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BRAZIL'S COTTON Industry



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FOREWORD

This report presents information and analyses regarding current and prospective developments in the cotton economy of Brazil. It is one in a continuing series of studies by the Cotton Division, FCA, on countries that are major competitors of the United States in world cotton markets.

In recent years, Brazil has been the sixth largest producer of cotton in the world and the fourth largest exporter. Since 1970 Brazil also has become one of the world's major exporters of cotton textiles. As such, Brazil exerts an important influence on the market for U.S. cotton.

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Brazil's Cotton Industry

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SUMMARY AND CONCLUSIONS

Cotton in Brazil has a history of many ups and downs. Nevertheless, Brazil continues to have one of the world's most important cotton industries. During 1970-74 (years beginning August 1) production averaged 2.7 million bales (480 lb net) annually, exports nearly 1.0 million, and consumption, 1.6 million, Table 1.

As a producing country, Brazil was outranked during this period only by the United States, the USSR, the People's Republic of China (PRC), and India; and as an exporter, only by the United States, the USSR, Egypt, and Pakistan. Brazil now consumes more cotton in its mills than any other country except the PRC, the USSR, the United States, India, Japan, and Pakistan.

In Brazil, cotton contributes substantially to the rapidly expanding national economy. In 1973 the cotton crop, valued at 3.9 billion cruzeiros or around \$640 million, was Brazil's sixth most valuable crop, after soybeans, corn, rice, beans, and coffee. Cotton is one of Brazil's most valuable exports, earning \$218 million in 1973. It is the principal raw material for the textile industry (Brazil's largest employer) which provides jobs for over 300,000 people.

Brazil's cotton production declined for the third consecutive season in 1974/75, (August-July) to 2.4 million bales from 2.7 million in 1973/74 and a record 3.3 million bales in 1968/69. A further decline to 1.7 million bales appears likely in 1975/76, but with higher world prices for cotton some recovery in 1976/77 is possible.

Around two-thirds of Brazil's cotton grows in the South, largely in São Paulo and Paraná, and is harvested in March through June. Production in South Brazil peaked at 2.3 million bales in 1969/70 and again in 1971/72, but was down to 1.7 million bales in 1973/74 and 1974/75. Prospects are for only 1.0 million bales in 1975/76. Agriculture in this part of Brazil is highly commercialized. Some former cotton lands, particularly in Paraná, have been diverted to double cropping of wheat followed by soybeans. Other lands are being used for single-cropped soybeans, pasture, and food crops.

Lower cotton prices and rapidly rising costs caused farmer dissatisfaction in 1974/75. Prices late in 1975 were higher, however, and the Government began subsidizing fertilizer costs by 40 percent. South Brazil could grow much more cotton in the future but will not do so unless prices are high enough to compete with other crops and to provide adequate returns. Demand for food and feed crops is rising with rapid industrial development. The cost to grow a pound of cotton in South Brazil in 1974/75 was around 44 U.S. cents including land and overhead, which is about the same as the average for rain-grown cotton in the United States.

In Northeast Brazil, production in 1973/74 nearly equaled the record million bales attained in 1963/64 but declined to 690,000 in 1974/75. Most Northeast cotton is perennial tree or "Moco" cotton, unique in the world of cotton, that grows for several years before replanting. This type of cotton usually is interplanted with food crops. Its low yields are associated with ability to survive for long periods of drought. Moco cotton production is not particularly sensitive to price and has practically no competition as a cash crop. Production can vary considerably from year to year because of weather conditions. The crop is harvested largely from August to November. Production in 1975/76 was 605,000 bales.

In recent years the staple length of South Brazilian cotton has increased from being mostly 1" or under in staple length, to 1-1/32" and 1-1/16" with some 1-3/32". Most Northeast cotton is 1-1/32" to 1-3/32", but some is longer and some shorter. South Brazilian cotton has fairly low micronaire readings and apparently produces more waste than U.S. cotton generally. A problem in the Northeast is the deterioration of varieties. All Brazilian cotton is rain-grown and saw-ginned with the exception of some longer staple Serido cotton in the Northeast which is roller-ginned. Practically all is handpicked, but there now may be 300 mechanical pickers in South Brazil.

Consumption of cotton in Brazil was in the doldrums for many years, totaling 1,250,000 bales in 1960 and

TABLE 1. BRAZIL: COTTON AREA, YIELD, PRODUCTION, IMPORTS, DISAPPEARANCE, AND STOCKS, 1947-75¹

| Year beginning August 1 | Area ¹ | Production | | Imports | Disappearance | | | | Stocks | |
|-------------------------|--------------------|------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | Lint | Yield | | Consumption | Exports | Destroyed | Total | Change during year | On July 31 |
| | <i>1,000 acres</i> | <i>Lb</i> | <i>1,000 bales</i> | <i>1,000 bales</i> | <i>1,000 bales</i> | <i>1,000 bales</i> | <i>1,000 bales</i> | <i>1,000 bales</i> | <i>1,000 bales</i> | <i>1,000 bales</i> |
| 1947 | 4,400 | 137 | 1,260 | 0 | 850 | 1,049 | 9 | 1,908 | -648 | 1,188 |
| 1948 | 4,100 | 175 | 1,500 | 0 | 885 | 955 | 10 | 1,850 | -350 | 838 |
| 1949 | 4,500 | 138 | 1,300 | 0 | 850 | 598 | 20 | 1,468 | -168 | 670 |
| 1950 | 5,300 | 149 | 1,650 | 0 | 850 | 697 | 20 | 1,567 | +83 | 753 |
| 1951 | 5,100 | 183 | 1,950 | 0 | 825 | 347 | 18 | 1,190 | +760 | 1,513 |
| 1952 | 4,500 | 166 | 1,560 | 0 | 850 | 145 | 15 | 1,010 | +550 | 2,063 |
| 1953 | 4,000 | 175 | 1,465 | 0 | 890 | 1,400 | 13 | 2,303 | -838 | 1,225 |
| 1954 | 4,500 | 176 | 1,650 | 0 | 1,000 | 1,036 | 14 | 2,050 | -400 | 825 |
| 1955 | 5,000 | 163 | 1,700 | 0 | 1,050 | 810 | 15 | 1,875 | -175 | 650 |
| 1956 | 4,300 | 145 | 1,300 | 0 | 1,040 | 380 | 5 | 1,425 | -125 | 525 |
| 1957 | 3,700 | 175 | 1,350 | 0 | 1,050 | 215 | 10 | 1,275 | +75 | 600 |
| 1958 | 4,000 | 168 | 1,400 | 0 | 1,150 | 242 | 8 | 1,400 | 0 | 600 |
| 1959 | 4,600 | 177 | 1,700 | 0 | 1,180 | 446 | 14 | 1,640 | +60 | 660 |
| 1960 | 5,000 | 187 | 1,950 | 0 | 1,250 | 695 | 5 | 1,950 | 0 | 660 |
| 1961 | 5,500 | 220 | 2,525 | 0 | 1,350 | 847 | 13 | 2,210 | +315 | 975 |
| 1962 | 5,500 | 200 | 2,300 | 0 | 1,250 | 1,145 | 5 | 2,400 | -100 | 875 |
| 1963 | 5,750 | 192 | 2,300 | 0 | 1,300 | 1,023 | 2 | 2,325 | -25 | 850 |
| 1964 | 5,750 | 175 | 2,100 | 0 | 1,150 | 1,040 | 0 | 2,190 | -90 | 760 |
| 1965 | 5,500 | 218 | 2,500 | 0 | 1,275 | 937 | 3 | 2,190 | +285 | 1,045 |
| 1966 | 5,000 | 188 | 1,960 | 0 | 1,275 | 1,014 | 0 | 2,264 | -329 | 716 |
| 1967 | 5,600 | 226 | 2,640 | 0 | 1,275 | 836 | 14 | 2,100 | +515 | 1,231 |
| 1968 | 6,500 | 243 | 3,300 | 0 | 1,350 | 1,765 | 0 | 3,090 | +185 | 1,416 |
| 1969 | 6,800 | 218 | 3,090 | 0 | 1,375 | 1,933 | 0 | 3,285 | -218 | 1,198 |
| 1970 | 6,100 | 177 | 2,250 | 18 | 1,390 | 1,011 | 25 | 2,410 | -158 | 1,040 |
| 1971 | 6,400 | 234 | 3,120 | 5 | 1,450 | 1,409 | 0 | 2,859 | +266 | 1,306 |
| 1972 | 5,700 | 251 | 2,975 | 1 | 1,650 | 1,333 | 0 | 2,983 | -7 | 1,299 |
| 1973 | 5,650 | 226 | 2,657 | 1 | 1,800 | 661 | 0 | 2,461 | +197 | 1,496 |
| 1974 | 5,475 | 206 | 2,355 | 0 | 1,750 | 269 | 0 | 2,019 | +366 | 1,862 |
| 1975 (prelim) | — | — | 1,665 | 0 | 1,885 | 367 | 0 | 2,252 | -587 | 1,275 |

¹ Compilation of Foreign Agricultural Service, U.S. Department of Agriculture. Acreage figures are considerably smaller than those of Brazilian Ministry of Agriculture, notably to take account of interplanting with other crops in Northeast Brazil. Bales are 480 lb net.

1,350,000 in 1969. Thereafter a period of rapid expansion and modernization in the textile industry set in, carrying the cotton consumption total to 1.8 million bales in 1973/74 with a moderate decline to an estimated 1,750,000 bales in recession-ridden 1974/75. Most of the expansion was to produce textiles for export stimulated by import privileges, special tax treatments, and other Government incentives aimed at increased processing of Brazilian raw materials at home.

The cotton equivalent of cotton textile exports is estimated to have increased from 83,000 bales in 1970 to 353,000 in 1973, then declined moderately to 322,000 in 1974. In 1975 it appears that the export

equivalent reached a new peak of nearly 400,000 bales because of a record export of cotton yarn. Further increases seem likely in the future, considering efforts being made to open markets in the developed countries and the continued expansion of the Brazilian textile industry.

The domestic offtake of cotton textiles has continued to rise but has lagged behind increases in population and income. Brazil's per capita consumption of textiles is still quite low—5.0 kilograms per year, compared with 24.9 in the United States, 15.8 in the European Community, and 7.4 in Argentina—but consumption is likely to rise as incomes increase further. Cotton's share

of the market declined from 81 percent in the 1960-64 period to 63 percent in 1973, while the percentage taken by manmade fibers rose from 15 percent to 36 percent. This compares with 68 percent taken by manmades in 1973 in the United States. Synthetic fiber prices in Brazil, however, are much higher than those in the United States.

Exports of raw cotton from Brazil peaked at 1,935,000 bales in 1969/70, but since have declined rapidly, totaling only 660,000 bales in 1973/74 and around 270,000 bales in 1974/75.

With consumption rising rapidly and production actually declining, there has been less cotton available for export. In 1973, Brazilian mills became concerned about rapidly rising cotton prices and possible shortages of cotton, with the result that the Government restricted exports for a time. In 1974, world prices fell rapidly just as the South Brazilian crop was coming on the market.

THE RAW COTTON INDUSTRY

History and Commercial Importance

When European explorers reached Brazil in the early sixteenth century, they found cotton growing along the coast, not only in the north but south to the present State of São Paulo. Today in the little settled regions of the Amazon, the most definite sign of a nearby Indian tribe is the presence of perennial cotton. Cotton was used by the Indians to make cloth, cordage, fishing nets, and other artifacts. A prevalent variety was *Gossypium barbadense* var. *brasiliense* or "rim de boi" (ox kidney) cotton, so named because of the shape of the seeds. This perennial cotton is of the same species as Egyptian and Pima cottons, and is considered by botanists to have developed in response to the needs of the peoples in the moist, tropical forests of Brazil.¹

The first European settlers in Brazil immediately planted cotton, probably "rim de boi," which was handspun and woven into coarse fabrics for clothing slaves and the poorer classes. Old records in Maranhão, where the first cotton plantations began to flourish, indicate the use of balls of cotton yarn as money. Cotton exports were prohibited in Maranhão from 1703 to 1756 because officials feared the money supply soon would be exhausted if exports of cotton were promoted.

