as *Deli*, which is common in Sumatra, or by a more recently favored variety known as *tenera* which yields thin-shelled fruit (45, p. 856). Similarly, in the natural palmeries efforts have been made over a period of years to replant with improved varieties. This has been done under European supervision. In 1955 about one-fifth of the total oil-palm acreage of the Congo was classified as "improved wild."

Cultivated palms have several important advantages over wild trees: much higher yields, earlier bearing age, and greater ease of cultivating and harvesting because they are set out and are shorter. The wild trees do not bear fruit until the trunk has reached considerable height and must be climbed for gathering, a prac-

tice the young West Africans seem reluctant to do. Although a 40-foot wild tree can be climbed in a minute, the cultivated variety does not need climbing when young or until the fruiting head is eight feet or more from the ground. (In some parts of the Congo native-made ladders are used when trees are not higher than about 25 feet.) The shorter the distance the fruit bunch is dropped after cutting the less chance of bruising, which contributes to the rapid development of free fatty acid.

Operating with cultivated palms under plantation methods has many advantages. These have been set forth specifically by the United Africa Company and may be summarized as follows (46, pp. 3-4):

(1) Observation of rate of growth and fruiting leads to selection of best types of seed for planting; (2) orderly planting in regular lines facilitates the control of weeds, develops shorter palms with thicker trunks and advances the bearing period to six or seven years after seed is planted; (3) harvesting can be carried out systematically, swiftly, and therefore cheaply; (4) systematic application of fertilizers is feasible under the plantation system; (5) transport to the processing center can be organized on the most economical basis; (6) a regular supply of fruit can be assured, justifying the erection of power mills for processing. These mills extract over 90 per cent of the oil content of a given weight of fruit, compared with only 45-50 per cent by primitive African methods. Furthermore, the oil is cleaner, generally has a lower proportion of free fatty acid, and is therefore of higher quality than oil produced by African methods; (7) the waste products of milling can be usefully employed in firing boilers and fertilizing the plantation.

In addition to these advantages it is contended that a "striking" economy of manpower may be achieved by plantation methods. "In a recent investigation it was found that the amount of human effort required to produce a given tonnage of oil from natural palmeries was at least three times that required to produce the same tonnage from plantations, the fruit in each case being milled mechanically" (46, p. 33). A manpower shortage in the Congo is given as another reason for favoring the development of the industry in the future along plantation lines. "It may well be that, except in times of acute world-wide shortage of oils and fats, much of the hard-earned fruit from natural palmeries will not be gathered; or at any rate will not reach the mechanical mills" (46, p. 33). As in Nigeria, there is extensive use of palm oil in cooking and for other purposes in parts of the Congo. These needs will doubtlessly continue to be filled primarily from natural palmeries and by native extraction methods.

In marked contrast with the smallholder oil-palm industry of Nigeria, and the mixed smallholder-plantation pattern of the Belgian Congo, operations in plantation-oriented producing countries are characteristically on a scale of many thousands of acres. Holdings of such size are necessary to support the rather elaborate and expensive estate facilities, including efficient processing equipment. The optimum size of an oil-palm estate in Malaya, for example, is considered to be 5,000 to 10,000 acres (47, p. 25); some estates are around 12,000 acres. In Indonesia the optimum size is lower, but the maximum higher.

In the third most important producing and exporting country, Sumatra, the oil-palm industry is almost entirely in the hands of large plantation enterprises.

Although oil palms were planted in Indonesia in the last century on an experimental basis, it was not until the interwar period that a great development took place in Sumatra which resulted in that island becoming the world's leading exporter of palm oil.

During the interwar period Indonesian oil-palm plantings expanded from 28,000 acres in 1922, to 150,000 in 1930, to 270,000 acres in 1940 (20, pp. 141-42). In the early 1930's nearly four-fifths of the acreage was on ten estates with over 2,000 acres, which was then considered the minimum size for economical operation. Some estates were immense—one had 16,500 acres in 1950 (20, p. 143). The successful development of the industry was attributed to the strong world demand for palm oil (especially from the United States), the good profits attainable, and the much higher yields of Sumatra palms in comparison with the West African.

Wartime and postwar disruptions prevented maintenance of Sumatra's position. The industry suffered severely from the Japanese occupation, mainly because of destruction of extraction mills. Shortages of new equipment and of plantation labor, political disturbances and uncertainties all conspired to discourage restoration of the industry. In the 1950's production and exportation of oil-palm products were substantially below prewar. Nevertheless, the official export record shows that all shipments have consistently originated on the estates (19).

