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# BRAZILIAN COTTON

## *Trends and Prospects*

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## FOREWORD

Brazil has been for many years a major competitor with the United States in most foreign cotton import markets. In recent years, shipments have exceeded 1 million bales annually—a level second in Latin America only to Mexico's.

This study is another in the continuing series of reports on competitive agricultural developments in foreign countries. It is intended to help U.S. cotton interests evaluate problems and potential in the Brazilian cotton industry, and to delineate the probable competition from Brazilian cotton in foreign markets that can be expected over the next several years.

An on-the-spot survey in the spring of 1966 provided a part of the information for this study. In addition, certain parts of *Cotton in Brazil*, FAS M-156, April 1964, by Horace G. Porter and Jimmy D. Minyard, were drawn upon for substantial information.

The author wishes to express his thanks to the many persons who so graciously contributed to this study. Special recognition is due the agricultural attaché and his staff in Rio de Janeiro and the agricultural officer in São Paulo.

A handwritten signature in dark ink, appearing to read "R. C. Sherman", is written over a horizontal line.

R. C. Sherman  
Director, Cotton Division

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# BRAZILIAN COTTON

## *Trends and Prospects*

By VERNON L. HARNESS, Cotton Division

Brazil is the largest cotton producing country in South America. Actually, three-fifths of the continent's cotton is grown in that nation, where production in 1965-66 was estimated at 2.5 million bales.<sup>1</sup> This figure was moderately above the previous crop and equaled the record high of 2.5 million bales grown in 1961-62. Over two-thirds of Brazil's cotton is produced in the southern States—São Paulo, Parana, Minas Gerais, Mato Grosso, and others. For the 1966-67 crop, a preliminary forecast indicated a substantial reduction, as both area and yield of cotton in the South were below levels of a year earlier.

Brazil has considerable potential for increased agricultural output, but it appears unlikely that cotton will share in that potential in the near future. Profits have become less attractive than those from other crops and livestock. Total cotton area declined moderately to 5.5 million acres in 1965-66 despite some expansion into previously uncleared areas. While higher yields could offset a part of the reduced acreage, it now seems doubtful that total Brazilian cotton production will rise over the next several years unless government policies should be modified so as to improve the competitive position of cotton relative to other crops. Lower cotton prices in international markets have been a factor in the altered outlook for the nation's cotton; however, a number of other factors have also been important. Competition is intense among various uses for the better land in the cotton region of the South. In this region, most farm managers are quite sensitive to changing profit relationships among competitive crops. During the past two seasons, the profit advantage has swung away from cotton to several alternative crops, especially peanuts and other oil seeds. Soybean acreage, although still extremely small, is expanding rapidly. Peanut prices have held firm despite increased production. If the shift in price relationships which has recently favored food crops should continue, the shift to production of these

crops could be expected to continue over the next few seasons. However, a change back to cotton production could occur quickly if the profit advantage should again swing back in favor of cotton.

The cotton area in South Brazil is moving generally westward—a trend that has continued for many years. Acreage is declining in São Paulo, Brazil's largest producing State. Even in the more westerly Parana, the second most important cotton State, production is shifting toward the West. Cotton area is expanding slowly in the adjacent State of Mato Grosso, where forest land is being cleared and planted to cotton. However, a sharp reduction in 1966-67 was expected in Mato Grosso in anticipation of lower producer prices and higher marketing charges.

Conditions in the cotton producing States in the Northeast are quite different from those in the South. In the Northeastern region, rainfall is heaviest along the coast, but diminishes to arid levels a relatively short distance inland. Heavy rainfall and other conditions near the coast favor the production of cane and other higher profit crops there. In a moderate-rainfall area further inland, annual-type cotton is grown.

Still further inland, a perennial-type cotton that can withstand severe drought is one of the most dependable crops. This perennial, or "tree" cotton, yields little, if any, fiber the first year, but after that can produce a crop annually for a number of years. The seeds are planted several yards apart, and often the field is interplanted with other crops. As might be expected, tree cotton yields are extremely low. Nevertheless, this crop is widely regarded as one of the few dependable cash crops in these low rainfall areas of the northeast.

Generally, yields of tree cotton fall off sharply after about 6 years; at this time the plants are cut to ground level or replaced. Present conditions are such that the cotton area in the northeast is likely to remain near present levels or even expand somewhat during the immediate years ahead, with production fluctuating with available moisture.

Brazil has experienced a long-term uptrend in cotton consumption. However, in recent years the textile in-

<sup>1</sup> In this report, bales are 480 pounds net weight. Unless otherwise noted, acreage and production data reflect unofficial trade estimates.

dustry has been plagued with troublesome inventories and credit shortages, and domestic use has held at a level near one and one-fourth million bales. Despite serious problems, many enterprises within the industry are moving ahead with plans for continued improvements and expansion. Modernization of facilities is needed badly in most textile mills, though considerable progress is being made along those lines.

There is a basis for considerable optimism about

higher consumption. Future prospects will be even brighter for the cotton textile industry if Brazil finds export markets for additional quantities of cotton textiles. Cotton textile exports, though representing only a small part of total consumption, have increased in recent years both to neighboring countries and to the United States; however, considerable improvement in efficiency appears necessary for large-scale competition in foreign textile markets.

## THE RAW COTTON INDUSTRY

### Acreage and production

Cotton was being utilized in Brazil when Europeans reached the area about 1500. Since that time there have been several periods of expansion and contraction of cotton production, and since the late 1800's the crop has been firmly entrenched as a major crop. While the country grew mainly perennial cotton in the early periods, annual varieties have been dominant in recent decades.

In terms of production, cotton is a leading crop in Brazil. However, the crop is grown on only a relatively small part of the nation's cultivated area (including perennial crops) of over 75 million acres. Corn, rice, coffee, and dry beans account for nearly two-thirds of the total crop area, cotton occupies about 7 percent. Notwithstanding, Brazil accounts for two-thirds of the cotton acreage and three-fifths of production in South America.

Unlike that of most crops in Brazil, acreage in cotton has not expanded in recent years. After reaching a record level of 6.7 million acres in 1940, cotton area drifted lower throughout that decade and well into the next. Area rebounded from the low point of 3.7 million acres in 1957, and has held relatively stable near 5.5 million in recent years.