Another presettlement variety of cotton in Brazil was *Gossypium hirsutum*, var. *marie-galante*, commonly

Support prices became out of line with the world price level, exports came to a near stop, and stocks rose rapidly.

Exports are expected to recover to 365,000 bales in 1975/76. World prices in dollars have moved up and cruzeiro prices have gone still higher because of frequent mini devaluations in exchange rates. Although taxes on exports were reimposed on January 1, 1976, Brazil had a large carryover of cotton, and sales were higher in the early months of the new season.

Future prospects for raw cotton exports are highly dependent on the world price level. If cotton prices are high enough to compete with prices for other crops and to cover costs, both much higher than a few years ago, cotton production will at least hold its own; otherwise it will decline. If cotton production is not expanded further, however, it appears that there will be less and less raw cotton available for export from Brazil because of rising domestic consumption.

known as Moco cotton. This cotton, of the same species but a different variety than American Upland, is a perennial that grows as a large shrub or small tree up to 20 feet high. It became the common cotton of the dry areas of the Spanish Main, the West Indies, and northeastern South America.

Production of cotton, practically entirely perennial, tree-type, and largely in the North and Northeast, expanded only slowly during the sixteenth and seventeenth centuries. By 1775, however, cotton was an important item in Brazilian exports and in 1810 approximately 12,000 bales (480 lb net) were exported through the port of Pernambuco alone. The first factories for spinning and weaving cotton utilizing skilled workmen from India, were established in Minas Gerais about 1775, but such mills encountered opposition from the Portuguese Government. Various restrictions and prohibitions were not relaxed until the 1840's.

The invention of the cotton gin in 1793 and the rapid development thereafter of cotton growing in the United States brought on a decline in world cotton prices that caused cotton production in Brazil to level off between 1800 and 1860. In 1801 production was estimated at 75,000 bales; in 1831, 79,000; in 1861, 75,000. Interest revived, however, during the U.S. Civil War, when the thriving European textile industry was largely cut off from U.S. cotton and prices rose to high levels. British interests encouraged Brazilians to rapidly expand their output by shipping some seed, undoubtedly of the annual *Gossypium hirsutum* var. Upland, to São Paulo, where cotton production was also promoted by cotton planters moving to Brazil from the U.S. South soon after

¹ Hutchinson, J. B., Silow, R. A., and Stephens, S. G., *The Evolution of Gossypium*, Oxford University Press, 1947, page 102.

the Civil War. Although annual cotton had been introduced into Brazil some 20 years earlier in Minas Gerais, this was the first attempt to grow such cotton on a large scale.

Brazil's cotton exports rose from around 51,000 bales annually during 1859-61 to a peak of 362,000 in 1872/73. With the return of the United States to the cotton trade after 1865, Brazilian exports, which came almost entirely from the Northeastern states, receded less than 100,000 bales annually from 1890 to 1920 (Table 2). Cotton production in São Paulo, however, was developing slowly during this period to supply a developing textile industry that had 734,928 spindles in 1905 and 1,512,626 in 1915.

By 1924/25, Brazil was producing 738,800 bales of cotton, of which 124,047 were in São Paulo. Although world cotton prices fell after 1929, coffee prices fell much more drastically and coffee growers turned to cotton production. Brazilian cotton production rose from 571,000 bales in 1929/30 to 2.5 million bales in 1940/41, of which 1.7 million bales were in São Paulo. After World War II, production was down to 1.3 million bales in 1947/48, 1949/50, and again in 1956/57. Thereafter, cotton production again picked up to an alltime record of 3.3 million bales in 1968/69. The export peak of 1,609,000 bales in 1938/39 was not surpassed until 1969/70 when 1,933,000 bales were exported.

Production Areas

Brazil's cotton production is almost entirely concentrated in two centers about a thousand miles apart. Seventy percent is in the region northwest and west of the city of São Paulo in South Brazil. The other 30 percent is in the Northeast hump. Practically no commercial cotton is produced in the vast Amazon basin.

In South Brazil, São Paulo continues to be the most important cotton State with production often totaling over a million bales. Although less than 900,000 bales were produced in 1973/74 and 1974/75, São Paulo still accounts for half of South Brazil's production. Historically, cotton culture began in the eastern part of the State and then spread to the western extremities. However, today cotton production again is moving eastward, with the leading production area centered around Campinas, not many miles west of the city of São Paulo.

Cotton production in northern Paraná increased rapidly during the 1960's but has subsided a little since that time. The State usually grows 500,000-700,000 bales, or 30 percent of South Brazil's cotton production.

A boom in production of cotton occurred in the early 1970's around Santa Helena in southern Goiás, roughly 250 miles southwest of Brasília, but enthusiasm has been dampened by two successive crop failures. Production in 1974/75 was only 76,000 bales, compared with 351,000

TABLE 2. BRAZIL: QUANTITY OF COTTON PRODUCED AND EXPORTED AND VALUE OF COTTON EXPORTED IN RELATION TO TOTAL EXPORTS, BY DECADES, 1821-1970

| Decade | Production | | | Value of cotton exported as percentage of total exports | Decade | Exports ¹ | | |
|-----------------|-----------------|-------------|---------|---|--------------------|----------------------|------------------|---------|
| | 1,000 bales | 1,000 bales | Percent | | | 1,000 bales | 1,000 bales | Percent |
| 1821-30 | ² 67 | 56 | 20.0 | 1901-10 | ³ 325 | 89 | 2.1 | |
| 1831-40 | ² 79 | 53 | 11.0 | 1911-20 | ³ 411 | 70 | 2.0 | |
| 1841-50 | ² 63 | 51 | 7.5 | 1921-30 | ³ 528 | 105 | 2.4 | |
| 1851-60 | ² 83 | 65 | 6.2 | 1931-40 | ⁴ 1,560 | 715 | 14.3 | |
| 1861-70 | ² 75 | 133 | 18.4 | 1941-50 | ⁴ 1,670 | 903 | 11.3 | |
| 1871-80 | — | 176 | 9.5 | 1951-60 | ⁵ 1,603 | 560 | 6.2 | |
| 1881-90 | — | 105 | 4.2 | 1961-70 | ⁵ 2,496 | ⁵ 1,155 | ⁶ 6.6 | |
| 1891-1900 . . . | — | 73 | 2.5 | | | | | |

¹ "Evolution of Brazilian Cotton Plantations," *Conjuntura Economica*, No. 5, 1970.

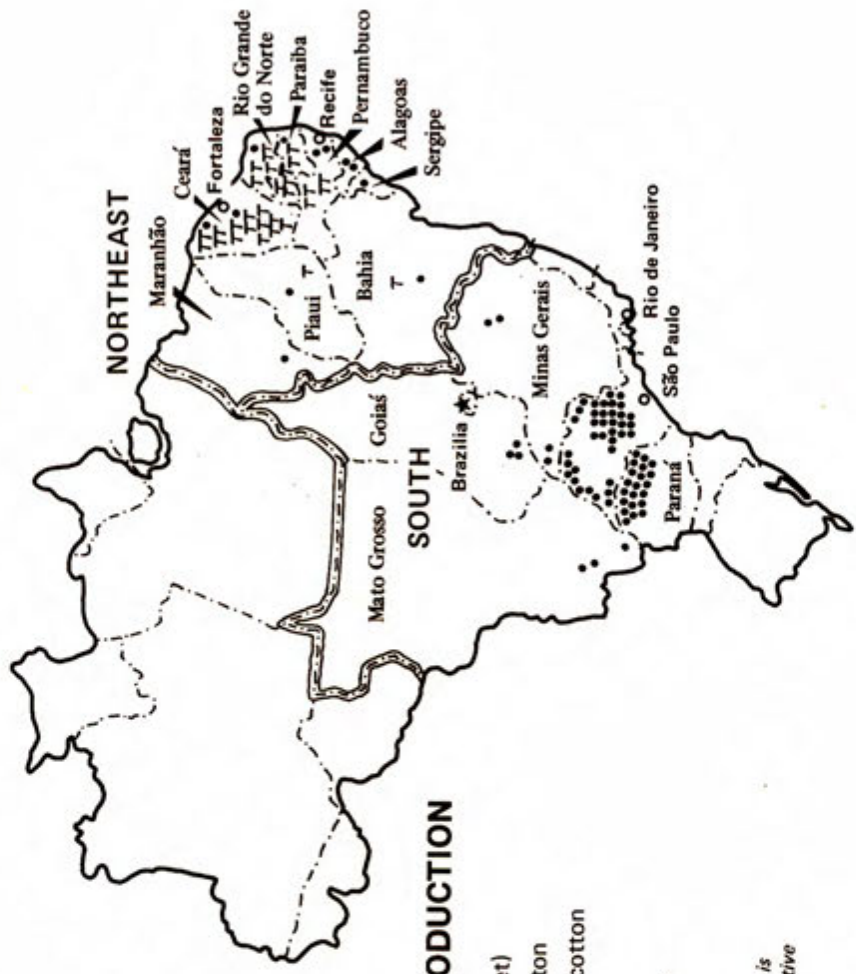
² For beginning year of decade. McHenry, George, *The Cotton Trade*, published originally in 1863.

³ Manuscript by Erwin P. Keeler, 1935.

⁴ "International Cotton Advisory Committee," *Cotton World Statistics*, April 1959.

⁵ USDA, FAS.

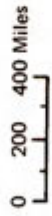
⁶ 1961-69 only.



BRAZIL'S COTTON PRODUCTION

25,000 Bales (480 lbs. net)

- American upland cotton
- T Serido or sertao tree cotton



Boundary Representation is not Necessarily Authoritative

bales in 1971/72, but many Brazilians still consider this area the land of the future for cotton production.

An area of limited cotton production, around 50,000 bales annually, is located in the valley of the Rio São Francisco in Minas Gerais, which is approximately 500 miles north of Rio de Janeiro. Production has not varied much in recent years. Another 50,000-75,000 bales are raised in the Triângulo Mineiro, in the southwestern extremity of Minas Gerais. Also, a little cotton, 50,000-75,000 bales, is grown in the southern extremity of Mato Grosso, not far from the Paraguay border. A few small areas along the coast are planted to cotton in the States of Rio de Janeiro and Espírito Santo.

The Northeast cotton region, where 30 percent of Brazil's cotton is grown, fans out for 500 miles northwest, west, and southwest of Recife and Natal, two of Brazil's port cities located on the eastern extremity of the hump. Ceará is the most important cotton State, producing 367,000 bales in 1973 and 248,000 in 1974. Paraíba, Pernambuco, and Rio Grande Do Norte are also important, each producing around 100,000 bales or more in 1974.

An aggregate of between 100,000 and 180,000 bales are produced annually in the States of Sergipe, Bahia, Piauí, and Maranhão.

Land Resources

According to a survey by FAO and UNESCO, "an outstanding feature of South American soils is their low natural fertility."²

Regions rated as poor in soil fertility include all of Brazil except the Northeast hump and the region extending generally west and northwest of the city of São Paulo in São Paulo State, Paraná, and southern Mato Grosso, Goiás, and Minas Gerais. Brazil's cotton production is located almost entirely in these areas. The red soils in São Paulo and adjacent States are noted for their fertility.

Most of the Northeast hump, however, has water deficiency problems which are overcome by using a highly drought-resistant, perennial variety. Western Mato Grosso, not yet settled to any extent, has poor drainage problems. Steepness of the terrain is not much of a problem in Brazil, but the rolling, hilly areas in São Paulo State and Paraná are not as adaptable to mechanical cultivation as is much of the terrain farther west and northwest. In the vast Amazon Valley, soils deteriorate rapidly under traditional methods of cultivation and are soon exhausted. High rainfall and temperatures create chemical reactions that cause a loss of organic matter in soils, leaching, and that encourage weeds and pests.

² *Soil Map of South America*, World Soil Resources Reports 34, 1968, p. 247 of explanatory text.

A quarter of a century ago there was still a rugged agricultural frontier in Paraná. Semimigratory workers and itinerant farmers cleared virgin land by slashing and burning. Owners could expect decades of profitable crop production with minimum technological investment before fertility decreased enough to halt ordinary crop production. Today, however, much of the usable land in Paraná, São Paulo, and western Minas Gerais has been cleared or put in pasture. The opportunity for further expansion by traditional methods in the south-central States is nearly gone.³ In fact, some of the land on the western frontier of São Paulo and Paraná has been turned over to pasture after being in cotton for a number of years and losing some of its fertility.