Throughout its history in both Sumatra and Malaya the oil-palm industry has remained almost exclusively a plantation enterprise. Economical operation depends upon scale production and organization. Several thousand acres of palms are required to justify a modern factory. The construction of narrow-gauge railways for transporting the newly harvested fruit to processing centers can be justified only with large acreage. The movement of palm oil to market requires bulk storage and handling facilities. High yields in Sumatra support the somewhat elaborate organization of the industry. Yields are high because of the variety of palm cultivated, favorable growing conditions, efficient cultivation, and modern plants which extract twice as much oil as obtained by typical African methods.

Smallholders in Southeast Asia could presumably participate in the oil-palm industry through the establishment of cooperatives for transport and milling. If adequate capital resources were available, assuming availability of competent management, a pooling of resources might enable them to compete with the large estates. Thus far, however, there has been no evidence of interest in such a development, the peasant farmer preferring to grow coconuts and produce copra. As noted earlier, large-scale organization of copra production is not noticeably superior to smallholder enterprise.

#### COFFEE: A PLANTATION CROP WITH A SMALLHOLDER POTENTIAL

It is already clear that the smallholder is not precluded from the production of any major crop. Yet the degree of his participation depends upon a variety of factors differing from crop to crop which either increase his difficulties or his disadvantages in comparison with large-scale and more scientific methods of production.

In growing, processing, marketing, and financing—or some combination of

these functions—knowledge, capital, and size of holding have an important bearing on the risks involved and the ability of the smallholder to compete in the export markets. Similarly, for a number of minor crops the smallholder's position and potential depend upon the nature and requirements of the crop for successful commercial exploitation. Coffee, the most valuable export crop of all, illustrates this point.

Coffee has long been classified as a plantation crop because the bulk of world production has come from huge estates, or *fazendas*, as they are called in Brazil. Yet it is not the technical requirements of the crop that determine whether it may be grown best by smallholder or plantation methods. Historically, the modern coffee industry developed on a plantation basis in Brazil, where originally there was ample land and labor for large-scale exploitation, and a system of land holding that favored large-scale operations. Smallholders and plantations are equally equipped to care for the crop under present conditions of technology, and processing of the harvested cherries does not present insurmountable obstacles. Brazil still emphatically dominates the industry, but over the years its importance in world exports has declined as rival producers have stepped up their output.

Even before World War II Brazil still accounted for some 54 per cent of world exports and until 1952 one-half of the total, but in recent years the figure has been closer to 44 per cent. Meanwhile, shipments from Colombia, the second exporter, have expanded, and in the postwar period Africa has become an important supplier to European markets and also, to some extent, to the United States. In both cases smallholders have been important participants in the expansion.

In the coffee trade all growths are divided into two broad classes—"Brazils" (all coffees from Brazil regardless of type) and "milds" (all other coffees). This, however, is not a precise distinction, for botanically there are three main types of coffee: *Arabica* (most of Western Hemisphere production); a more hardy type, *Robusta* (a native of the Congo but widely grown elsewhere outside the Western Hemisphere); and *Liberica* (mainly from West Africa). In East Africa the term "mild" is applied, as it should be, to Arabica coffee prepared by the wet-pulp method, while the term "hard" applies to sun-dried coffee (usually inferior) and mainly to the Robusta type. The chief significance of these distinctions lies in the growing popularity of soluble coffee for which Robusta (nearly 80 per cent of African production) may be used.

Although the coffees of the Western Hemisphere are mostly Arabica, the "milds" of Colombia are considered more desirable and generally sell at a premium over Brazilian growths. The differences in coffees are accounted for by a number of factors, chief of which are the variety grown, cultural practices, and methods of processing the harvested fruit (see *10*, pp. 38-54). Cultural practices especially distinguish the intensive Colombian coffee industry, which is largely in the hands of smallholders, from the extensive Brazilian industry. Economy of labor leads the Brazilians to harvest all the crop at one time, whether all cherries are ripe or not, while in most mild-producing countries several selective pickings of only the mature fruit are common practice.

The so-called "wet" method of preparation, which generally produces a better product, involves equipment not required by the "dry" method. Price differentials normally exist between "washed" and "unwashed" or "natural" coffees which

are so described according to method of preparation. Years ago all coffee was prepared by natural drying—and this is still common in Brazil, although shifting to the wet method has been encouraged by the government since the 1930's. In the long run the dry method is uncertain and uneconomic and it is rapidly disappearing as trade demand shows a definite preference for washed coffees prepared by the "wet" method.