Aggregate area devoted to all crops has continued to increase, with most of the expansion resulting from the settlement of raw, previously uncleared land. For many years, Brazilians have pushed westward into the interior as a mean of relieving pressure on the more densely populated coastal States. Cotton has been in the foreground in this westward movement, but increased cotton acreage in the interior has been offset by declining cotton area in the older farming regions.

Several decades ago, cotton production in Brazil responded closely to changes in acreage. Yields were similar in the Northeast and South. In the past two decades, yields have shown a tendency to strengthen, although the upward progress has been extremely irregular. Nationwide yields seldom exceed 200 pounds of lint per acre—far below the world average of over 300

pounds. Virtually all of the modest increase in Brazil's outturn has been achieved in the South, where recent yields compare favorably with the world average.

Spurred by favorable returns, compared with those from coffee, and by substantially higher yields in the South, Brazilian cotton production began a long upward movement in the early 1930's. Production totaled 1

Table 1.—Cotton: Supply and distribution in Brazil, 1955-65<sup>1</sup>

Season <sup>1</sup>	Stocks Aug. 1 <sup>2</sup>	Pro- duc- tion	Total supply	Con- sump- tion	De- stroyed	Ex- ports
	<i>1,000 bales<sup>3</sup></i>	<i>1,000 bales<sup>3</sup></i>	<i>1,000 bales<sup>3</sup></i>	<i>1,000 bales<sup>3</sup></i>	<i>1,000 bales<sup>3</sup></i>	<i>1,000 bales<sup>3</sup></i>
1955 -----	825	1,700	2,525	1,050	15	810
1956 -----	650	1,300	1,950	1,040	5	380
1957 -----	525	1,350	1,875	1,050	10	215
1958 -----	600	1,400	2,000	1,150	8	242
1959 -----	600	1,700	2,300	1,180	14	446
1960 -----	660	1,950	2,610	1,250	5	695
1961 -----	660	2,525	3,185	1,350	13	847
1962 -----	975	2,300	3,275	1,250	5	1,145
1963 -----	875	2,300	3,175	1,300	2	1,023
1964 -----	850	2,100	2,950	1,150	0	1,040
1965 -----	760	2,500	3,260	1,250	3	937

<sup>1</sup> Beginning August 1. <sup>2</sup> Includes cotton at mills and in trade channels. <sup>3</sup> 480 pounds net weight.

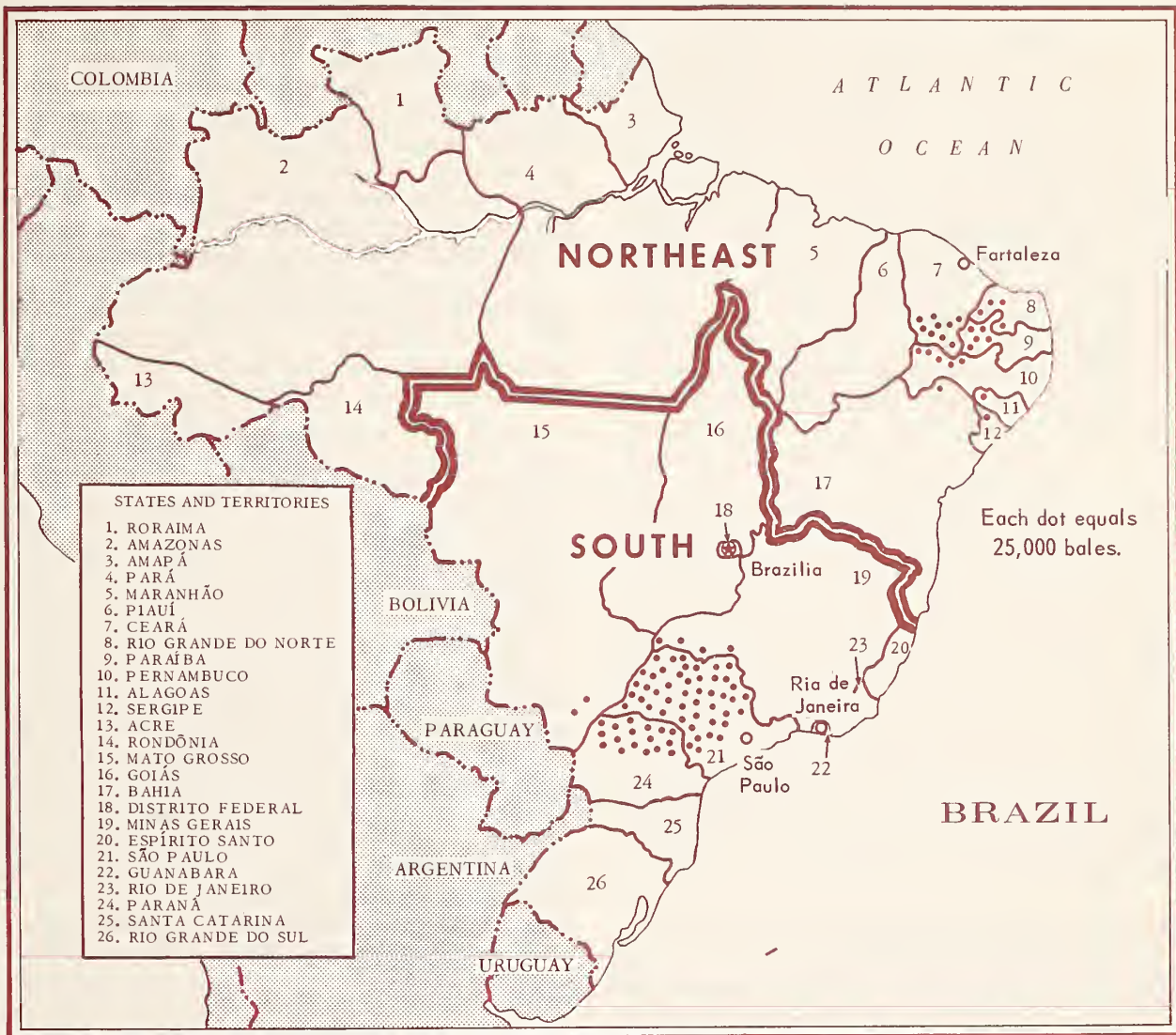
Official and trade statistics of Brazil and other sources.