A few years ago the Brazilian Ministry of Agriculture completed an exploratory soil survey of the western two-thirds of Brazil, which showed that around 470 million acres have good potential for cultivated crops without irrigation, if advanced technology is applied. The areas identified have good soil structure and texture, receive adequate rainfall, are not very susceptible to erosion, and could be mechanized. In contrast, new land of high productive potential that could be cultivated under present farming methods, such as that used in nearly all of Brazil, was estimated at only 24 million acres.

The soil survey also found that an additional 516 million acres of less desirable soils could be brought under cultivation in western Brazil by applying advanced technology, but that only 16 million acres could be cultivated by using currently employed farming methods. By comparison, Brazil had approximately 74 million acres under crops in 1970, including around 6 million acres net in cotton. This compares with 333 million acres under crops in the United States, including 11 million acres in cotton.⁴

Some consider Brazil to be the cotton land of the future. With its huge undeveloped areas, Brazil would not feel the pressure felt in many other cotton-producing countries to grow food or feed crops instead of cotton. However, the most desirable lands for cotton and competitive crops are already largely in cultivation. New areas usually will require substantial investments, much of which will depend on whether cotton prices are remunerative.

In January 1975, the President of Brazil announced a "Polocentro" plan to cost \$12 billion to develop Brazil's 320 million acres of "Cerrados." "Cerrados" refers to a vast, thinly settled savanna area covering most of Goiás, large parts of Mato Grosso and Minas Gerais, and smaller portions of some neighboring States. "Cerrados" soils

³ Johnson, Robert W., "Trade Implications of Brazil's Agricultural Frontier," *Foreign Agriculture*, July 13, 1970.

⁴ *Ibid*, July 13, 1970.

generally have low fertility, high acidity, and aluminum toxicity. In structure they are usually very porous and will not hold moisture so that a 2-week dry spell in the middle of the growing (rainy) season can be disastrous. Resources totaling \$1.3 billion are to be made available for fiscal incentives, special credits, and infrastructure. Through this project, an estimated 4.4 million acres are expected to be brought into production with such crops as soybeans, corn, rice, cotton, and manioc.

Weather and Climate

South Brazil's cotton area is on the Tropic of Capricorn, a latitude similar to that of Havana or central Mexico. This is in a transition zone between tropical and subtropical conditions. Although there are occasional frosts, which at times have greatly damaged Brazil's coffee tree plantations, the frost-free season is more than adequate for cotton. The date of the last frost in spring and the first in fall are not of vital importance to growers as they are in the United States.

In South Brazil, cotton is planted in October and November and harvested mainly from March through June. This is a situation of some value economically because cotton comes on the market at a time several months removed from that of most other cotton-producing countries.

As noted by Carns and Mauney, cottonseed germination and subsequent seedling growth in the United States are adversely affected by temperatures under 60° F.⁵ A comparison of average temperatures during the growing season in Brazil and the United States is given in Table 3.

⁵ Carns, H. R. and Mauney, Jack R., *Advances in Production and Utilization of Quality Cotton*, Iowa State University Press, 1968.

In South Brazil, temperatures are about the same at planting time as at planting time in cotton-growing centers of the United States, but somewhat lower during the peak of the growing season and a little higher at harvest time.

Temperatures might be adequate for cotton in some areas farther south than present cotton lands in the States of São Paulo and Paraná, but there is greater danger of inadequate temperatures for cotton development and these States appear to be better suited in temperature for such crops as wheat and soybeans. Even in present cotton areas, particularly Paraná, low temperatures at planting time can prejudice the early development of the crop. Since no important mountains run from east to west in South America, east of the Andes, winds blow freely from Tierra del Fuego to Amazonas, which can result in quite low temperatures for such low latitudes.⁶ Practically all of the rest of Brazil farther north, however, would be suitable for cotton if temperatures were the only consideration.

With minor exceptions, none of Brazil's cotton is irrigated. In South Brazil, cotton is grown in areas where the average annual rainfall is 40-60 inches a year. This is comparable to the Mississippi Delta and eastward in the United States but far in excess of the precipitation received in irrigated cotton regions of the United States.

South of the present cotton zone in South Brazil, most areas have rainfall of 60 to 100 inches a year, which would be excessive for cotton. The same would be true for almost all of the vast Amazon basin, which receives 60-120 inches of rain or more a year.

In **Northeast Brazil**, some annual cotton is grown in a narrow belt that usually is not far from the coast and in

⁶ *Soil Map of South America*, FAO and UNESCO, Chap. 2.

TABLE 3. TEMPERATURES DURING COTTON GROWING SEASON IN BRAZIL AND THE UNITED STATES¹

[Fahrenheit]

| Period | Brazil South Sao Paulo | Brazil NE Quixeramobin | U.S. Memphis, Tennessee | U.S. Lubbock, Texas | U.S. Fresno, California |
|----------------------------------|------------------------------|------------------------------|-------------------------------|---------------------------|-------------------------------|
| Planting time | 66-69 | 82-84 | 67 | 69 | 64 |
| Peak of growing season | 71-75 | 80-82 | 82 | 80 | 81 |
| Picking time | 67-70 | 82-83 | 63 | 49 | 64 |

¹ For purpose of this illustration, planting, peak, and picking times are considered to be as follows: São Paulo, October-November, February, April; Quixeramobin, January-March, July-August, October-November; Memphis, April 15-May 15, July, October; Lubbock, May, July, November; Fresno, April 15-May 15, July, October. Data are normals from National Oceanic and Atmospheric Administration.

places is actually on it. Practically all of the 40-60 inches of rain in this area falls from March through August. A little farther inland, rainfall dwindles to 20-40 inches or less, and largely occurs from January through May. Under these conditions, only tree cotton with its extensive deep root system is able to survive.

Occasionally, little or no rain falls in this semidry belt. A drought in 1953 brought the total number of dry periods for this area to 26 in 250 years, including the most severe one which lasted from 1877 to 1879.⁷ Another one occurred in 1958, and a drought in the 1970/71 cotton year caused production to decline to 373,000 bales, compared with over 860,000 bales in the preceding and following years. According to one authority, years with as little as 6 inches or less of rain occur in fairly regular cycles, approximately every 6 years.⁸ On the other hand, rains extending into September reduced yields in 1973/74, while yields were lower in 1974/75 as a result of too much rain as the fall picking season began.

South Brazil has a decided rainy season that coincides with the growing period for cotton. At planting time, average rainfall is comparable to rainfall in the central belt of the United States but with less possibility of the crop being rained out (Figure 1). Occasionally, as in 1971/72, germination of cotton in South Brazil can be affected by cold weather and lack of needed rainfall.

Excessive rainfall, however, is probably the greatest hazard faced by the South crop. After planting time, rainfall normally increases rapidly in this area, but it generally declines in U.S. rain-grown areas. At the peak of the growing season, rainfall in São Paulo normally is twice as great as in Little Rock, Ark., or Memphis, Tenn. And in one of every five seasons rainfall may be 12-15 inches per month in January and February, which is more than three times the average rainfall for Little Rock or Memphis in June and July.

As for cotton picking time, rainfall normally declines in March in South Brazil and by April should be comparable to the central belt of the United States in the fall. If the end of the rainy season is delayed and rainfall is heavy in March, both the quality and quantity of the crop will be adversely affected. Reports speak of "untimely rainfall" in March in São Paulo reducing yields in 1971/72 and of April rains in Goiás ruining the 1972/73 cotton crop in that State. In 1974/75 the cotton crop estimate for South Brazil was reduced because of heavy rains and low temperatures in December and early January.

⁷ *Cotton of Brazil's Northeastern States*, published about 1963 by the Sanbra cotton organization in Brazil.

⁸ Demetriadi, M. A., Long Staple Cotton in Northeast Brazil, *Empire Cotton Growing Review*, July 1973.

Although most of Brazil is not suitable for the production of present commercial varieties because of excessive rainfall or too low temperatures, there are extensive unsettled areas northwest of São Paulo in the central west region, where temperatures and rainfall are suitable for cotton.

Similarly there are large unsettled areas in the Northeast in which tree cotton could survive. Other areas, such as east and north of Brasília could support annual cotton under irrigation but irrigation facilities are scarce.⁹

Variety Development

South Brazil—Cotton grown in South Brazil is of the American Upland (*Gossypium hirsutum*) variety. Cottonseed for planting is developed and multiplied for South Brazil almost entirely by the Cotton Section, Agronomic Institute of Campinas (IAC), of the Secretariat of Agriculture, State of São Paulo. Official Paulista varieties are cultivated exclusively, not only in São Paulo but also in Paraná, Goiás, and Mato Grosso. In Minas Gerais, an SL-7 variety provided by the Sete Lagoas Experiment Station also is cultivated on a small scale.

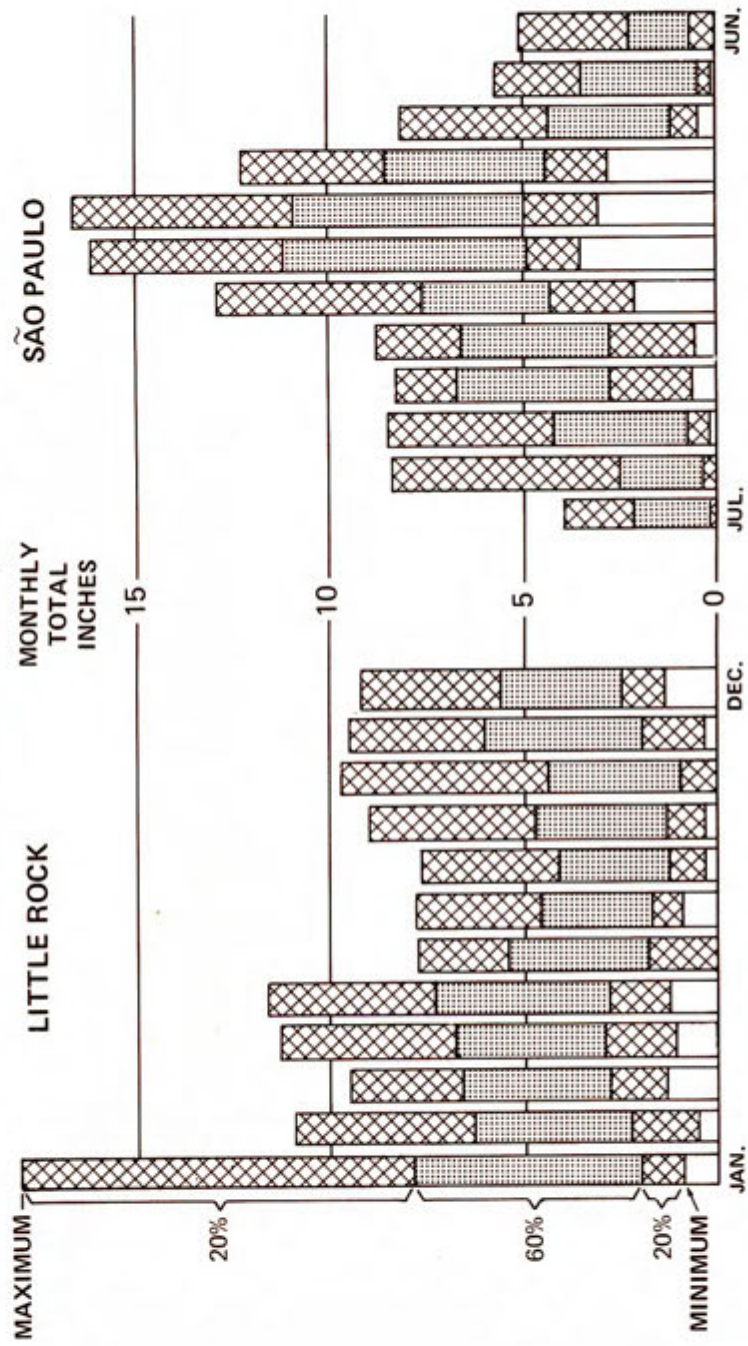
In the State of São Paulo, "genetic seed" is developed by experiment stations of the Agronomic Institute. Such seed then is multiplied into "basic seed" at cooperating farms, notably Santa Genebra and Monte d'Este in the municipality of Campinas, under control of officials and technical personnel of the cotton section of the Agronomic Institute and technicians of CATI (Coordinator of Integrated Technical Assistance). Cotton is ginned at an IAC gin.