Preparation of coffee by the wet process requires special equipment and an ample supply of water. Pulping, fermenting, washing, and drying are the stages in the wet process prior to hulling or milling. Plantations usually possess the financial resources for this equipment, but the small grower must depend upon others, or use the sun-drying method. As transportation facilities have improved, however, the smallholder in Colombia and Central America has been able to sell his coffee to large cleaning establishments (*beneficios*) for processing.

Thus, in a way, coffee is a "satellite" crop for small growers. Yet the dependence upon facilities which are a normal part of plantation enterprise does not seem to be as great as in the case of sugar, bananas, and other satellite crops; hence the potential for the smallholder in coffee production. That this potential is recognized is apparent from the growth record in producing countries other than Brazil. In the five years before World War II Colombian exports were about 14 per cent of the world total, while in recent years they have fluctuated around 20 per cent; African exports were about 8 per cent of the total and are now more than 20 per cent.

Capital and labor requirements of coffee culture make the crop one well adapted to large-scale production. Yet the vast and well-publicized fazendas of São Paulo (Brazil) cannot be considered typical of the Brazilian coffee industry even though they are the most important factors in it. Almost half of all the coffee trees in that state are found on estates having from 50,000 to 300,000 trees each, and less than two dozen have a million trees or more; but over half of the estates have fewer than 10,000 trees (48, p. 94). In comparison with the plantations (*fincas*) of Colombia, however, even the smaller fazendas of Brazil are large. Some 87 per cent of all Colombian coffee farms, around 150,000 in number, have fewer than 5,000 trees, and only .2 per cent have over 100,000 trees (48, p. 95). The average holding appears to be about 3,000 trees on about three hectares (7.4 acres).

The area under coffee in Colombia in 1956 was estimated at 860,000 acres, excluding some 1,423,000 acres interplanted with other crops (49, p. 55); unfortunately, the lack of reliable statistics makes a comparison with the prewar acreage impossible. Some countries in Africa registered spectacular gains over prewar; e.g., in French West Africa (now the third most important exporter) acreage increased more than three times, while expansion in Angola was equally large. For all Africa, coffee production in 1956/57 was 72 per cent greater than in 1948-52, contrasted with only a 3 per cent increase for all Latin America during the same period (38, p. 16). Percentage-wise, the increase in African coffee production has been impressive, but in absolute terms the expansion in Latin America was actually almost twice as great.

The important increase in African coffee production in recent years, according to an FAO report (38, pp. 15-16),



could not have been achieved without energetic and efficient government support . . . . Encouraged by the high level of coffee prices obtaining since 1950, vast new areas were brought under production. . . . Until 1956, premiums were paid to subsidize new plantings. Support funds for coffee production were established in many territories and field extension services were expanded. Government nurseries to produce better and higher yielding strains were set up in all territories . . . . The rehabilitation of old plantings was undertaken . . . . African growers are encouraged to take up coffee growing co-operatives . . . . In the Congo and in Ruanda-Urundi, African smallholders are encouraged and even obliged to plant coffee in their co-operatives (*paysannats*) . . . .

In Africa the two largest coffee exporters are currently French West Africa (chiefly the Ivory Coast) and Angola. In both cases the type of coffee grown is largely Robusta, only a "very small proportion" of French African coffees being Arabica, and "less than one per cent" Angolan. In French African territories coffee is essentially a smallholder's operation, about two-thirds of the crop being produced by peasant farmers (45, p. 835); while in Angola Robusta production is predominantly by large estate farms, although growing by smallholders is officially encouraged (38, p. 17), and is estimated now to account for about one-fifth of total production (45, p. 836). Similarly, in the Belgian Congo Robusta (about two-thirds of total coffee output) is produced mostly by large estates.

Originally, all coffee in East Africa was grown by Europeans in the highlands, but with the introduction of more easily grown types, peasant participation has increased. Considerable Arabica coffee is still produced, usually by Europeans on estates located at elevations of 2,000 feet or more, where this variety does best with good soil and careful cultivation. Other varieties grow well from 2,000 feet down to sea level. This is the zone which has shown a steady increase in production by African farmers. Robusta is the usual type, being generally favored over Liberica and similar varieties.

Uganda is the most important producer and exporter of coffee in East Africa, with only about 9 per cent of output in Arabica. Kenya follows in importance and here coffee is mainly a plantation industry, although an increasing African participation is foreseen. "In the year ending June 1958 the area planted to coffee in the African land units of Kenya increased from 15,272 acres to 23,140 acres. The number of African growers rose from 57,210 to 83,452. As of last June, they were organized in 98 cooperative societies, which were operating 111 coffee factories and 223 nurseries containing 4,842,000 seedlings" (50, p. 12). Whatever significance these figures have, they indicate only a fraction of an acre per registered coffee grower, which is explained by the fact that coffee is commonly only one of several crops grown on a mixed farm. In many cases the registered grower may have only a few trees, but these may provide an important addition to his cash income.