Table 2.—Cotton: Area, lint yields, and production in Brazil, 1955-65<sup>1</sup>

Season <sup>1</sup>	Area	Yield	Production
	<i>1,000 acres</i>	<i>Lb. per acre</i>	<i>1,000 bales<sup>2</sup></i>
1955 -----	5,000	163	1,700
1956 -----	4,300	145	1,300
1957 -----	3,700	175	1,350
1958 -----	4,000	168	1,400
1959 -----	4,600	177	1,700
1960 -----	5,000	187	1,950
1961 -----	5,500	220	2,525
1962 -----	5,500	201	2,300
1963 -----	5,750	192	2,300
1964 -----	5,750	175	2,100
1965 -----	5,500	218	2,500

<sup>1</sup> Beginning August 1. <sup>2</sup> 480 pounds net.

Official and trade statistics of Brazil and other sources.



**COTTON PRODUCTION IN MAJOR PRODUCING STATES • BASED ON TRADE ESTIMATES OF 1965-66 PRODUCTION.**

*Over two-thirds of Brazil's cotton is produced in the South—São Paulo State alone contributes more than one million bales to the nation's total of about 2.4 million. In the South, competitive factors are contributing to a movement of the crop into western areas of São Paulo, Parana, and nearby sections of Mato Grosso. More than half of the nation's cotton acreage is in the Northeast, but extremely low yields hold down production. Cotton is the major cash crop in an economy of general subsistence farming. The dry interior is the home of Brazil's perennial "tree" cotton. No major changes are foreseen in cotton area or production in the Northeast.*

million bales in 1933; this figure was doubled only 4 years later. Production topped out in 1943 at 2.7 million bales, and substantially smaller crops followed. During the remainder of the 1940's and the 1950's, cotton area, yields, and production fluctuated sharply from year to year, production ranging between 1.3 million bales and 1.95 million. In the present decade, yields have been sustained at moderately higher levels on increased acreage; and again total production has climbed well above 2 million bales.

The fate of one of the competitive crops might have a serious impact on cotton acreage in the South. In mid-1966 the Brazilian Coffee Institute (IBC) made several changes, with such potential results, in coffee marketing regulations. The diversification program, under which payments are made to farmers who destroy coffee trees and substitute an approved crop, was liberalized, so that cotton was included as one of the approved replacement crops. Any of the following annual crops may be substituted for coffee: beans, castorbeans, corn, cotton, forage crops for green manure or silage, manioc, peanuts, rice, soybeans, sunflower, tobacco, and wheat. Approved perennial crops are avocado, banana, citrus, mango, pecan, peppermint, phormium, ramie, and tung nuts. Also included are other commercial fruit and forest crops and other crops that may be approved later by IBC. Diversification payments are not made when land is diverted to pasture or when coffee is replanted on the same land. However, no restrictions have been placed on additional plantings of coffee on other land owned by recipients of diversion payments.

Many coffee growers seem to be receptive to the program, partly because of the less favorable support price for coffee and because of considerable frost damage in 1966 to coffee in Parana and São Paulo.

## Producing areas

Brazil has two quite distinct areas of production—the South and the Northeast. In the South, cotton is planted in October and November and harvested mainly from March through June. Annual cotton is planted from February through May in the Northeast; the crop is picked from August through January. In the South, cotton fits into a relatively intensive type of agriculture, and competition for land and other production resources is strong. Cotton fits into a subsistence type of farming in the Northeast, and alternative crops are limited in areas where this crop can be grown. Commercial varieties of upland cotton are grown in the South. The Northeast is the home of perennial “tree” cotton.

*South.*—São Paulo and portions of adjacent States represent the heart of Brazil's agricultural resources, in terms both of present output and immediate potential. These several States account for nearly half of the total value of Brazil's agricultural production. In addition to

cotton, the area dominates in output of coffee, corn, rice, dry beans, sugarcane, peanuts, potatoes, cattle, and hogs.

The South gained the lead in cotton production from the Northeast in the 1930's, under impetus from some strengthening of yields and a sharp jump in area. This lead has been maintained; and in 1965, the South accounted for over two-thirds of Brazil's cotton. The southern crop is grown on less than one-half of the nation's aggregate cotton area—a reflection of the higher yields that have been obtained in the South. Acreage has declined moderately in recent years, but production has held fairly firm through improvement in yields.

Acreage, yield, and production in 1965-66, for southern cotton producing States, follow; these data reflect estimates from various trade sources, rather than official statistics:

	Area <i>1,000 acres</i>	Yield <i>Lb./acre</i>	Production <i>1,000 bales</i>
São Paulo -----	1,305	421	1,145
Parana -----	540	373	420
Minas Gerais -----	330	160	110
Mato Grosso -----	75	352	55
Other states -----	125	173	45
Total South -----	2,375	359	1,775

Cotton production has moved westward in South Brazil (and acreage in Sao Paulo has declined) during the past several years. Competition is intense in the southern cotton area for both developed agricultural land and new, uncleared land. Cotton must compete with coffee and pasture, in addition to annual crops, for developed land. Land is often shifted to coffee or pasture from annual crops; the reverse movement seldom occurs on a permanent basis.

Contributing to the general downward trend in cotton acreage in São Paulo State—leader in cotton output—has been the fact that competitive crops are easily marketed in the rapidly growing city of São Paulo, the industrial center of Brazil. Here, in addition to the excellent market for various other agricultural commodities, the sharply rising demand for food over the years appears to have adversely affected cotton production. Cotton prices, closely related to world price levels, have frequently not been as profitable to producers as have perishable food products and some staple food crops.

Minas Gerais State, though far behind São Paulo, for many years, ranked second among the southern States in cotton acreage. With this State's dropback during the 1940's, Parana first drew abreast with, and later moved securely into, second place among southern States.

Rainfall in practically all of the southern area is adequate for producing cotton. Distribution is not ideal, but the latter months of harvest tend to be generally favorable for gathering the crop. Except for a small



coastal band, almost all of the tillable land in Sao Paulo State is suitable for cotton. Much of the northern half of Parana and a sizable part of Minas Gerais also are suitable. In addition, there are large areas of Goias and Mato Grosso States where cotton could be cultivated.