Thereafter, there are "A" and "B" multiplication levels at other cooperating farms before general use. Purchase of seed and ginning is under direct control of official technical personnel. Ginned seed is sent to collection points where it is delinted mechanically and cleaned. Seed thus prepared is sold by specified agricultural firms acting as agencies for the Secretariat of Agriculture of the State of São Paulo and is the only seed legal for plant purposes. Varieties sold in each region are in accordance with results of regional trials by the Agronomic Institute.

Present varieties in South Brazil are based on selections from such U.S. lines as Auburn 56, Rex, Deltapine, and an Acala strain introduced from the United States many years ago. The thrust of the research program over the years has been to increase yields and fiber lengths. Since 1957 a major objective has been to develop varieties resistant to wilt, which began to sweep the region at that time.

⁹ *Soil Map of the World*, FAO and UNESCO, Chap. 2.

~ SÃO PAULO, BRAZIL'S AND LITTLE ROCK, ARKANSAS' RAINFALL INTENSITY, 1931-60



Source: World Meteorological Organization, Geneva.

In São Paulo State, the leading variety in 1971 was IAC-12, but in 1974/75, IAC-13.1 accounted for 40 percent of production, IAC-RM₃ for 35 percent, and IAC-RM₄, 25 percent. IAC-13.1 is considered the best variety when wilt resistance is not much of a problem, although it does have such resistance to a limited extent. It is the preferred variety for the eastern two-thirds of the State. If greater wilt resistance is needed, IAC-RM₃ and IAC-RM₄ are preferred, and they are the recommended varieties for the extreme western third of the State. A reduction of 5 to 10 percent in yields is sacrificed, however, in order to gain the increased wilt resistance.

Present plans call for continued use of IAC-13.1 in the areas with few wilt problems. It is expected that a new wilt resistant variety, IAC-16, selected from IAC-RM₄, will be introduced in 1975/76 and still another such variety, IAC-17, selected from IAC-RM₃, will be introduced in 1976/77.

For all of South Brazil, IAC-13.1 accounted for around 70 percent of production in 1974/75. The remainder was wilt resistant varieties. Over the years, both the yield and staple length of South Brazilian cotton have improved as indicated in the section on quality.

Northeast Brazil—The situation as to varieties in Northeast Brazil is much more complicated than in South Brazil, and somewhat confusing. Brazilian authorities note that a *Gossypium barbadense* L., commonly

known as Quebradinho (kay-bra-deeno), is produced in rainy zones in West-Central Maranhão. In Bahia, there is some production of *Gossypium barbadense* var. *brasiliensis*, or "rim de boi" cotton. Production of these varieties is very limited and the staple length of 1 inch is much shorter than that obtained from *barbadense* varieties in Egypt, the Sudan, Peru, and the United States.

The most widely used variety in the Northeast, accounting for two-thirds of the production, is known locally as Mocó (Table 4). This cotton apparently is constituted from a mixture of several types: Mostly *Gossypium hirsutum*, Marie galante strain, but also *Gossypium barbadense* var. *brasiliense* (Rim de Boi) and *Gossypium hirsutum*, strain *latofolium*¹⁰.

Mocó is a perennial, the seed of which is usually planted between December and March. This variety begins to bear the first year but maximum yields are between the second and fifth or sixth year. Often, however, it is 7 to 10 years after planting before farmers go to the trouble of replanting. A study by the Instituto Nordestino de Fomento de Algodão e Oleaginosas

¹⁰ Demetriadi, M. A., "Long staple cotton in Northeast Brazil," *The Empire Cotton Growing Review*, July 1953; Pinheiro, Deodato, Fournier, J., and Treilu, A., "Physiology and Breeding of Brazilian Perennial Moco cotton," *Cotton Et Fibres Tropicales*, June 1970.

TABLE 4. BRAZIL: APPROXIMATE DISTRIBUTION BY VARIETIES OF COTTON IN NORTHEASTERN STATES, 1973/74

[In 1,000 metric tons of lint]

| State | Perennial Mocó | | | Annual Upland or Mata | Total |
|---------------------------|----------------|--------|-------|--------------------------|-------|
| | Serido | Sertão | Total | | |
| Pernambuco | 2 | 15 | 17 | 13 | 30 |
| Paraíba | 11 | 16 | 27 | 11 | 38 |
| Rio Grande do Norte | 15 | 4 | 19 | 10 | 29 |
| Ceará | 5 | 75 | 80 | 5 | 85 |
| Bahia | — | 3 | 3 | 7 | 10 |
| Sergipe | — | — | — | 3 | 3 |
| Alagoas | — | — | — | 6 | 6 |
| Piauí | 1 | 4 | 5 | 1 | 6 |
| Maranhão | — | — | — | 3 | 3 |
| Total | 34 | 117 | 151 | 59 | 210 |

Source: Commercial estimates.

(INFAOL) notes the following yields: 1st year, 107 pounds per acre; 2nd year, 222; 3rd, 184; 4th, 145; and 5th, 107.

Mocó cotton is divided commercially into three classes: Sertão, which grows in drier areas and has a staple length of 1-1/16 to 1-3/16", Serido, which grows under somewhat better conditions than Sertão and has a staple length from 1-1/8" to 1-3/16"; and Sertão Zinho, or little Sertão, which grows under poor soil and climatic conditions with a staple length of 1 to 1-1/32". These three are commercial types, based somewhat uncertainly on commercial classing by staple lengths rather than any distinction in botanical varieties.¹¹ Some distinction, however, is apparent in the growing areas.

Mocó cotton is characterized by very low yields per acre, partly because it is interplanted with other crops and partly because its low yields are associated with ability to survive without irrigation during long periods of drought because of its deep root system. Alternative cash crops that will grow in the dry region of Brazil are hard to come by. Thus, it appears Mocó is at least holding its own.

In the Northeastern States, an extensive program to develop Mocó cotton production, including variety development and selection, is conducted by the Northeast Institute for the Development of Cotton and Oilseeds (INFAOL). In addition, State governments, a thread manufacturing concern, and cotton marketing companies have been active in this field. Considerable economic incentive is offered for breeding work to maintain and increase the staple length because of the needs of the Brazilian textile industry. Progress has been slow, however, because of the nature of the plant and the primitive conditions under which it is grown.

While perennial Mocó cotton accounts for most of the cotton grown in the Northeast, more than one-fourth is Upland cotton (*Gossypium hirsutum*-Upland), known locally as Mata. This cotton is grown in the heavier rainfall belt at or near the coast where dependable rainfall is available.

A few years ago, certified seed of the São Paulo IAC-13 variety was brought into the Northeast. According to merchants, it was characterized by high yields, a

highly uniform staple of 1-1/32," and good quality. Financial returns to the farmer were considered good. Problems developed, however, because farmers often did not realize that this variety required a considerably higher level of care. Yields would be good one year and poor the next, depending on weather conditions. Soon the IAC-13 seed degenerated and became mixed with nondescript Upland seed already there. Also, it was planted in areas for which it was not suited. By 1973/74, average yields were at the low figure of 115 pounds per acre. In 1975 an attempt was again made to try a new variety from the South that had been adapted for use in the Northeast for 2 or 3 years. Unlike those in the South, Northeast State governments do not control the selling of seed to farmers.

Planting of Mata indiscriminately has caused in some cases a mixing with Mocó cotton with unsatisfactory results. Also, in marketing, keeping the varieties separate has been a problem.

Planting and Harvesting Schedule

In São Paulo State, cotton is usually planted between October 10 and November 20; in Minas Gerais and Goiás during October; and in Paraná during October and November. Generally, the best results are obtained in São Paulo and Paraná when the cotton is planted early in October. Planting after mid-November results in greatly reduced yields. The later cotton is planted the more likely it is to run into bad weather at harvest time. Also, it is desirable to complete cotton picking before coffee harvesting begins and labor becomes scarce.

Picking takes place in South Brazil from March to June. In 1975, an estimated 85 percent of the harvest was completed by the end of May and 98 percent by the end of June.

In Northeast Brazil, Upland annual or Mata types are planted in April and May. Picking usually gets underway in Paraíba and Rio Grande do Norte in October and finishes by January. In Pernambuco, however, because of higher altitudes, cotton matures later and is not ready to be picked until around December 1. Picking usually is not completed until February.

The perennial Sertão and Serido types usually are planted between December and March, often before the first rain. The crop is harvested from August to November.

¹¹ Ibid. 7.

ACREAGE AND PRODUCTION TRENDS

Annual production of cotton in North Brazil, South Brazil, and all of Brazil is given for the 1900-75 period. Supply and distribution figures, detailed acreage, yield and production data for 1950 to 1974 are given in Table 5.

Brazilian cotton production can rise rapidly if economic conditions are right, but it also can fall rapidly. Production shot up in the 1930's and early 1940's from around 500,000 bales annually to a peak of nearly 2.7 million bales in 1943/44. Thereafter, production slumped to less than 1.4 million bales in 1947/48, 1949/50, and again in 1956/57 and 1957/58. Then, a strong upward trend carried cotton production to an alltime record of 3.3 million bales in 1968/69. Production in 1974/75, however, was down to 2.4 million bales and in June 1976 it appeared that the 1975/76 crop would be only 1.7 million bales.

Over the decades there have been upward trends in cotton production in both North and South Brazil.

South Brazil accounted for 69 percent of the national production in 1950-54 (years beginning August 1), 65 percent in 1955-59, 63 percent in 1960-64, 68 percent in 1965-69, and 72 percent in 1970-74. Nearly a million acres were taken out of cotton in South Brazil between 1971 and 1974, about half of it in São Paulo State in 1972 and most of the remainder in Goiás in 1973 and 1974. Nevertheless, 1974 acreage was larger than it was in 1955-59. Average yields have been rising over the years in South Brazil, from 210 pounds per acre in 1950-54 to 338 in 1970-74. The latter compares with an average 1970-74 yield in the U.S. Delta of 539 pounds and in the U.S. Southwest of 341 pounds.

Yields can vary greatly with weather conditions. In São Paulo State, for example, the yield was 330 pounds