In Tanganyika, the third East African exporter, an interesting development in smallholder coffee production has occurred on the southern slope of Kilimanjaro. Here natives grow coffee as their cash crop, and bananas for food and shade for coffee. They are well organized in the Kilimanjaro Native Cooperative

Union, which functions to assist in growing, marketing, and financing. Under such favorable conditions peasant coffee may be competitive, and the African's lack of capital is not the handicap that it would be to other East African export crops such as tea and sisal.

The smallholder seems definitely to be of increasing importance in African coffee production. High coffee prices, official encouragement of the industry, and the growing market demand for Robusta in instant coffees have all contributed to this development. In the United States only about 2 per cent of coffee imports in 1949 was used in the manufacture of solubles, while in 1957 this percentage had increased to 20 (38, p. 15). A trade estimate in mid-1959 placed the figure at 33 per cent.

Before the war Indonesia was the world's third most important exporter of coffee (mostly Robusta), a position not since regained despite substantial improvement in recent years. Coffee production has a long history in Indonesia. Although it was once predominantly an estate crop, the sharply fluctuating prices of the first 30 years of the present century caused a shift of interest to more promising crops such as rubber and tea. Native growers, however, found it profitable to continue with coffee. Their share in exports increased steadily; in 1929 they accounted for 73 per cent of the total. The drastic fall in coffee prices during the depression of the early 1930's and following years, owing to huge surpluses in Brazil, reversed this tendency. By 1949, native production, at 24 per cent of total coffee exports, was approximately one-third as important as 20 years earlier. Since 1952, and in a period of rapid change in Indonesia, native output has been rising at the expense of estates even though the latter continue to do much of the processing for the small growers. In 1952 some 74 per cent of Indonesia's exports originated with natives, and by 1957 the percentage had increased to 84, making coffee once again predominantly a smallholder's crop.

#### SMALLHOLDERS IN THE PLANTATION ECONOMY OF INDONESIA

The far-reaching changes which have occurred in Indonesia since the war have resulted in significantly influencing the agricultural production pattern of the islands. However, Indonesia is the only country with a diversity of major and minor export crops, plus a record extending over a period of years sufficient to suggest changes in the respective contributions of native and estate agriculture to the export trade in tropical crops. Indonesia may be considered as a case study. Here the range in crops grown is still probably greater than in any other country.

Until about 1870 all Indonesian agricultural exports originated with smallholders, more or less under European control. After slavery was abolished in the West Indies, and labor costs began to rise, attention shifted from the American to the Asiatic tropics for the production of newly appreciated tree crops such as coffee, cinchona, tea, and finally rubber. Following Ceylon, the Netherlands Indies came to the fore after the opening of the Suez Canal in 1869 and abolition of the Culture System a year later. The Culture System, introduced in 1831, obliged peasant producers to plant one-fifth of their land in crops (e.g., sugar, coffee, and indigo) designated by the government. They were required to deliver their output to government warehouses, partly in payment of taxes. It was a

system designed to force native production of export crops, but its success was limited and, beginning around 1870, the system was supplanted by private enterprise in the form of plantation production (51, p. 177).

Perhaps nowhere did Western capitalized and managed plantations become more important than in Indonesia before the war. Yet the native producer generally attained an increasingly important role in export crop production. Around the turn of the century European enterprises were responsible for about 90 per cent of total agricultural exports from the Netherlands Indies, in the 1920's about 70 per cent, and by the outbreak of World War II about 60 per cent. The rise of native agriculture is thus fairly recent. Native-produced crops now probably account for more than 50 per cent of agricultural exports, leading in rubber, copra, coffee, and tobacco. These four crops account for about 50 per cent of the value of *all* Indonesian exports.

The bulk of agricultural exports from Java formerly originated on plantations, but in the Outer Provinces native production provided well over half the exports, and established leadership over Java and Madura over 20 years ago. In 1933 the value of agricultural exports was divided 50:50 between Java and the Outer Provinces; by 1940 the ratio was 40:60. Meanwhile native-grown crops had increased in importance from about 11 per cent of exports in 1894 to 37 per cent in 1940. The gradual shift of both plantation and native export agriculture from Java to the Outer Islands,<sup>11</sup> and the rising importance of the smallholder, are two of the most noteworthy features of present-century agricultural developments in the islands.