For the most part, cotton's role in South Brazil has been closely related to that of coffee. In the past, poor returns from older coffee plantings occasioned either by low prices or by frost damage sometimes prompted farmers to plant cotton between rows of coffee trees while awaiting a more favorable coffee situation.

Also, when badly eroded coffee lands are no longer fit for further coffee production, farmers have generally reverted, at least in the short run, to cotton production. This is especially true on smaller coffee farms that are too small to justify a cattle operation.

Such coffee acreage is constantly undergoing change, since coffee is planted in newly cleared jungle areas. Generally speaking, land taken out of coffee production is usually devoted to some other crop or to livestock use; it might even be entirely abandoned if its continued use seems unprofitable. On land that is still well suited for coffee, cotton or other crops are normally weak competitors. However, cotton tends to be in a comparatively strong competitive position once the decision has been made to retire land from coffee production. This is especially true on heavier red soils. On the lighter soils, peanuts give cotton strong competition.

In general practice, coffee has first claim on the best red soils, and more of the cotton is found on the lighter soils. In areas where the supply of labor is ample to harvest both coffee and cotton promptly, both crops can be handled satisfactorily despite the fact that peak harvest labor requirements of the two crops tend to coincide. Where labor is less abundant, however, other crops with different labor patterns may compete with cotton for inclusion in a farming system with coffee. Peanuts are often planted (instead of cotton) if soils are suitable; and, in some areas, castorbeans offer considerable competition.

Peanuts offer stiff competition to new areas of cotton production in the western part of São Paulo. In view of the relatively high prices for vegetable oils in Brazil, peanuts probably will continue to share acreage with cotton in the newly developing land.

Grassland, too, competes with cotton for land, because of the fairly adequate net returns associated with large livestock enterprises and the relatively low requirements of capital and labor. Owners of large livestock enterprises have no need for concentrated periods of labor; this reduces their need for seasonal workers. Thus, there is a tendency for large-scale farmers to allow grass to remain on readily tillable land. Much of this land, therefore, has potential for cotton farming.

Brazilian cotton producers (the landowners) as a class have not been as well organized as coffee pro-

ducers, nor does cotton production carry community status equal to coffee or livestock production. Agricultural laborers, too, traditionally have preferred to work with coffee or livestock, as these enterprises provide stable employment on a year-around basis.

*Northeast.*—In the Northeast, three areas and kinds of cotton production must be delineated. First is the upper coastal cotton area, lying behind the immediate coastal zone, where rainfall is too heavy for cotton. Rainfall in the upper coastal area, however, is customarily from 25 to 40 inches, and it is here that the annual or Upland-type "Mata" cotton is grown. Inland from this upper coastal cotton area, which ranges in width from 5 to 100 miles, lies the second region, an area of lower rainfall, where both annual-type "Mata" and perennial-type "Sertao" cotton are grown. Still further inland, where rainfall is normally inadequate for annual cotton, is the third region. "Serido" cotton, similar to "Sertao", is grown here.

Table 3.—Trade estimates of 1965-66 cotton production in the Northeast

State	Mata	Sertao <sup>2</sup>	Serido <sup>2</sup>	Total
	<i>1,000 bales</i>	<i>1,000 bales</i>	<i>1,000 bales</i>	<i>1,000 bales</i>
Ceara -----	0	207	46	253
Paraiba -----	19	77	31	127
Pernambuco -----	28	81	9	118
Rio Grande do Norte -----	17	25	63	105
Sergipe -----	23	0	0	23
Bahia -----	26	0	0	26
Alagoas -----	15	0	0	15
Other States -----	0	58	0	58
Total -----	128	448	149	725

Several decades ago, the Northeast was Brazil's leading cotton producing area. While it now accounts for about one-third of Brazil's total production, probably about three-fifths of the nation's cotton area is in that region. South Brazil's shift to dominant position occurred in the 1930's because of that region's acreage expansion coupled with improved yields. There was no slackening of interest in the northeastern cotton region. In fact, cotton acreage in the Northeast has expanded rather steadily for generations.

A total cotton area of slightly over 3 million acres is under cotton in the Northeast, unofficial estimates indicate. Nearly one-third of the total, or about a million acres, is in the State of Ceara, where a major portion of the Sertao cotton is grown. Ceara's State-wide yields are considerably above the region's average of about 115 pounds of lint per acre, and the State accounts for over one-third of northeastern production. The States

<sup>2</sup> Perennial-type cotton, not a distinct variety, named for region in which cotton is grown.

of Paraba, Pernambuco, and Rio Grande do Norte each devote about half a million acres to cotton. Smaller acreages are planted in Maranhao, Sergipe, Bahia, and several other States. In recent years, a substantial part of the acreage expansion has taken place in Ceara and Rio Grande do Norte.

Cotton does not fit into an intensive cash crop economy in the Northeast as it does in the South. Northern perennial cotton areas are generally characterized as predominantly subsistence farming areas. Periodically, cash returns in these areas fall even below subsistence levels and the outflow of farm workers to nearby cities is temporarily much greater than normal. This generally happens in drought years. However, when rains come, the cotton will start to grow again, and returning families can expect their cotton to have survived and to provide them with a source of cash income after a few months.

In the cotton areas of the Northeast, the comparatively strong competitive position of cotton as a cash crop helps cause cotton farming to carry relatively more standing than in South Brazil. In the Northeast, although cotton is considered a relatively reliable cash crop, there is a decided tendency to take it somewhat for granted. For best results, farmers are advised to give cotton the exclusive use of land, but they characteristically interplant cotton fields with such crops as corn, peas, castorbeans, and even cactus. Cotton, planted over one-fourth of the region's cropland, encounters little competition from other crops in Northeast Brazil. In recent years, sisal has gained increased importance as a cash crop, but it appears to offer keenest competition only where the owner is desirous of establishing a large-scale sisal plantation and land holdings are large enough. Corn and beans also account for a sizable part of the area devoted to crops.

## Production practices

In South Brazil, much of the cotton is produced on farms ranging in size from several hundred acres to several thousand, although there is a sizable group of owners with holdings of only a few acres.