PRODUCTION OF COTTON IN NORTHEAST AND SOUTH BRAZIL, 1900-75

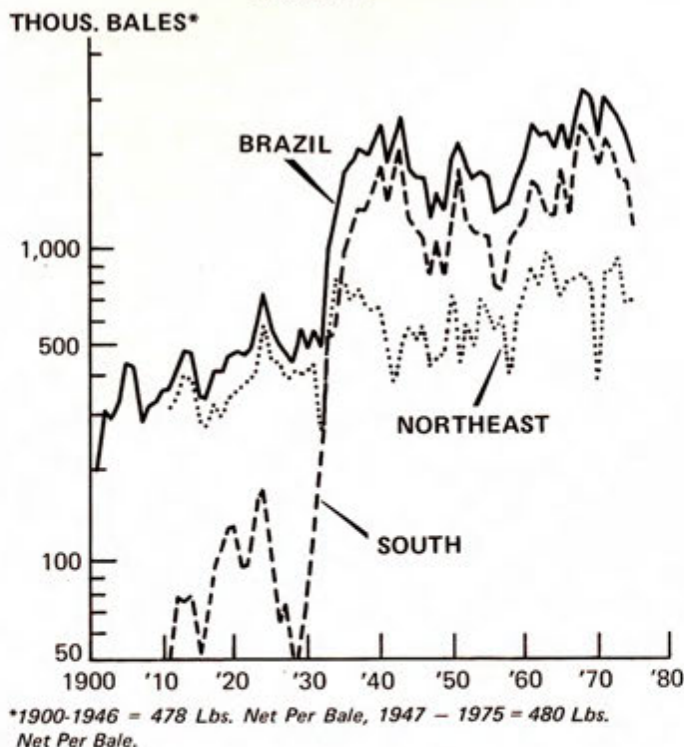


TABLE 5.-BRAZIL: PRODUCTION, AREA, AND YIELD OF COTTON, 1970-74

| Crop year beginning August 1 | South Brazil | | | | | Northeast Brazil | | | | | Total all Brazil | | |
|------------------------------|------------------------------------|--------|--------------|-------|-------|------------------|-------|---------|------------|---------------------|------------------|-------|-------|
| | São Paulo | Paraná | Minas Gerais | Goiás | Other | Total | Ceará | Paraíba | Pernambuco | Rio Grande do Norte | | Other | Total |
| | <i>1,000 bales of 480 lbs. net</i> | | | | | | | | | | | | |
| PRODUCTION | | | | | | | | | | | | | |
| Average: | <i>1,000 bales of 480 lbs. net</i> | | | | | | | | | | | | |
| 1950-54 | 1,083 | 89 | 74 | 21 | 20 | 1,287 | 120 | 135 | 130 | 103 | 92 | 580 | |
| 1955-59 | 719 | 193 | 97 | 24 | 11 | 1,042 | 160 | 150 | 95 | 31 | 551 | 1,593 | |
| 1960-64 | 921 | 314 | 120 | 40 | 43 | 1,438 | 305 | 185 | 130 | 140 | 82 | 842 | |
| 1965-69 | 967 | 651 | 92 | 55 | 64 | 1,829 | 330 | 160 | 105 | 110 | 150 | 855 | |
| 1970-74 | 965 | 592 | 121 | 174 | 64 | 1,916 | 276 | 136 | 115 | 109 | 120 | 756 | |
| Annual: | | | | | | | | | | | | | |
| 1970 | 1,045 | 561 | 87 | 115 | 70 | 1,878 | 125 | 75 | 55 | 45 | 75 | 375 | |
| 1971 | 1,070 | 592 | 160 | 351 | 77 | 2,250 | 331 | 122 | 133 | 117 | 167 | 870 | |
| 1972 | 1,041 | 641 | 119 | 228 | 66 | 2,095 | 310 | 175 | 140 | 130 | 125 | 880 | |
| 1973 | 868 | 560 | 111 | 101 | 52 | 1,692 | 367 | 184 | 156 | 138 | 120 | 965 | |
| 1974 | 803 | 605 | 125 | 76 | 56 | 1,665 | 248 | 125 | 92 | 115 | 110 | 690 | |
| 1975 | - | - | - | - | - | 1,000 | - | - | - | - | - | 665 | |
| AREA | | | | | | | | | | | | | |
| Average: | <i>1,000 acres</i> | | | | | | | | | | | | |
| 1950-54 | 2,411 | 193 | 220 | 55 | 63 | 2,942 | 784 | 656 | 555 | 749 | 533 | 3,277 | |
| 1955-59 | 1,311 | 343 | 319 | 66 | 48 | 2,087 | 947 | 826 | 706 | 833 | 746 | 4,058 | |
| 1960-64 | 1,489 | 654 | 256 | 61 | 114 | 2,574 | 1,429 | 1,010 | 931 | 1,050 | 1,156 | 5,576 | |
| 1965-69 | 1,115 | 954 | 392 | 99 | 111 | 2,671 | 2,701 | 1,092 | 820 | 1,206 | 1,151 | 6,970 | |
| 1970-74 | 1,255 | 732 | 369 | 243 | 124 | 2,723 | - | - | - | - | - | - | |
| Annual: | | | | | | | | | | | | | |
| 1970 | 1,495 | 1,025 | 269 | 119 | 120 | 3,028 | 2,897 | 1,196 | 898 | 1,199 | 1,110 | 7,300 | |
| 1971 | 1,557 | 718 | 401 | 377 | 155 | 3,208 | 3,088 | 1,268 | 966 | 1,235 | 1,173 | 7,730 | |
| 1972 | 1,063 | 633 | 438 | 377 | 150 | 2,661 | 3,288 | 1,372 | 879 | 1,241 | 1,209 | 7,989 | |
| 1973 | 1,102 | 612 | 419 | 226 | 90 | 2,449 | 3,125 | 1,253 | 1,003 | 1,249 | 1,276 | 7,906 | |
| 1974 | 1,059 | 673 | 317 | 114 | 105 | 12,268 | - | - | - | - | - | - | |
| YIELD | | | | | | | | | | | | | |
| Average: | <i>Lb per acre</i> | | | | | | | | | | | | |
| 1950-54 | 216 | 221 | 161 | 183 | 152 | 210 | 73 | 99 | 112 | 66 | 83 | 85 | |
| 1955-59 | 263 | 270 | 143 | 175 | 110 | 240 | 81 | 87 | 65 | 66 | 20 | 65 | |
| 1960-64 | 297 | 230 | 225 | 315 | 181 | 268 | 102 | 88 | 67 | 64 | 34 | 72 | |
| 1965-69 | 416 | 328 | 113 | 267 | 277 | 329 | 59 | 70 | 61 | 44 | 63 | 59 | |
| 1970-74 | 369 | 388 | 157 | 344 | 248 | 338 | - | - | - | - | - | - | |
| Annual: | | | | | | | | | | | | | |
| 1970 | 336 | 263 | 155 | 464 | 280 | 298 | 21 | 30 | 29 | 18 | 32 | 25 | |
| 1971 | 330 | 396 | 192 | 447 | 238 | 337 | 51 | 46 | 66 | 45 | 68 | 54 | |
| 1972 | 470 | 486 | 130 | 290 | 211 | 378 | 45 | 61 | 76 | 50 | 50 | 53 | |
| 1973 | 378 | 439 | 127 | 215 | 277 | 332 | 56 | 70 | 75 | 53 | 45 | 59 | |
| 1974 | 364 | 432 | 189 | 320 | 256 | 352 | - | - | - | - | - | - | |

Compiled from official Brazil Federal and state publications and from trade sources.

¹Estimated at 1,485,000 acres in 1975 yielding 323 lbs. per acre.

per acre in 1971/72, 470 in 1972/73, and 378 pounds in 1973.

Acreage planted to cotton in Northeast Brazil, according to available data, has been rising from an average of 3.3 million acres in 1950-54 (years beginning August 1) to 7.9 million in 1973/74. However, cotton is interplanted with other crops and net acreage figures undoubtedly are much lower.

Yields in Northeast Brazil remain very low, substantially less than 100 pounds per acre on a gross acreage

basis, with no indication over the years of an upward trend. The only region rivaling Northeast Brazil in low yields would be the Deccan Plateau in India and a few countries in Africa.

Nevertheless, production in Northeastern Brazil in 1973 nearly equaled the million-bale record set in 1963 and is likely to exceed that record in the not too distant future. This would entitle the Northeast, by itself, to be one of the 10 most important cotton-producing countries in the world.

FACTORS AFFECTING PRODUCTION

Bringing New Lands into Cultivation

Beginning in the 1930's, the rapid expansion of cotton acreage and production was largely associated with the clearing of virgin forests. For a time, this was particularly true of western São Paulo State, but when all the better soil areas had been cleared, new land ceased to be much of a factor. The area in crops in São Paulo State has remained at the same level since the early 1960's, although there have been substantial increases in areas in pasture.

After São Paulo's frontier clearing ceased as a factor in cotton area, interest shifted to northern Paraná where clearing accounted for much of the expansion in cotton acreage during the 1960's and some of the expansion in soybeans in the early 1970's. However, by now land clearing largely has subsided in Paraná also.

Quite typically, in periods of rapid agricultural expansion around the world much land may be planted to a crop such as cotton, that is not best suited for the purpose in the long run. After a while, fertility declines and problems with insects and disease increase. While ultimately better use of the land may be for pasture or other crops, cotton yields and returns may be sufficient at first to pay off the heavy costs of clearing the forest and establishing farms.

Some of the land planted in cotton not long ago in western São Paulo State and northwestern Paraná now has been converted to pasture. On the other hand, cotton is reported to have gained in some of the older areas in São Paulo State.

Goiás was hailed not long ago as the land of the future for cotton in Brazil, and acreage, largely reclaimed from brush land, rose rapidly in the late 1960's and early 1970's. However, two successive crops were ruined by too much rain, and enthusiasm has been dampened. At the same time, opinion still is expressed that during most years cotton can be grown very satisfactorily in this area, and that with 1 or 2 good years the current downward trend will be reversed.

Obviously plenty of land also is available in Minas Gerais and particularly Mato Grosso, where acreage remains very small but has been characterized by an upward trend.

In the Northeast much of the gain in the extensive interplanted cotton acreage in recent years has been from bringing new land into cultivation. The present gradual rising trend in cotton acreage is expected to continue because of the suitability of tree cotton for the region and the lack of competition for cotton as a cash crop.

Rising Yields

Area planted to cotton in São Paulo declined very drastically during the 1950's, principally because many marginal farmers withdrew who were disappointed with low yields caused by unfavorable weather, increased insect attacks, and soil depletion.¹² Cotton remained then only on farms best suited for the purpose. With rapid improvements in agricultural technology, yields rose rapidly. Cotton yields in São Paulo are reported to have risen at a faster rate than those of any other crop, averaging 369 pounds per acre during 1970-74 (August-July) compared with 297 pounds a decade earlier, and 216 two decades earlier. São Paulo's peak yield of 470 pounds was in 1972/73.

Yields vary frequently from 1 year to the next with weather conditions, but the average of 352 pounds in 1974/75 for all of South Brazil compares with an average of 329 during 1965-69 (August-July) and 240 pounds during 1955-59.

Yields in South Brazil, however, still are quite low, compared with some of the other rain-grown areas of the

¹² Missiaen, Edmund and Ruff, Samuel O., *Agricultural Development in Brazil—A case study of São Paulo*, Econ. Res. Serv., U.S. Dept. Agr., June 1975, p. 13.

world, and further progress can be made. The average for Mississippi in 1969-73, for example, was 610 pounds per acre and for Central America, 708 pounds.

Lint yields per acre in Northeast Brazil at around 60 pounds in 1973, are among the world's lowest, comparable only to those for rain-grown cotton in the dry areas of the Deccan Plateau in central India, and in certain areas in Africa. However, the low yield apparently does not take into account the fact that most cotton is interplanted with other crops that are counted into the cotton area.

Over the years, yields in Northeast Brazil have remained level at best or may even have deteriorated slightly.

Seventy-three percent of the cotton acreage in Northeast Brazil was planted to tree cotton which, with a 30-percent outturn of lint from seed cotton, produced only 62 pounds per acre in 1973/74. Although Upland seed from South Brazil was planted in some of the heavier rainfall areas, statistics indicate an average lint yield of only 115 pounds per acre, which is far below that of South Brazil and generally elsewhere for annual Upland cotton.

Obviously, yields could be substantially increased for both tree and annual Upland cotton by the application of modern technology, as some farms have demonstrated, by employing such measures as breeding and careful selection of seed; moisture conservation practices; supplemental irrigation, particularly for annual Upland cotton; and application of fertilizer in situations where it would be financially rewarding.

The problem is that cash returns per acre under extensive dry land cotton agriculture, as practiced in Northeast Brazil, are low and funds available for inputs are limited. Considering this and the subsistence nature of the bulk of farming done in the Northeast, cotton yields in Northeast Brazil cannot be expected to gain very rapidly.

Competition from Other Crops

South Brazil—Acreage and value of cotton production in relation to other crops in South Brazil and Northeast Brazil are given in Table 6. Changes in crop acreages in São Paulo, the leading cotton State, are given in Table 7.

In the producing States of Southern Brazil, cotton is the fifth most important crop in annual value. Competition between the various crops and use of land for pasture has been intense over the years, both on newly cleared land and established tracts. Cotton competes for developed land with such perennial crops as coffee and pasture, as well as with such annuals as corn, peanuts, soybeans, and rice. Land is often shifted to coffee or pasture from annual crops; the reverse seldom occurs on

a permanent basis except when coffee is abandoned as a result of soil depletion or freeze damage.

Over a million acres were taken out of cotton in São Paulo in the early 1950's, when world cotton prices were falling as an aftermath of the Korean crisis. This million plus acres apparently went into corn, rice, sugarcane, peanuts, and pasture.

Cotton acreage in São Paulo rose from 838,000 acres in 1967/68 to 1,735,000 acres in 1969/70, apparently because of favorable growing conditions for a year or two and as a reaction to a cotton crop failure in the Northeast.