Clearly the plantation development in the Indies after 1870 inspired native commercial production as certain estate crops, introduced from the outside, demonstrated their adaptability and profitability in world markets. In postwar years and since independence from Dutch control, native agriculture has become relatively more important as government policy has generally favored the smallholder and raised obstacles to further development of the plantation system. But even earlier, under the Dutch regime, the smallholder was receiving more attention and help.

For some crops native production seems not to be at a great disadvantage in competition with plantation output. In fact, in periods of adversity the flexibility in the native system offers real advantages. This feature, when combined with government assistance in the form of providing better planting materials, makes the smallholder a formidable factor not only in rubber production but in the growing of a number of other tropical crops. The tendency to favor small holdings may in some cases be misapplied to the detriment of the over-all export economy of Indonesia, but this is a matter now in the political rather than the economic realm.

Clear-cut distinctions in production are difficult, especially for "satellite" crops grown by natives but purchased from them by the estates and processed along with their own output. Furthermore, some smallholder's crops are com-

<sup>11</sup> In the Outer Provinces, where "shifting cultivation is the common form of agriculture the abundance of land and the relative scarcity of labor and capital have led the native . . . to concentrate on commodities that can be produced with a minimum of inconvenience, especially hevea rubber and copra . . ." (2, pp. 35-36).

sumed locally and thereby have a separate and distinct market.<sup>12</sup> While rubber overshadows every other crop (accounting for over two-fifths of the value of *all* exports, including petroleum and tin, in recent years), half a dozen other crops—copra, tea, palm oil, coffee, tobacco, and sugar—normally account for 2 to 5 per cent each, varying according to volume exported and relative prices. Only tobacco is primarily a temperate-zone crop, and of the eight major tropical export crops previously considered, only cocoa and bananas are not sufficiently important in Indonesian exports to qualify among the leaders. Peasant participation in the cultivation of minor crops, however, is even more important than in that of the major crops. This is suggested by a tabulation of official statistics which shows, for selected years, the percentages of total quantities exported that originated with smallholders (19, pp. 4-6, and earlier issues; figures in italics are values in million rupiahs):

Commodity	1929	1939	1949	1952	1957	1957
Pepper .....	99	100	99	100	100	95
Cassava products .....	...	56	2	81	100	13
Essential oils .....	62	85	100	99	99	21
Coconut products .....	90	94	97	98	96	490
Coffee .....	73	49	24	74	84	334
Kapok products .....	96	90	73	81	73	27
Tobacco .....	45	18	0	35	68	383
Rubber .....	41	49	60	61	63	3,984

Estate production dominated in the exports of the following crops (per cent of total exports):

Commodity	1929	1939	1949	1952	1957	1957
Oil-palm products .....	...	100	100	100	100	347
Cinchona .....	...	100	100	100	100	10
Cocoa .....	87	97	100	100	100	4
Hard fibers .....	...	100	93	99	100	49
Tea .....	78	83	66	81	92	340
Sugar .....	99	99	100	100	83	215

Over the longer period of more than a quarter of a century, for which such statistics are available, the data, with a few exceptions, generally confirm a classification of tropical export crops that might be expected from the technical requirements involved. They do not suggest the special circumstances which make coffee primarily a peasant crop and cocoa a plantation crop when, typically, they are just the reverse.

Before the war (1939) coffee, rubber, and tobacco were exported to a greater extent from estates than from native smallholdings, but during the Japanese occupation much land devoted to such export crops was shifted to food production. Later, during the period of civil strife, a movement of squatters onto estate

<sup>12</sup> Local consumption of so-called colonial products is usually quite small. In Indonesia, it has been estimated that only 1 per cent of the rubber produced is used at home, 4 or 5 per cent of the leaf tobacco and cinchona, and about 10 per cent of the tea (52, p. 25). However, the domestic market is more important for such commodities as sugar, coconut products, and coffee, the prewar share ranging from 20 per cent for sugar to 34 per cent for coffee.

lands led to a breaking up or reduction of these areas. Tobacco, grown mainly on Sumatra, was severely affected by squatter occupation; also, leases of many estates were expiring, and negotiations for renewal were slow; and labor was scarce and inefficient. It became increasingly difficult to recruit a European supervisory staff, and—to top it all—there was a steep decline in the demand for wrapper leaf in Europe. Estate output fell drastically and, although the production of smallholders was better maintained, exports slumped to only about 40 per cent of the prewar level.<sup>13</sup>