Many of the large farms are professionally managed for absentee owners. Cotton acreage is allocated to tenants on the basis of their known ability, of the quantity and quality of the equipment available to them, and often of the size and composition of their families. Cotton production is a hand operation, for the most part, although tractor power is often used for land preparation. Generally, cotton rows are spaced about 1 yard apart.

In this area, the typical cotton farmer in the small-operator group is a tenant, perhaps with no more than 15 acres planted to cotton. Land is rented for 3–5 years on a cash basis or with sharecropping. A typical arrangement in undeveloped areas is for renters to clear

the land, to farm it for the stipulated period, and to return the land to the owner, who then plants coffee or grass.

In the Northeast, as in the South, large farms dominate crop production. Especially common in the dry interior are large operations that use either tenants or day laborers for cotton production. Of course, the low productivity of the arid portions of the region necessitates relatively large land holdings there by an individual tenant.

Nevertheless, over four-fifths of the farms in the Northeast are less than 250 acres in size. Land preparation, planting, cultivation, and harvesting are all done by hand. The major agricultural implements on many farms are hoes and machetes. Most farmers own cattle, but animal power is rarely used for draft purposes other than transportation. Cotton plants are characteristically planted from several feet to several yards apart.

*Fertilizer.*—Virtually no fertilizer (manure or chemical) is used in the Northeast. The situation is a little different in the South, where many of the better farmers fertilize their crops. Nevertheless, cotton is a major recipient of the limited quantities of fertilizer now used in Brazil.

In general, soils in southern cotton areas are relatively fertile compared with those in the rest of Brazil; but even here fertility is lost rapidly under intensive crop use. Most soils that have been cropped for several years are now acid and badly leached. Research has shown that cotton is quite responsive to soil treatment with nitrogen, phosphate, potassium, lime, and several minor elements.

At present, much of Brazil's nitrogen and phosphate, as well as all its potassium, is imported. Expansion of domestic production of nitrogen and phosphate is under way. The nation does not now produce potash, but feasibility studies for its production have been undertaken. Generally about three-fourths of Brazil's nitrogen imports come from Europe and about 15 percent from Chile. Ammonium sulfate accounts for nearly 60 percent of the nitrogen used. About one-fifth of the nitrogen is ammonium nitrate limestone, the principal type produced in Brazil.

The United States is the major supplier of imported phosphate, mostly rock phosphate and triple superphosphate, while West Germany, France, and the USSR supply most of the rest of Brazil's potash requirements; nearly all imports are made in the form of potassium chloride.

*Pest and disease control.*—Cotton insects often cause considerable damage to the crop in Brazil. The bollworms, both pink and common, are considered the most destructive. Other insect pests frequently causing trouble in local areas include the leafworm, spider mites, aphid,

several sucking and cutting insects, and ants. Brazil does not have the cotton boll weevil.

Virtually no insect control measures are carried out in the Northeast. In fact, it is sometimes contended that partial defoliation by insects aids harvesting. In the South, control measures are applied by some farmers. Up to 12 spray applications are made by a few farmers. Insecticides are applied with hand and tractor equipment.

Cotton diseases are not normally a problem in the Northeast, although various wilts, mildews, and leaf spots are sometimes troublesome when local conditions make their growth possible. Diseases are more serious in the South, where rainfall during the growing season encourages their spread. A measure of control existed in the past, when fields were withdrawn from cotton production after a few years. Now that less new land is available for clearing, more attention is being given to disease resistant varieties and to cultural practices, such as crop rotation, that help retard the spread of diseases.

Wilt caused by *Fusarium* is a serious problem in the South, and has been partly responsible for considerable reduction in cotton acreage in several areas of São Paulo State. Resistance to *Fusarium* has been a major objective in cotton breeding work in the South. Considerable success has been achieved. In addition to *Fusarium* wilt, Anthracnose, Mosaic, wilt caused by *Verticillium*, and other diseases have been identified in the South. While not widely troublesome in most years, these diseases cause localized problems.

## Financing and extension

Sizable amounts of credit to cotton growers in the South are supplied indirectly through gins by cotton merchants. The grower receives production credit from his landlord, or directly from a ginner if the grower is also the landowner. Often the landlord or other local moneylender obtains much of his money for purposes of lending from the ginner. Relatively little credit is available in the Northeast, but cotton merchants are probably the major source in that region.

A relatively small but growing amount of financial aid is available to farmers through agencies and branches of the National Bank of Brazil. The Bank of Brazil supplies credit also to farmer cooperatives and a few large farm enterprises. Implement dealers and individuals provide substantial amounts of farm credit; private and state banks, relatively little.

The current interest rate for agricultural credit from the Bank of Brazil is 12 percent per annum; added are amounts up to 6 percent for various fees and service charges. On the other hand, rates charged by dealers and individuals may be 48 percent annually or even higher. Virtually all agricultural loans are for less than 2 years, with most due within a few months.

General extension and credit services are provided to farmers by the *Associacao Brasileira de Credito e Assistencia Rural*, Ministry of Agriculture, through State, regional, and local offices in 16 States. This organization provides credit and farm supervision to farmers in an effort to help the cooperator improve farm and home practices. Limited extension services are carried out also by other agencies within the Ministry of Agriculture, by the *Escritorio Tecnico de Agricultura*, State Secretariats of Agriculture, the United States Agency for International Development, agricultural colleges, and private research institutions. Nevertheless, the typical cotton producer, especially in the Northeast, has little contact with any extension agency.

## Development programs

Brazil is moving on a number of fronts to expand foreign exchange earnings from cotton and other export crops. Such developments are geared, directly or indirectly, toward increasing the production of cotton, inasmuch as government policy encourages the domestic cotton textile industry to expand output to meet increased requirements in domestic and foreign markets. Production for raw cotton exports come over and above that needed for domestic consumption. Present emphasis seems to lean toward efforts to raise cotton yields more than toward increased acreage.

Sizable cotton exports provide much-needed foreign exchange and reduce the extreme reliance upon coffee as an earner of foreign exchange that has characterized some periods in the past. However, although official policy has indicated that expanded cotton exports are a national objective, governmental actions, at times, have scarcely been consistent with the avowed objective. The minimum official price for the 1966 crop was increased about 5 percent from the 1965 level, but most producers felt that production costs rose considerably more than 5 percent. However, higher yields have been promoted through loans by FUNFERTIL, a new program to encourage increased use of fertilizer.