Since then, cotton acreage has declined by 676,000 acres, although it still is higher than in 1966/67 or 1967/68. In these 5 years, notably soybeans, as well as oranges, sugarcane, coffee, and miscellaneous crops have gained, while acreage in peanuts, corn, and rice as well as cotton has declined. A further substantial decline in cotton acreage in 1975/76 was taking place because of unfavorable cotton prices for the preceding crop.

In the 1930's the rapid increase in cotton production in São Paulo was associated with low prices and a hard freeze that put many coffee plantations out of business. A sharp decline in São Paulo's coffee area during 1962-64 under a coffee eradication program, however, had little effect on cotton acreage. A few years ago it was thought that coffee rust would cause diversion to other crops, but apparently this problem has been controlled and some increase in coffee acreage currently is taking place.

Sugarcane is a crop that gives cotton and even coffee strong competition for high yielding land to the extent that milling capacity is available. Although Government controls have kept farmers from capturing much of the recent upward movement in sugar prices, sugar acreage in São Paulo has been steadily increasing and sugarcane is now the second most important crop in area and value.

Soybean production in South Brazil has been increasing very rapidly, from 2.1 million tons in 1971 to 9.6 million tons in 1975. The bulk of this production is in Rio Grande do Sul and Paraná, where soybeans are double cropped with wheat.

Although 35 percent of Brazil's soybeans are in Paraná, the second most important cotton State, a 25 percent increase in soybean production is expected there in 1976. The soybean expansion in this State thus far has had a minimal effect on cotton acreage, which has been stable since 1971.

In São Paulo, soybean production has been increasing steadily and acreage is now nearly as great as that of cotton. Unlike farther south, soybeans are grown as a single crop, mostly on large mechanized farms. Production centers mainly around Ribeirão Preto, but is spreading to other areas of the State, particularly the

TABLE 6. SOUTH AND NORTHEAST BRAZIL: COTTON IN RELATION TO OTHER CROPS¹

| Crop | Area | | | | Value of production ² | | | |
|-------------------------|--------------------|--------------------|----------------|----------------|----------------------------------|------------------------|----------------|----------------|
| | 1970 | 1973 | 1970 | 1973 | 1970 | 1973 | 1970 | 1973 |
| SOUTH BRAZIL | <i>1,000 acres</i> | <i>1,000 acres</i> | <i>Percent</i> | <i>Percent</i> | <i>Million dollars</i> | <i>Million dollars</i> | <i>Percent</i> | <i>Percent</i> |
| Rice | 8,556 | 7,854 | 20 | 19 | 326 | 448 | 16 | 12 |
| Corn | 13,483 | 12,495 | 31 | 29 | 300 | 494 | 15 | 14 |
| Coffee | 5,197 | 4,523 | 12 | 11 | 280 | 611 | 14 | 17 |
| Beans | 4,433 | 4,146 | 10 | 10 | 197 | 355 | 10 | 10 |
| Cotton | 3,313 | 2,905 | 8 | 7 | 191 | 316 | 10 | 9 |
| Sugarcane | 2,038 | 2,209 | 5 | 5 | 176 | 251 | 9 | 7 |
| Cassava | 997 | 1,002 | 2 | 2 | 89 | 146 | 4 | 4 |
| Peanuts | 1,602 | 1,194 | 4 | 3 | 79 | 92 | 4 | 3 |
| Soybeans | 943 | 2,936 | 2 | 7 | 32 | 326 | 2 | 9 |
| Wheat | 761 | 973 | 2 | 2 | 32 | 53 | 2 | 1 |
| Other | 1,763 | 2,063 | 4 | 5 | 289 | 510 | 14 | 14 |
| Total | 43,086 | 42,300 | 100 | 100 | 1,991 | 3,602 | 100 | 100 |
| | Area | | | | Value of production ² | | | |
| | 1969 | 1973 | 1969 | 1973 | 1969 | 1973 | 1969 | 1973 |
| NORTHEAST BRAZIL | | | | | | | | |
| Cotton | 7,580 | 7,907 | 29 | 28 | 107 | 326 | 13 | 18 |
| Beans | 3,724 | 4,154 | 14 | 14 | 103 | 271 | 12 | 15 |
| Cassava | 2,482 | 2,607 | 10 | 9 | 111 | 245 | 13 | 13 |
| Sugarcane | 1,497 | 2,004 | 6 | 7 | 123 | 230 | 14 | 12 |
| Rice | 1,906 | 2,140 | 7 | 7 | 46 | 77 | 5 | 4 |
| Corn | 5,096 | 5,434 | 19 | 19 | 62 | 106 | 7 | 6 |
| Cocoa | 1,004 | 937 | 4 | 3 | 104 | 159 | 12 | 9 |
| Sisal | 768 | 248 | 3 | 1 | 19 | 74 | 2 | 4 |
| Other | 2,035 | 3,314 | 8 | 12 | 181 | 362 | 22 | 19 |
| Total | 26,092 | 28,745 | 100 | 100 | 856 | 1,850 | 100 | 100 |

¹ South Brazil includes only São Paulo, Paraná, Minas Gerais, Mato Grosso, and Goiás for purpose of this table; Northeast Brazil only Maranhão, Piauí, Ceará, R.G. do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, and Bahia.

² Converted from cruzeiros, 4.09 per U.S. dollar in 1969, 4.5246 in 1970, and 6.079 in 1973.

Source: *Anuário Estatístico do Brasil*, 1970, 1971, and 1973; some data for Northeast from Banco do Nordeste do Brasil.

peanut area near Marília. Substantial land tracts, previously used for cotton, are now occupied by soybeans.

Peanuts are most competitive with cotton in sandier soil areas and offer little competition on São Paulo's red soils. Rice is relatively stronger on poorly drained areas than on well-drained soils.

Recent studies indicate that cotton acreage responds to changes in price more than any other major crop in South Brazil. For other crops, the response is inelastic; that is, changes in planted area are proportionately less than the related changes in price.¹³

¹³ *Ibid.*¹².

The considerable drop in world cotton prices in 1974/75 had its effect on cotton acreage in South Brazil during that season and again in 1975/76. Much higher prices for cotton in the spring of 1976, compared to prices a year earlier, could well result in increased cotton planting in 1976/77.

Over the years, the development of São Paulo into the largest industrial and commercial metropolis of Latin America, as well as increasing population in a number of other urban areas, has provided Brazilian farmers with a rapidly increasing market for staple food crops, perishables, and poultry and livestock with their supporting feed requirements. Cotton prices, closely related to world price levels, frequently have not provided profits as high as those from the other commodities.

TABLE 7. CHANGES IN CROP AREAS IN SÃO PAULO STATE, HARVEST YEARS 1950-1974

[In Acres]

| Item | Area | | | | | | Change in area | | |
|------------------------|--------------------|--------------------|--------------------|--------|--------|--------|--------------------------|--------------------------|--------------------|
| | 1950 | 1960 | 1970 | | | | 1950-60 | 1960-70 | |
| Total farmland . . . | 46,969 | 47,700 | 50,888 | | | | ¹ + 731 | +3,188 | |
| Forest, uncult, etc. . | 15,078 | 11,525 | 10,008 | | | | ² -3,553 | -1,517 | |
| Pasture | 21,369 | 24,394 | 29,086 | | | | +3,025 | +4,692 | |
| Cropland | 10,522 | 11,782 | 11,794 | | | | +1,260 | + 12 | |
| | 1950-54 Average | 1960-64 Average | 1970-74 Average | 1970 | 1973 | 1974 | 1950-54 to 1960-64 | 1960-64 to 1970-74 | 1970 to 1974 |
| In crops: | 11,643 | 13,563 | 13,556 | 13,647 | 12,716 | 13,492 | +1,920 | - 7 | -155 |
| Cotton | 2,684 | 1,413 | 1,366 | 1,735 | 1,063 | 979 | -1,271 | - 47 | -756 |
| Coffee | 3,501 | 2,901 | 1,782 | 1,683 | 1,814 | 1,977 | - 600 | -1,119 | +294 |
| Corn | 2,177 | 3,299 | 3,588 | 3,647 | 3,212 | 3,188 | +1,122 | + 289 | -459 |
| Rice | 1,248 | 1,777 | 1,324 | 1,572 | 1,282 | 1,149 | + 529 | - 453 | -423 |
| Sugarcane | 556 | 1,213 | 2,011 | 1,873 | 1,982 | 2,150 | + 657 | + 798 | +277 |
| Peanuts | 358 | 983 | 954 | 1,107 | 667 | 519 | + 625 | - 29 | -588 |
| Soybeans | 5 | 12 | 403 | 166 | 494 | 828 | + 7 | + 391 | +662 |
| Oranges | 44 | 247 | 474 | 467 | 754 | 934 | + 203 | + 227 | +467 |
| Others | 1,070 | 1,717 | 1,653 | 1,399 | 1,448 | 1,769 | + 647 | - 64 | +370 |

¹ (+) Gains.² (-) Losses.

Source: Farmland and cropland data, Census of Agriculture of Brazil. Other data from "Modernization of Agriculture in the State of São Paulo" and "Prognostico", Instituto de Economia Agrícola, São Paulo.

Of course, the existence or absence of ginning or milling capacity, as well as market facilities, is sometimes an important factor in the level of the cotton production. Also, weather conditions in a given year may be more favorable to one crop than another.

Brazilian cotton producers (landowners) as a class have not been as well organized as coffee producers. Cotton producers also do not carry as much status as those producing coffee or livestock, as the latter provide stable employment on a year-round basis. Supporting Government and commercial organizations for cotton in the fields of research, financial backing, and marketing would seem to compare well with those of other commodities and certainly with those in other cotton-producing countries. The fact remains, however, that in South Brazil, competition for land between cotton and other crops must now be as intense as anywhere. The region has demonstrated that when cotton prices are high in relation to prices of other commodities, cotton can respond rapidly with increased production. When prices are low the opposite can happen.

Northeast—Cotton is the most important crop in the Northeast, accounting for more than a fourth of the acreage and 17.6 percent of the value of production in 1973. As noted elsewhere, cotton acreage statistics in this region may not be completely dependable. Variations in spacing of cotton in and between rows and widespread interplanting make the task of calculating the area in cotton quite difficult. Brazilian official statistics show 7.9 million acres were in cotton in 1973; FAS statistics indicate 3.4 million.

Other important crops in order of value are beans, cassava or manioc, sugarcane, cocoa, and corn. From 1969 to 1973 there was a substantial increase, according to available data, of over 2.5 million acres; in crops, of which 500,000 were in sugarcane, 325,000 in cotton, 430,000 in beans, and 338,000 in corn.

Cotton is not produced under an intensive cash crop farming system in Northeast Brazil as it is in the South. Northeastern perennial cotton areas are predominantly farmed on a subsistence basis. Cotton is produced for cash but is interplanted with beans, corn, and other

crops for home use. After harvesting, the land is grazed. When a drought occurs, production of both food crops and cotton falls below subsistence levels, and more families than usual leave home to work in nearby cities or elsewhere.

When the rains return, cotton begins to grow again, and returning families can expect their surviving cotton plants to provide some cash income within a few months. Droughts do kill many individual plants so that more than normal replanting may be necessary.

Cotton does not appear to have competition as a cash crop in most of the areas where it is grown, and acreage and production in the region appear to be following an upward trend. Sugarcane, grown in areas of heavier, assured rainfall, generally does not compete for cotton land. Sisal has gained some importance since World War II, but not much, if any, of its growth has been at the expense of cotton.

Production Cost

South Brazil is a highly commercial farming region. The key factor determining how much cotton is grown is whether net returns will be greater than for competitive crops.

Of course, over a period of years, returns must cover the cost of production absolutely or no cotton will be grown regardless of other crops.

Other important considerations in determining whether cotton or another crop is grown include: Capital requirements; credit availability; presence or absence of marketing and processing facilities; dependability of markets; alternative opportunities; and existing facilities as to machinery, technology, and investment.

Costs vary considerably from one area to another within the country and from farm to farm within the same community.

Economic studies indicate that in 1973/74 cotton was about halfway down the scale of cost per acre, compared with other crops grown in São Paulo State. In 1974/75, costs were higher and returns undoubtedly were much lower for cotton. Of the competitive crops, soybeans cost little to raise and gave a high return in 1973/74, but not as high as that of cotton. Truck crops cost more to raise but returns were high on limited acreages, particularly for potatoes. Such crops are risky, of course, because most of them are perishable, easy to overproduce, and the state of the market when the produce arrives is highly important.