The estate crops of the 1950's—oil-palm products, cinchona, cocoa, hard fibers, tea, and sugar—were estate crops during the 1930's. Of the present estate crops, the most important change in recent years has been the decline of plantation sugar in exports, which reflects curtailed planting and destruction of factories during the Japanese occupation and the period of civil strife that followed, discouragement to new investment, labor troubles, rising costs, and government policy favoring peasant over estate cultivation. As a result, the output in 1952 was less than a third of prewar, hardly more than needed for domestic consumption (20, pp. 85-87). Since then Indonesian sugar has again appeared on world markets, but in a greatly reduced volume; and it is no longer almost exclusively of estate origin. In 1956 only 170,000 long tons were exported as against a 1937-39 average of 1,151,000 tons.

In the predominantly estate group of export crops only cinchona has not been previously discussed. Though of minor importance in total agricultural exports, cinchona is of interest because of the almost complete monopoly in its production which Java held for many years. In the middle of the 19th century, when cinchona supplies from the forests of the Andes seemed to face exhaustion, the Dutch government in the Netherlands Indies began to support experimentation in cinchona growing. Initial results were discouraging, but by the early 1870's this government venture succeeded in developing a variety with a profitably high quinine content. Java's monopoly position was established early in the 20th century (20, p. 93).

However, the industry experienced many ups and downs during the years up to the outbreak of World War II, in efforts to adjust to market factors. The native smallholder showed little interest in the crop because of the size of the capital risks involved and the long waiting period (at least 15 years) before the cinchona tree is ready to yield its bark. Only in the 1930's, after a government restriction scheme was introduced, did native production show up at all. In 1938 smallholder output amounted to only about 1.5 per cent of the total (20, p. 67).

During World War II the cinchona monopoly was broken as synthetics were developed after supplies from Java were cut off. In the postwar period cinchona output and exports have been considerably below prewar, and the outlook for the industry is not encouraging.

In the predominantly native group of exports, products of four minor tropic

<sup>13</sup> In appraising the export data it must be borne in mind that a substantial portion of the tobacco grown by natives is prepared on plantations and therefore shown as a plantation export. Not reported, of course, is the native tobacco grown for the domestic cigarette market.

cal crops are recorded: pepper, cassava, essential oils, and kapok. Before the war Indonesia was the leading supplier of pepper to world markets, but in the post-war period exports have reached only a little more than one-third of the earlier level. The crop is grown almost exclusively by smallholders. Pepper is simple to grow and process, but requires care in details that the smallholder can attend to better than the large-scale operator. Traditionally it is even more of a native-cultivated crop than cassava, essential oils, or kapok.

Cassava cultivation is also easy, as is the manufacture of flour and tapioca. Native production is primarily for domestic consumption, and large quantities are consumed locally, but there has long been a considerable export trade in meal and tapioca. In the past, estate growing was substantial, accounting for 44 per cent of exports before the war (1939),<sup>14</sup> but during the unsettled 1950's the trade in cassava products became based more and more upon native production, until in 1956 and 1957 all exports were credited to smallholders.

Somewhat the same type of increase in native participation in exports occurred in essential oils as in cassava products, except that it apparently took place earlier. The trade is almost exclusively concerned with sereh grass, the raw material of citronella oil. It developed remarkably in the 1930's, mostly by native producers who, unlike the small estates, found growing profitable despite the sharp drop in prices during the depression years (52, p. 76). However, the quality of the native product deteriorated with the fall in prices and, as with many other crops, estates continued to buy and process much of the smallholder's output.

Kapok is the only minor crop of Indonesia (mainly Java) to show a decline in native participation in exports over the past three decades. Before World War II Indonesia was by far the leading exporter of kapok, but in recent years shipments have been only a fraction of the former level. (Thailand is now the chief exporter.) Decline in world demand, owing to the development of various substitutes for kapok in numerous uses, is the principal reason for the change and helps explain smaller peasant representation.

Although kapok remains essentially a native product—"single trees, lining the roads and the banks between fields and clustered in native compounds, are more numerous than those in regular plantations . . ." (51, p. 71)<sup>15</sup>—low prices of the early 1930's resulted in deterioration of the native product and unremunerative cultivation. As with many other export crops, government intervention in the market and a valorization scheme were deemed necessary to rescue the industry. Surplus stocks were not worked off until war broke out in Europe.

Fortunes of the industry improved considerably over the short term, but the long-term repercussions were adverse. Kapok is usually hand-picked, it must be cleaned, ginned, and compacted into bales for export. Apparently, in the interests of maintaining quality in a highly competitive market, estate facilities have continued to be used by smallholders; hence exports credited to plantations may actually originate in native gardens.