Stimulation to cotton marketing should result from a new tax system under which cotton will be taxed on a value-added basis. Under the previous system, a tax was levied on the entire amount of each sale reported—many transactions, it is claimed, went unreported.

Production of cotton for export has been disrupted by developments in Brazil's overall financial condition. One such influence has been official manipulation of Brazil's exchange rates. At times, farmers have found it more profitable to produce some alternative crop for which the internal price was high because part of local requirements had to be imported at a high rate of exchange, in contrast to an export crop like cotton for which the local price was based on export prices.

A form of disruption taking place several years ago

was the periodic unwillingness of the government to adjust the exchange rate at the beginning of each harvest season to reflect changes that had occurred in the internal price to producers, the value of cotton on the world market, and deterioration in the value of Brazilian currency. Under those conditions, pressures built up for the government to alter the exchange rate applicable to aid cotton exports. In recent years, there have been no special exchange rates applicable to cotton.

Development in some parts of South Brazil may depend on determining soil potentials. Here, there are large areas of problem soils on which farming has never been profitable. Research is now being conducted by the government to determine the reason. Should a practical way be developed to bring such soils into profitable cultivation, the land use pattern could undergo a major change; but it is impossible to anticipate how cotton might fare as a crop in these particular soil areas. In any event, rapid development of cotton farming in such areas is unlikely.

Promise exists for better use of land where agriculture in the coffee areas has been exploitive of soil resources. Many of these soils are inherently productive and would respond to good soil management practices. In general, cost studies are not available to show how profitable various improved practices would be, and there are many farmers in Brazil who believe that the cost structure would preclude their adoption.

Programs are in operation in the northeastern States to encourage farmers to plant more cotton, to plant improved varieties of cotton, and to adopt improved cultural practices. Although in many ways recognized as Brazil's No. 1 problem area, the Northeast regards cotton as one of the more dependable sources of cash farm income. Evidence to date suggests that some progress is being made, but not rapidly, as a result of the programs. Over a period of 5 or 10 years, there may be a continued expansion of cotton acreage in the drier areas of the Northeast and a somewhat general adoption of the improved varieties. However, it is doubtful whether cultural practices will be improved fast enough to have much effect on production in the Northeast within that time.

It is too early to assess the role that cotton will play in the development of land in the Rio Sao Francisco Valley of the Northeast. Much of this land appears highly productive. However, much time and huge investment would be required to complete such a development operation. To date, indications show that cotton here can be high yielding, but alternative crops also are. It is therefore questionable whether cotton will claim a large share of the irrigated land in that area in future.

## Research, varietal control

The respective State governments are largely respon-

sible for activities in cotton research and for distribution of planting seed. Considerable work is done in seed selection and distribution; somewhat less on problems related to cultural practices. In terms of official attention given to cotton, and to all its varied requirements and problems, the State of São Paulo ranks first by a large margin. Most other States depend upon São Paulo for much developmental work, although a few are becoming somewhat more involved in various cotton activities.

Present breeding work is aimed at developing wilt resistant varieties with suitable characteristics of yield and quality. The rapid spread of *Fusarium* wilt, especially in the older producing areas of São Paulo, has sped up work on resistant varieties. Present varieties now being grown in South Brazil are selections from U.S. stock. Prominent stock includes Auburn 56, Rex, Deltapine, and an Acala introduced from the United States many years ago. Under local conditions in the South, Auburn 56 rates favorably in terms of resistance to *Fusarium*, staple length, and several other quality characteristics.

In South Brazil, considerable success has been scored in recent years in adapting longer stapled varieties to local conditions. Adoption of other quality characteristics has not been as noteworthy. There is a fairly wide range in grade of Brazilian cotton from year to year, mainly because of widely varying weather during harvest. In some years when rainfall continues late into the harvest period, a relatively large share of the crop falls into the lower grades. Brazilian cotton is graded on a number series, 1 through 9, with half-grades. All below-grade cotton is inferior to 9. Brazilian cotton cannot be compared exactly with U.S. growths. However, Grade 5, the base grade, is roughly equivalent to Middling Light Spot or Strict Low Middling Light Spot. The trade concept of Grade 5 staple length is  $1\frac{1}{2}$  inches or a little less.

Table 4.—Commercial staple lengths<sup>1</sup> of cotton produced in the State of Sao Paulo, 1956-65

Year	27 mm	28 mm	29 mm	30 mm	More
	or less				than
	Percent	Percent	Percent	Percent	Percent
1956	22.6	68.6	8.8	( <sup>2</sup> )	---
1957	41.6	53.9	4.5	( <sup>2</sup> )	---
1958	1.0	14.7	77.0	6.2	1.1
1959	1.8	6.6	18.3	54.5	18.8
1960	.7	3.0	20.8	60.8	14.7
1961	.2	9.1	59.0	25.6	6.1
1962	.2	1.7	43.2	44.0	10.9
1963	.2	.4	9.4	55.7	34.3
1964	.1	( <sup>2</sup> )	.8	24.4	74.7
1965	.2	.1	1.8	27.7	70.2

<sup>1</sup> Most persons in the cotton industry consider South Brazilian cotton to be somewhat shorter than indicated in this table. Nevertheless, the improvement in staple lengths is obvious. <sup>2</sup> Less than 0.05 percent.

Brazilian statement to the 25th Plenary meeting, International Cotton Advisory Committee.

The rapid improvement in staple length of cotton in São Paulo reflects both the breeding work and control of seed distribution exercised by the State. As soon as a variety proves acceptable, the government supervises multiplication and distribution of the seed to farmers. Producers purchasing seed from the government must accept the strains being distributed. The State seed monopoly also has a campaign under way to treat all seed before distribution to control pink bollworm, which in some years has done a great deal of damage.

In the Northeast, a program for improvement of Moco (perennial) cotton was initiated in the mid-1940's. It has resulted in the development of improved strains that appear under several different names, Sertao and Serido, which do not identify distinct varieties of cotton. Rather, these are commercially recognizable names for perennial cotton derived from the regions in which the cotton is grown. Moco is a local name for cotton properly classified as *Gossypium hirsutum*—variety Marie-Galante. This perennial-type—sometimes called “tree cotton”—is capable of withstanding drought better than any other known variety. Its roots have been known to go down 16 feet in search of moisture.