Sugarcane costs much more to raise than cotton but returns were lower, no doubt, because of controls on prices. Coffee, which requires a few years to bring into bearing, had somewhat higher costs than cotton but gave a good return, Table 8.

Cost schedules indicate that the direct costs of raising cotton in South Brazil have risen much more steeply than in the United States. In South Brazil, it appears that the direct cost in 1970/71 at average yields was around 12 cents per pound of lint, which would have been less than for the majority of U.S. growers at about that time. By 1974/75, however, direct costs were comparable to those in the United States, Table 9.

Individual cost items in South Brazil and the United States are given in Table 10. Although wages generally are much lower in Brazil than in the United States, much more labor is used in producing the crop and labor costs are over three times higher. On the other hand, power and equipment, used to a considerably greater extent in the United States, cost much more per pound of lint than in Brazil. Cruzeiro costs for fertilizer in Brazil quadrupled from 1973/74 to 1974/75, and by then accounted for one-third of total production costs, but this rise was partly offset by a subsidy program in 1975.

Irrigation is not used in Brazil, while irrigation costs are important for much of the cotton grown in the United States.

In Brazil, as elsewhere, costs are lower if farmers are able to obtain high yields. In 1974/75 a private estimate indicated a net, direct cost of 29 cents per pound of lint for farmers obtaining 575 pounds of lint per acre, 34 cents for those obtaining 380 pounds and 42 cents for those obtaining only 190. These exclude overhead costs and provision for the cost of land.

The profitability of growing cotton in South Brazil declined in 1974/75 both because of higher costs, and a precipitous fall in cotton prices, which brought on reduced production in 1975/76. The economic relationship of cotton to other crops, however, appeared to be shifting in cotton's favor in 1976, which might result in increased plantings in September-October 1976. No data were obtained on the cost of cotton production in the Northeast. As noted elsewhere, most of the cotton, particularly the tree cotton types, is grown with few cash inputs.

Brazilian income tax legislation greatly favors agriculture. Most farmers do not pay income tax, and the small number who do pay are taxed on a somewhat lower taxable income and at a favored rate of 6 percent instead of the 30 percent on commercial and industrial enterprises.

Mechanization

South Brazil—In the countryside, many enterprises sell mechanical farming equipment, and a few sell mechanical cotton pickers. However, extensive use of human labor and animal power still is quite common. By now, almost all soil preparation for cotton planting is by

TABLE 8. OPERATING COSTS AND NET EARNINGS PER ACRE FROM VARIOUS CROPS, SÃO PAULO STATE, 1973/74 AND 1974/75¹

| Item | 1973/74 | | | 1974/75 | |
|--------------------|-------------------------|--------|----------------------------------|-------------------------|-----------------------|
| | Operating cost | Return | Return as percent operating cost | Operating cost | Increase over 1973/74 |
| | <i>Dollars per acre</i> | | <i>Percent</i> | <i>Dollars per acre</i> | <i>Percent</i> |
| Tomatoes | 2,119 | 1,125 | 53 | 3,228 | 52 |
| Potatoes | 503 | 1,280 | 255 | 644 | 28 |
| Coffee | 221 | 319 | 144 | 289 | 31 |
| Sugar | 213 | 68 | 32 | 265 | 24 |
| Cotton | 124 | 108 | 87 | 178 | 44 |
| Oranges | 86 | 107 | 124 | 131 | 52 |
| Manioc | 91 | 54 | 59 | 128 | 41 |
| Peanuts | 99 | 38 | 38 | 133 | 34 |
| Rice | 68 | 34 | 50 | 93 | 37 |
| Soybeans | 38 | 66 | 174 | 63 | 66 |
| Wheat | 36 | 22 | 61 | 62 | 72 |

¹ Converted at 6.555 cruzeiros per dollar for 1973/74 and 7.805 for 1974/75, prevailing rates in April 1974 and April 1975.

Source: Reports of Institute of Agricultural Economics, São Paulo.

TABLE 9: SUMMARY OF COTTON PRODUCTION COST DATA, SOUTH BRAZIL AND UNITED STATES
(In cents per pound of lint)

| Item | South Brazil | | | | | United States ¹ | | |
|---|----------------------|---------------------|----------------------|----------------------|---------------------|----------------------------|---------------------|---------------------|
| | 1970/71 ² | | 1973/74 ³ | 1974/75 ⁴ | | 1964-69 (Aug-July) | 1972/73 | 1974/75 |
| | 373 lb. per acre | 559 lb. per acre | 434 lb. per acre | 382 lb. per acre | 573 lb. per acre | 487 lb. per acre | 407 lb. per acre | 470 lb. per acre |
| Direct costs prior to ginning | 15.0 | 13.7 | 28.6 | 37.8 | 32.4 | 21.7 | 22.7 | 32.0 |
| Ginning | 2.6 | 2.6 | 4.6 | 5.4 | 5.4 | 3.8 | 4.5 | 5.5 |
| Subtotal | 17.6 | 16.3 | 33.2 | 43.2 | 37.8 | 25.5 | 27.2 | 37.5 |
| Less value of seed . . . | 5.3 | 5.3 | 10.4 | 9.1 | 9.1 | 4.1 | 4.1 | 8.0 |
| Direct cost, net . . . | 12.3 | 11.0 | 22.8 | 34.1 | 28.7 | 21.4 | 23.1 | 29.5 |
| Land and overhead . . . | 5.2 | 4.5 | (⁵) | 9.7 | 7.2 | 8.2 | 9.3 | 14.6 |
| Total cost | 17.5 | 15.5 | (⁵) | 43.8 | 35.9 | 29.6 | 32.4 | 44.1 |

¹ Average data for entire country: Irving R. Starbird, Econ. Res. Serv., U.S. Dept. of Agr.

² Private estimate, Horace G. Porter, FAS-M-232. São Paulo average yield in 1970/71, was 336 pounds per acre.

³ São Paulo average yield was 376 pounds per acre in 1973/74; based on data from Institute of Agricultural Economics, São Paulo.

Costs converted at 6.555 cruzeiros per U.S. dollar for São Paulo State.

⁴ Private estimates for São Paulo State where average yield was 388 pounds per acre; costs converted at 7.805 cruzeiros per U.S. dollar.

⁵ No data.

TABLE 10. DETAILED COTTON PRODUCTION COSTS, SOUTH BRAZIL AND THE UNITED STATES, 1973/74 AND 1974/75

(In cents per pound of lint)

| Item | South Brazil ¹ | | United States ² |
|-----------------------------------|---------------------------|------------|----------------------------|
| | 1973/74 | 1974/75 | 1974/75 |
| Labor | 520.61 18.3 | 6.555 17.3 | 7.805 5.6 |
| Power and equipment | 76.81 2.7 | 434 2.7 | 476 11.5 |
| Seed | 19.91 .7 | .7 | 1.5 |
| Fertilizer | 82.50 2.9 | 12.0 | 3.6 |
| Insecticides and fungicides | 68.28 2.4 | 3.3 | 4.0 |
| Irrigation | .0 | 130.86 0 | 2.8 |
| Other | 45.52 1.6 | 1.4 | 3.0 |
| Total farm operating cost | 28.6 | 37.4 | 32.0 |
| Ginning | 4.6 * | 5.4 * | 5.5 |
| Subtotal | 33.2 | 42.8 | 37.5 |
| Less value of cottonseed | 10.4 * 295.87 | 9.1 * | 8.0 |
| Total, direct cost | 22.8 | 33.7 | 29.5 |
| Land, interest, overhead | (³) | 9.3 | 14.6 |
| Total | (³) | 43.0 | 44.0 |

¹ Schedules of cost data converted at 6.555 cruzeiros per U.S. dollar for 1973/74 and 7.805 for 1974, which were prevailing rates at harvesttime. Original data from Institute of Agricultural Economics, São Paulo, except land, interest, and overhead which are from a private tabulation. Based on yields of 434 pounds of lint per acre in 1973/74; 476 pounds in 1974/75.

² Average for entire country: Irving R. Starbird, Econ. Res. Ser. U.S. Dept. of Agr. Average yield was 470 pounds per acre.

³ No data.

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tractors, which are manufactured in large numbers in Brazil and cost considerably less than in the United States. For example, a 55 horsepower model in Brazil costs \$5,500, compared to \$8,300 in the United States. Also buyers have subsidized credit and the privilege of no down payment and a 5-year repayment period.

Perhaps 50 percent of the planting and three-fourths of the cultivation, however, are by mule. Even on large farms, mules are still being used along with tractors.

In 1971, farmers belonging to the Campinas Central Agricultural Cooperative experimented with three mechanical cotton pickers. The following year the co-op purchased 10 used harvesters from Nicaragua, which reportedly have given promising results. In 1973, 49 new machines were imported from the United States at a cost of approximately 9.8 million cruzeiros, or around \$33,000 each. The harvesters were imported by the co-op through a private bank with financing at 7 percent per annum over 5 years "plus exchange corrections," and were sold to individual farmers.

By 1975, an estimated 300 mechanical cotton pickers were in South Brazil, of which 250 were in São Paulo.

This compares with only three or four pickers in 1971.

Nevertheless, only an estimated 5 percent of the 1974/75 crop was mechanically picked. Most of the cotton in Goiás, a new cotton area with relatively flat lands, now is picked by machine but not more than 10 percent in São Paulo and almost none elsewhere in South Brazil.

Cotton picking machines are not an unqualified success in Brazil. Much of the cotton terrain is hilly, making use of mechanical pickers difficult. Farmers are warned of the importance of leveling the soil as much as possible and completely removing sticks and stones. In addition the need for long, evenly and correctly spaced rows and for the use of herbicides and defoliant is emphasized.

Another problem is that gins in South Brazil generally are not equipped with the cleaning equipment needed to properly handle machine-picked cotton. An exception is a large new installation at the cooperative in Campinas.

Still it appears that South Brazil must mechanize rapidly if the cotton industry is to survive. The ever rising demand for labor by industries in the huge

business-industrial center of São Paulo, next door to many of Brazil's cotton fields, provides a strong incentive for workers to desert the cotton fields. In the short run the loss of many coffee trees because of cold weather in 1975 and an economic slow down, freed labor to work on cotton.

Northeast—The use of mechanical equipment in raising cotton still is extremely limited. Conventional harvesters cannot operate properly on tree cotton, which is the predominant type planted. Although experiments are being conducted with a back-carried, suction-pipe machine to pick tree cotton, the advantages of such equipment, compared with that of conventional methods is questionable. Small plots and lack of capital increase the difficulty of mechanizing any part of the production process.

Some of the experimental work being done in the Northeast is with mechanized dry farming techniques to conserve moisture.

The need for mechanical cotton picking was emphasized in 1973/74 when there was a shortage of labor in South Brazil. Cotton prices were high and rains interfered with the harvest. Cotton picking costs rose to the unprecedented levels of 14-22 cents per pound of lint, accounting for 30-40 percent of the entire cost of raising cotton before ginning. In 1974/75, despite rapid inflation in prices generally and in the cost of living, the cost of picking actually declined to around 6-9 cents per pound.

With a much lower world price for cotton, farmers could not pay anymore. Also, both coffee and cotton crops were smaller, easing the demand for labor. Third, the cotton bolls opened "all at once," making picking much easier than a year ago.

It is estimated that in Brazil a mechanical picker will harvest 26,000-33,000 pounds of seed cotton daily, compared with only 132-165 pounds by hand labor. One machine picker thus can do the work of 200 men.

Use of mechanization in place of hand labor and mule power means increased reliance on fuel. Gasoline cost the equivalent of \$1.02 a gallon in Brazil in April 1975, compared with 46 cents 2 years earlier. In April 1975, U.S. farmers paid an average of 47 cents from tank trucks. By January 1976 the Brazilian cost was up to \$1.60. Diesel oil cost 56 cents a gallon in Brazil in April 1975, compared with 39 cents in 1973, and the U.S. price in early 1975 of 37.4 cents per gallon.

Fertilizer Use

Virtually no fertilizer is used on most crops in the Northeast, but in the South many farmers now fertilize their crops. In general, soils in the southern cotton areas are relatively fertile, compared with those in the rest of Brazil, but even here fertility is exhausted rapidly under intensive crop use. Although rotation is recommended,

not much is done in actual practice. However, some switching from one crop to another is done because of prices and other economic considerations.