<sup>14</sup> Some of the exports credited to estates actually originated with small growers, but their raw cassava was processed by estate factories.

<sup>15</sup> Kapok on plantations is frequently used as a shade tree for young coffee and cocoa plants.

## SOME CONCLUDING OBSERVATIONS

Smallholders have always been responsible for the bulk of agricultural production in the tropics, although their contribution to exports has changed many times over the past century or more. The number of such peasant-type farmers is so great that their aggregate production achieves great importance. Individually their surplus output may be modest, but it is their chief source of cash or exchange. The most profitable cash crops grown by smallholders find export outlets overseas; regional market and domestic utilization is usually minor.

Holdings of the peasant-type farmer range from a few acres to 100, depending upon the crop, where and how it is grown, and also on how much land they are able to acquire. Yields obtained from operations also vary widely from one area and production situation to another. Neither size of holding itself nor size measured in terms of production is a reliable guide to classification of farming that ranges from the most primitive type of shifting cultivation to more sophisticated forms of permanent agriculture.

Among the tropical crops the most important in value of international trade and in relation to volume of production are bananas, cocoa, coconut products, coffee, oil-palm products, rubber, sugar, and tea. Exports of all eight are drawn partly from smallholder or peasant production, partly from estate or plantation production. The share of each may be, and has been, subject to radical and rapid change over the years.

A study of trends in available data reveals no tendency for the fraction of exports derived from plantations to increase. In fact, the opposite seems to be true; exports in the aggregate tend to consist increasingly of the outputs of peasant farmers. Whether the dominant basic influences center on economic efficiency or upon pro-peasant political pressures, or to what degree each has influenced the trend, is not clear.

However, it is clear that the growth in the relative importance of smallholders differs from one commodity to another. Some tropical export crops are far more "suitable" than others for peasant farmers under conditions of technology and markets existing at any particular time. Appropriateness or suitability depends upon the ease and simplicity of acquiring a number of key production factors at costs low enough to permit a profit from the operation. The smallholder's right and ability to acquire or lease land under favorable conditions; the suitability of the location of his property for the crop contemplated from a climatic and soil standpoint; the need for labor other than that provided by his family; the crop's requirements for capital equipment either in cultivation, harvesting, or processing; accessibility to markets through adequate road or rail connections; and so on—all are factors determining feasibility of the small-scale venture.

The many variations and possible combinations of factors which might help to define the suitability of a specific export crop for smallholder production are not easy to rate or classify. The commodities herein considered might be rated according to ease of land clearing, growing, tending, harvesting, and combatting hazards of weather and disease; simplicity of preparation for market, which involves the element of time after harvest (in order to preserve quality) and the complexity and cost of processing equipment; requirements of transportation, storage, and other facilities of marketing; and the capital resources needed for

all of these, including the waiting period (for tree crops) before the first marketable crop is obtained.

The smallholder enjoys a significant position in the trade of a number of commodities of world importance. Size is not a handicap in competition with large-scale plantation production of such crops as cocoa, coconuts, and rubber. Although the growing of oil palms, bananas, and coffee may be relatively easy, preparation for marketing, or marketing itself, is more difficult for the smallholder. He must depend upon the facilities of the plantation or those supplied by government agencies and cooperatives. With sugar processing, dependence becomes even greater, and reaches a peak with tea (and sisal). Sugar must be milled, tea fermented, and the oil from the fleshy portion of the oil-palm fruit extracted (for palm oil) as soon as possible after harvesting in order to preserve or develop quality characteristics. (And, in order to facilitate decortication, sisal should be processed within 48 hours.)

If the smallholder's output is deficient in quality, he need not necessarily be a less efficient producer than the plantation if there is a market demand for cheaper grades which he can supply. It is a question of profitability at a certain price, and the premium export markets are not always those most sought by individual growers.

When the smallholder can grow a crop more cheaply than the plantation, his output is frequently used to supply the estate factory. Arrangements of this type are mutually advantageous: the peasant supplies the labor for cultivation, while the plantation supplies the capital for processing equipment, the skill for operating it, and/or marketing facilities. The plantation may enter the arrangement earlier—in planting (with selected stock), in cultivation (machinery for weeding and spraying), in harvesting and transporting to processing centers (quality can be greatly injured by careless picking and handling, as with the fruit of the oil palm, bananas, and coffee). But when the processing phase of production is especially expensive or difficult, the plantation is usually obliged to engage heavily in production in order to have assured regular supplies for economical factory operation.