“Tree cotton” produces only a moderate crop, if any, the first year, but starting the second year it hits its stride in terms of yield. In older fields, plant populations tend to decline, helping to cause yields to taper downward. Typically, fields are allowed to produce for about 6 years, but some remain more than 10 years. Because of its resistance to drought, this perennial cotton is widely regarded by farmers as one of the best and most dependable cash crops in regions of scant rainfall.

Although farmers are at liberty to plant any seed available, there is a growing interest by Brazilian leaders in getting them to use improved seed in all new plantings. However, several years will be required before any real improvement in the perennial crop is noted, because Moco cotton is replanted only every few years; also, in some areas, farmers have been slow to adopt the improved seed. Fiber and spinning characteristics among the various strains of improved Moco cotton are essentially comparable, and all strains are quite superior to the unimproved perennial cotton now in production. Improved Moco fiber is relatively uniform, fairly strong (Pressley readings between 90,000 pounds per square inch and 100,000 are normal), and fine (Micronaire readings generally range between 3.2 and 3.8). By American standards, the staple length of improved Moco usually falls between 1¼ inches and 1¾.

## Marketing

Brazil maintains a guaranteed floor price for cotton. For the 1966 crop, the level was set at about 18.6 U.S. cents per pound of lint of base quality delivered to major consuming centers. The government stands ready to purchase cotton at the support level; but for many years, producers have received market prices above the seed-cotton equivalent of the minimum support level.

All cotton produced in Brazil is hand-picked, and virtually all is sold by farmers to the gins as seed cotton. Classers examine the seed cotton as it is received at the gins and producers are paid on the basis of quality. It is hoped that the farmers will pick their cotton carefully and sack it according to grade. This system, under which cotton is classified and sold before ginning, assures that those States wishing to do so may exercise considerable control of planting and seed distribution. Thus, a transition to improved varieties can be accomplished with relative ease.

A sample of each bale of cotton ginned in the State of São Paulo is sent from the gin to the Bolsa de Mercadorias in the city of São Paulo for classing. Parana also has organized an official classing agency. Since much of the cotton produced in neighboring States is trucked into São Paulo or Parana for ginning, a large share of the southern crop is officially classed but statistics are not adjusted to indicate the State in which it is grown. Some classification work is done in northern Brazil, as well.

Ginning facilities in Brazil are generally adequate to process the current cotton output; warehouse space, moreover, is available for more cotton than is now produced. However, the westward movement of cotton in South Brazil has necessitated the movement of some gins to newer regions and has caused still others to serve rather distant producing areas. Thus, while no general lack of marketing facilities hinders expanded cotton production, problems have developed of either moving ginning equipment and warehouses, or transporting seed cotton substantial distances, because of the new areas.

In South Brazil, cotton moves to southern mills and to the Port of Santos by rail and by truck. In North Brazil, cotton is transported by truck either to ports or to northern or southern mills. Some northern cotton proceeds from ports to southern mills by coastal vessel; some goes to foreign countries by ocean liner. Principal ports for cotton export in North Brazil are Fortaleza in the State of Ceara, Cabedelo in Paraiba, Natal in Rio Grande do Norte, and Recife in Pernambuco.

## FOREIGN TRADE

### Raw cotton

Traditionally, cotton has been one of Brazil's leading export crops and a major source of foreign exchange.

In 1965, exports of lint cotton accounted for 6 percent of the total value of exports. Although this figure was a relatively small part of the total, it was exceeded only by coffee, manufactured items, and iron ore.

The level of cotton exports has varied sharply from year to year for the past several decades. This tendency has been particularly noticeable in the past two decades, when consumption has been moving generally higher and production has climbed irregularly upward, since exports are a residual after consumption needs are satisfied. In recent seasons, shipments have totaled over 1 million bales annually—a level more than double exports in the 1955-59 period. Brazilian cotton competes strongly with comparable descriptions of U.S. cotton in nearly all foreign import markets.

Table 5.—Cotton: Exports from Brazil by country of destination, average 1955-59, annual 1960-65<sup>1</sup>

Destination	Avg. 1955- 59	1960	1961	1962	1963	1964	1965
	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>
Germany, West -----	56	120	189	202	250	242	179
Japan -----	127	113	90	188	114	131	105
Hong Kong --	23	61	88	116	54	110	92
Netherlands -	13	39	66	150	116	135	82
USSR -----	0	25	98	110	138	51	70
Belgium <sup>3</sup> ---	11	41	54	48	45	84	60
United Kingdom --	43	76	55	108	82	84	52
South Africa, Rep. -----	2	8	16	33	31	39	46
Spain -----	21	70	25	1	9	25	42
France -----	27	84	88	75	69	57	40
Czechoslo- vakia -----	6	0	3	5	1	0	34
Hungary ----	7	12	7	18	1	1	29
Bulgaria ----	0	0	3	2	0	0	29
Italy -----	15	14	27	26	13	7	19
Taiwan -----	0	0	7	1	10	20	13
Other -----	68	32	31	62	90	54	45
Total -----	419	695	847	1,145	1,023	1,040	937

<sup>1</sup> Seasons beginning August 1. <sup>2</sup> 480 pounds net. <sup>3</sup> Includes Luxembourg.

*Estatística do Comercio Exterior* (Rio de Janeiro) and other information.

As a natural outcome of the variety-improvement work that was discussed earlier, Brazilian cotton in foreign markets is now generally considered competitive

with longer lengths than it was several years ago. For example, Type 5 is frequently compared with U.S. Middling Light Spot 1½ inches in foreign import markets. A decade ago, Type 5 often would have been matched against Strict Low Middling Light Spot ¾ inch.

For many years, Brazilian policy has been aimed toward insuring adequate supplies of domestic cotton for the nation's textile industry. This policy was implemented by granting authority to export cotton only after domestic requirements had been assured. However, in 1966 cotton exports were freed of quota restrictions. Cotton imports are made prohibitive by high import duties.

## Textiles

Expansion of the cotton textile industry has enabled Brazil to become self-sufficient in total cotton textile requirements. However, a better balance of cotton goods might well be desirable to consumers. Although imports are negligible, exports of cotton textiles have increased irregularly in recent years.

At present, there seems to be no regular flow of shipments to particular countries. In the late 1950's, Western Europe took most of Brazil's textile export offerings. Later, other members of the Latin American Free Trade Association were major recipients.

More recently, shipments to Western Europe have resumed, and sizable quantities have moved to the United States. Brazil's exports of cotton fabric totaled 28 million-square yards in 1964. About three-fourth moved to the United Kingdom. In 1964, shipments of yarn totaled 1.3 million pounds, mostly to the United States. In 1965 and 1966, Brazil's shipments of textile goods expanded dramatically; with most of the impact felt in the United States.

Brazilian export statistics for 1966 are unavailable, but U. S. import data show that in the 12 months ending with July 1966, more than 95 million equivalent square yards of cotton textiles entered the United States. Piece goods and yarn comprised a substantial part.

## THE TEXTILE INDUSTRY

The domestic textile industry is one of Brazil's most important in terms of its contribution to national income. This single industry provides employment for about one-fourth of the workers in the nation's manufacturing sector.

Brazil's textile industry was established before the turn of this century. Except for a few relatively short periods, growth has continued for several decades; and, for most of its existence, the industry has been the dominant one in South America. At present, the cotton

section of Brazil's industry is substantially larger than the cotton textile industries in all other South American nations combined.

A comprehensive study of the Brazilian textile industry published by the United Nations in 1963 verified the widely held impression that much of the industry's equipment needed to be replaced if it were to meet high standards of technical efficiency. In recent years, modernization programs have been implemented in many Brazilian textile organizations. A number of the na-

tion's mills are now considered quite modern in every respect. On the other hand, little improvement in operations has occurred in a substantial part of the industry.

On December 31, 1964, Brazil had 3.9 million spindles and 97,000 looms operable for cotton use. Cotton spindles are increasing in number, while loom numbers, as indicated below, are declining as more efficient equipment replaces old machines:

In Place Dec. 31	Spindles 1,000	Looms 1,000
1955-----	3,361	110
1956-----	3,391	112
1957-----	3,453	116
1958-----	3,474	119
1959-----	3,700	127
1960-----	3,840	103
1961-----	3,880	103
1962-----	3,700	107
1963-----	3,935	110
1964-----	3,900	97

Brazil's cotton textile industry is concentrated in and around the nation's large cities. The State of São Paulo accounts for over one-third of total capacity. Other important textile States in the South are Guanabara, Minas Gerais, and Santa Catarina. Aggregate capacity in the Northeast is estimated at about 15 percent of the nation's total. With a few exceptions, plans to improve efficiency in cotton textile mills have moved ahead faster in the South than in the Northeast.

Inasmuch as Brazil produces a rather wide range of staple lengths of cotton, Brazilian mills are more ably supplied than the textile industries of most other producing countries that prohibit imports of cotton. Most Brazilian mills buy their cotton in the open market, but a few of the small northern mills buy locally produced seed cotton and operate their own gins. Quite generally, the mills in North Brazil utilize only cotton grown in the North. However, mills in South Brazil, where the major part of the industry is located, draw cotton from both producing zones.

The nation has experienced a long-term uptrend in cotton consumption. However, in recent years, the industry has been plagued with troublesome inventories and credit shortages. Annual domestic use has held between 1.2 million bales and 1.4 million since 1960. This compares with an annual average of 1.1 million bales in 1955-59, and 0.9 million in 1950-54. As expected, Sao Paulo State leads in cotton consumption.

Considerable optimism about a future of higher consumption is justified, because of Brazil's increasing population and a probable gradual rise in real levels of living. Per capita consumption of cotton in Brazil exceeds the average for Latin America, but much room

Table 6.—Consumption of cotton in specified areas and States of Brazil, annual 1960-65<sup>1</sup>

Area and state	1960	1961	1962	1963	1964	1965
	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>
South:						
São Paulo..	587	607	622	604	597	539
Minas						
Gerais ..	193	207	211	211	207	197
Rio de						
Janeiro ..	103	105	101	107	98	81
Guanabara	87	92	108	97	102	119
Santa						
Catarina	51	53	55	55	55	51
Total <sup>3</sup> ..	1,021	1,064	1,097	1,074	1,059	987
Northeast <sup>3</sup> ..	269	308	343	335	282	254
Total Brazil	1,290	1,372	1,440	1,409	1,341	1,241

<sup>1</sup> Year beginning January 1; data cannot be compared exactly with data in Table 1. <sup>2</sup> 480 pounds net. <sup>3</sup> Data for the Northeast include relatively small quantities consumed in unlisted southern states.

Brazilian statements to the 19th, 20th, and 25th annual Plenary Meeting, International Cotton Advisory Committee.

still exists for improvement. Total textile availability per capita for 1963 was about 9.7 pounds, of which cotton accounted for about 7.8 pounds, according to 1963 data compiled by the Food and Agriculture Organization of the United Nations. These levels are slightly higher than averages of 9.0 and 7.4 pounds, respectively, during 1950-54.

Cotton's share of the fiber market has held above 80 percent for many years. However, since 1960, non-cellulosic fibers have gained a small, growing share of the market at the expense of other manmade fibers, cotton, and wool.

Future developments in Brazil's textile industry depend to a considerable extent upon whether the stockholders and management of existing firms will be willing and able to work out changes within their firms. Much new investment will be required, of which a sizable proportion would be foreign exchange to import machinery not available locally. Brazil's foreign exchange situation is now stronger than in most recent year, but even if liberal foreign credits were granted, much of the total job would still be left to the local industry. Under any likely circumstances, progress in the Northeast surely will lag behind that in the South. In the Northeast, a severe shortage of credit is the major impediment to progress in the textile industry, although a number of other factors such as labor practices, attitudes of management and owners, and transportation problems are important. Nevertheless, the future can be bright for Brazil's textile industry when a number of adjustments have been made. Of particular importance may be the current investment program whereby the Brazilian Government has earmarked for development of the Northeast a portion of the corporation taxes collected from the country as a whole.