Capital requirements of the various major tropical export crops range from a low for such smallholder crops as cocoa and coconuts to a high for plantation crops like bananas, tea, and sisal. Yields per acre, the length of the waiting period for the first commercial crop, the cost of necessary processing equipment, the extent of clearing operations and transportation, storage, and housing facilities—all bear on the capital requirements of different crops. If returns from investment are long deferred (an extreme case might be cinchona) the native farmer faces, under present conditions, an almost unsurmountable handicap. However, some crops come to bearing in relatively few years; and the smallholder is frequently able to weather the waiting period by interplanting with food crops. Such "catch" crops are grown, for example, with young coffee, cocoa, and rubber. Of these interplanted crops bananas and plantains are commonly used not only for the fruit they bear, but for shading young tree crops.

With smallholder participation in the production of the major tropical export crops generally on the increase, it is clearly the easily grown crops such as coconuts and cocoa, now primarily peasant-produced, that are likely to continue



to be so unless there is some radical change in competitive relationships brought about by new market factors. For coconuts these would be a continued decline in soap consumption as detergents increase in popularity and further substitution of cottonseed, peanut, and soybean oils in margarine manufacture. The smallholder's continued participation in the production of rubber and oil-palm products, now very important, depends upon similar market developments. The ability to meet competition of synthetics, substitutes, and alternatives of one kind or another will be important in industries of relatively rapid technological change. With sugar and bananas, less subject to such changes, the smallholder is likely to maintain his present position but not noticeably to increase his share in exports. Coffee is also a crop based upon consumer preferences which change slowly, but the production pattern may well continue to permit smallholders a greater participation. Tea seems the least likely prospect for smallholders for many years to come, since changes in a habit-based market demand are very slow and technological advances in production will benefit the large-scale producer more than the small.

In development plans for most underdeveloped tropical countries the opinion is generally expressed that peasant farmers should not only be encouraged to grow an increasing proportion of their own food requirements, but further expand production for export. By continuing to produce appropriate crops for the export market the means will undoubtedly be provided for purchasing imports that cannot be produced locally but which become a natural accompaniment of rising levels of living. However, should any degree of industrialization occur in backward countries, the raw materials of agriculture would be needed, and the feeding of labor transferred from farm to factory would place additional demands upon the food-producing capacities of native agriculture. An improvement in nutritional status is a pressing need almost everywhere in these countries. Gains can be made, however, only with an increase in aggregate agricultural output and especially in variety of crops produced.

Cooperative enterprises of one type or another have been advocated as a means for meeting some of the problems of the small farmer in competition with corporate enterprise. Usually such arrangements do not involve collective ownership of the land; farming is conducted as though the small parcels were a single unit and many of the advantages of a large-scale operation are thus realized. The growing of sugar cane in some of the islands of the West Indies and in India has been handled in this manner. Coffee and bananas are produced in Jamaica under similar arrangements, as are oil-palm products and cocoa in Nigeria and Ghana.

I. C. Greaves' prewar observations seem pertinent today; the trends have been accelerated in the postwar period (53, p. 218):

. . . without direct Governmental support, systems of production which rely on simple wage labour are declining relatively to those which use labour on some co-operative basis of free contract. The native is gradually increasing his possession of capital, either individually or co-operatively; but even where his position is entirely that of a cultivator supplying foreign-owned factories, a contract based on final prices gives him an interest in the entire process of

production, and makes him to some extent participate in the risk—and profits—of changes in the market demand for the finished product.

On the other hand, some have “little faith in what is a rather popular idea today that the problems of the small farmer can be solved overnight by co-operation; by the creation of an organization that is in a position to initiate large scale estate methods,” and believe that “small and medium scale farming offers the greatest potential opportunity in tropical agriculture of the future” (see, e.g., A. L. Jolly, 54, p. 86). They point to the economic advantages of small-scale agriculture through closer managerial supervision of crops and livestock, but also concede that there are many handicaps to be overcome.

Various alternatives to typical peasant-type farming as it exists in the tropics and to the plantation system of producing export crops have been proposed and in some cases tried with different degrees of success. With the decay of colonialism, and the unpopularity of foreign enterprise with political leaders in some newly independent countries, such experiments will no doubt continue.

Because of the importance of coffee, rubber, and sugar in world exports of tropical commodities, and the established and generally improving position of the smallholder in the production of these crops, it seems safe to conclude that his role in commercial agriculture in the tropics will gradually gain in stature without, however, completely displacing the plantation system (or its equivalent) with its acknowledged advantages.

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