Most soils that have been cropped for several years become acid and badly leached. This has led to abandonment over the years of some former cotton growing areas. In recent years, however, the growing of cotton has been quite stable in regions with better soils, aided by rapidly rising use of fertilizer.

Cotton is a leading consumer of fertilizer in Brazil accounting for 15 percent of the country's entire consumption, despite the fact that it accounts for only 7 percent of the total southern crop acreage. It is exceeded only by wheat and sugar with 16 percent each. Like coffee, soybeans, and wheat, cotton takes 11 percent of the nitrogen. As for phosphate, sugar, soybeans, and cotton, each takes 15 percent of the total, but all are exceeded by wheat with 25 percent. With potash, cotton's 19 percent is exceeded by sugar's 22 percent.

Cotton farmers, like others in Brazil, have been under stress because of the rapid rise in fertilizer prices resulting from the world oil crisis, Table 11. Triple superphosphate was \$491 per metric ton in January 1975, compared with \$129 in 1973 and a U.S. price of \$236. Ammonia sulphate was \$269 in January 1975, compared with \$66 in January 1973 and \$163 in the United States in January 1975.

* Brazilian farmers complain that fertilizer accounted for one-third of the entire farm cost of producing cotton in 1974/75 and that they were placed at a decided disadvantage in relation to U.S. cotton farmers by the cost of this important input.

In March 1975, the Government of Brazil announced the grant of a 40 percent subsidy on the cost of fertilizer to agricultural producers retroactive to January 1, 1975. The new program was intended to roll back fertilizer costs to the early 1973 level in lieu of raising support prices for agricultural commodities. The latter, it was feared, would price Brazil out of world markets. It was estimated that the fertilizer program would cost \$400 million for all crops in 1975. Fertilizer consumption in Brazil had been rising at the rate of 30 percent a year after 1967, but after increasing by 55 percent in 1972, rose only 4 percent in 1973. Consumption declined in 1974, but recovered to 1973 levels in 1975.

Most of Brazil's consumption of nitrogen and phosphate and all of its consumption of potash is imported. A national fertilizer program was established in November 1973 to make Brazil self-sufficient in fertilizer by 1980. The program calls for increasing capacity from 450,000 metric tons of nitrogen and phosphate to 3.8 million tons of all three nutrients by 1980 at an estimated cost of \$1.3 billion.

An Agricultural Lime Program (PROCAL) was inaugurated in January 1975 to correct the high acidity of Brazilian soils. Lime production projects can obtain low

TABLE 11. PRICES OF SPECIFIED FERTILIZERS PER METRIC TON, SÃO PAULO, SPECIFIED DATES, 1973-75

| Fertilizer | Jan. 1973 | Jan. 1974 | Jan. 1975 | Sept. 1975 | Jan. 1973 | Jan. 1974 | Jan. 1975 | Sept. 1975 |
|-----------------------------------|---------------------------------|--------------|--------------|---------------|------------------------------|--------------|--------------|---------------|
| | <i>In cruzeiros¹</i> | | | | <i>In Dollar Equivalents</i> | | | |
| Ammonium sulphate | 411 | 965 | 2,032 | 1,689 | 66 | 152 | 269 | 198 |
| Potassium chloride | 456 | 832 | 1,283 | 1,402 | 73 | 131 | 170 | 165 |
| Triple superphosphate | 800 | 1,272 | 3,708 | 3,091 | 129 | 201 | 491 | 363 |
| Calcium nitrate (27% N) | 393 | 645 | 1,473 | 1,473 | 63 | 102 | 195 | 173 |
| Chilean nitrate | 640 | 1,060 | 2,193 | 1,980 | 103 | 167 | 290 | 232 |

¹ Instituto de Economico Agricola.

interest financing for 10 years, and lime users can finance for 5 years, both including 2 years interest free. The program calls for producing 15.3 million metric tons of agricultural lime by 1980.

The resource situation for domestic production of fertilizer is not particularly encouraging at present. It undoubtedly will take many years to develop. Because of likely heavy dependence on imported oil and natural gas for some time to come, fertilizer supplies are likely to continue to be expensive for Brazil, whether imported or manufactured nationally.

Pest and Disease Control

Insects cause extensive damage to the Brazilian cotton crop, destroying as much as 40 percent in some years. Boll worms, both pink and common, are considered the most destructive. Other insects frequently causing damage are the leaf worm, spider mites, aphids, several sucking and cutting insects, and ants. Brazil does not have the boll weevil.

Virtually no insect control measures are carried out in the Northeast. In the South, control measures are common and cotton is said to be the crop on which the largest amount of insecticides is used. Up to 12 spray applications can be made by farmers in years of severe insect attacks. Insecticides generally are applied by hand or with tractor equipment.

Fusarium wilt is the principal disease evident in the South and has been partly responsible for the decline in cotton production in several areas. Resistance to Fusarium has been a major objective in cotton breeding work in the South, and considerable success has been achieved in developing wilt resistant varieties. Other diseases are: Bacterial blight, verticillium wilt, damping off, and nematodes. While not widely troublesome in most years, these diseases can cause local problems.

Cotton diseases are not normally a problem in the Northeast, although various wilts, mildews, and leaf spots can be troublesome when local conditions are conducive to their development.

Brazilian consumption on all crops of insecticides, fungicides, and herbicides more than doubled from 1971 to 1974. Statistics for herbicides note that 5 percent of the supply was used on cotton, compared to 39 percent on soybeans, 13 percent on sugarcane, 10 percent on pastures, and 10 percent on coffee.

Prices, Price Supports, and Farm Credit

In the United States, the cotton grower typically takes his seed cotton to the gin, pays the ginner a fee to gin his cotton, sells the cottonseed to the gin, and takes his bales of lint cotton with him for storage or sale to whomever he wishes. In Brazil, the farmer typically sells his seed cotton to the gin, which may be owned by a large or small company or a co-op. With improvements in road transportation, Brazilian cotton producers are able to be more selective in choosing a gin than formerly.

The Brazilian farmer usually leaves his cotton at the gin and often waits a month to several months before fixing the price. Usually, the longer he waits the higher the price because of Brazil's policy of frequent small devaluations of the cruzeiro, although this did not occur in 1974/75. The hope of getting a higher price is, however, offset by the delay in having cash in hand and being able to pay off any production loans.

The Government of Brazil announces floor prices well before planting time each year for seed cotton as well as for such other export commodities as soybeans, corn, castor beans, and sisal. Floor prices are the

minimum rates at which it is legal to buy and sell cotton, or at which the Government may purchase at the growers option. Minimum seed cotton prices are differentiated according to four or five seed cotton types or grades. Similarly minimum floor prices for lint cotton, which are announced later, are tied to official standards for lint cotton, Types 2 through 9. Minimum prices are differentiated also according to the various producer localities to account for freight costs to consuming and export centers, agent commissions, sales taxes, rural social security taxes, and other expenses.

Low interest or even interest-free rural credit is available to farmers to cover costs of investment, production, and marketing. The Government of Brazil also has established several financing programs to develop agriculture in specific areas.

The Bank of Brazil and private banks make loans on the basis of the floor prices for lint cotton. Unlike the practice in the United States, loans are made without taking physical possession of the cotton, normally for 180 days but sometimes due dates are extended. Loans are made for 100 percent of the minimum price at 1.3 percent interest per month. Brazil's price support operations on cotton and other crops are controlled by the Comissao de Financiamento da Producao.

After cotton is ginned it is sold by companies or co-ops operating the gins to domestic mills or for export. Brazil has one of the largest central markets for cotton in the world, operated by the Bolsa de Mercadorias de São Paulo (Commodities Exchange of São Paulo). The Bolsa records transactions in cotton and establishes and publishes separate daily spot prices throughout the year for cotton ginned in São Paulo State, Goiás, and other southern states, as well as for Northeastern zone cotton. Separate quotations are given for Types 2 to 9 for cotton from the three locality descriptions noted in South Brazil. For Northeast cotton, the quotations are for "Types 3 and 4," differentiated according to six classifications of staple length.

The Bolsa de Mercadorias de São Paulo also operates one of the few cotton futures markets in the world but business has been scarce. Brazil is considering ways by which this market can assume a more important role in view of worldwide concern as to how cotton farmers, merchants, and consumers can hedge against rapid changes in the price of cotton.

The futures market has two contracts, the "Contrato Paulista" for cotton produced only in São Paulo and the "Contrato Meridional" for cotton of São Paulo, Goiás, Paraná, M. Grosso, and M. Gerais. Both contracts were offered during the latter part of May 1975 for delivery in June, July, October, and December 1975, and January, March, and May 1976.

Since Brazil normally exports much of its crop, Brazilian cotton prices basically are determined by the import markets, especially in Western Europe and the

Far East. Account must be taken of freight rates to such markets, handling charges, and export taxes. At times when exports have been temporarily restricted or embargoed, the spread between world and domestic prices can widen. Another important factor in converting from world prices to Brazilian prices is the exchange rate of the cruzeiro. The rise in cruzeiro prices has been much more rapid than in U.S. dollars because of the devaluation of the cruzeiro. Brazilian minimum prices can also be important at times (Table 12 and Figures 3 and 4).

The price spread between São Paulo spot quotations and Northern European quotations for Brazilian cotton more than doubled from 5.6 cents in August 1972 to 13.7 cents in August 1974, undoubtedly because of rising ocean transportation charges incident to the oil crisis, and embargoes and export quotas from May 1973 to March 1974. The spread tended to decline somewhat during the 1974/75 season, partly because of the removal of certain taxes and elimination of restrictions on exports.

Official minimum prices in Brazil have increased substantially from one season to the next. The original minimum price for 1973/74 cotton, set in about August 1973, was 69.90 cruzeiros per 15 kilos (Type 5, São Paulo) or 34.5 cents per pound. Under pressure from farmers faced with higher costs and a falling market, the minimum price for this old crop cotton was advanced to 90.90 cruzeiros in October 1974 or 38.1 U.S. cents.

The 1973/74 minimum proved to be above parity with prices on the world market, which began to decline very sharply beginning about February 1974, just before harvesting of the South Brazilian crop. As a consequence, substantial loan stocks accumulated and Brazilian exports declined precipitously. The support price for the 1974/75 season was set still higher at 100.20 cruzeiros. This was equivalent to 43.2 U.S. cents per pound when the support price was set in the fall of 1974, but by July 1975 the equivalent was down to 36.8 cents because of cruzeiro devaluation. The Government did not announce the 1975/76 support level for cotton lint until February 1976 when it was set at 139.05 cruzeiros, which was equal to 45.7 cents per pound.

In May 1975, it was announced that the Government of Brazil had purchased 229,000 bales of South Brazilian cotton which remained from the 493,000 bales that had been financed from the 1973/74 crop. Also some 23,000-28,000 bales from the 138,000 bales of Northeastern cotton also financed by the Government were taken over. In March 1976, 250,000 bales of the Southern 1973/74 cotton crop were still being held by the Government.

In the fall of 1975 it appeared that a number of developments were again making Brazilian cotton competitive in world markets. (1) Frequent mini-devaluations had made the cruzeiro 17 percent cheaper in dollars than a year earlier. (2) This had brought the support level for

TABLE 12: PRICES FOR SÃO PAULO TYPE 5 COTTON: OFFICIAL MINIMUM AND SPOT AT SÃO PAULO AND QUOTATIONS IN NORTH EUROPE

| Season and month | São Paulo | | Exchange rate | São Paulo | | In northern Europe | Difference Between São Paulo and northern Europe |
|---------------------------------|-----------------------------------|---------------------|---------------------------------|-----------------------------|------------------------|--------------------|--|
| | Official minimum | Market ¹ | | Official minimum | Market ^{1, 2} | | |
| 1971/72 | <i>Cruzeiros per 15 kilograms</i> | | <i>Cruzeiro per U.S. dollar</i> | <i>U.S. Cents per - lb.</i> | | | |
| August | 44.00 | 50.54 | 5.405 | 24.6 | 28.3 | 32.8 | 4.5 |
| April | | 57.66 | 5.845 | 22.8 | 29.8 | 35.0 | 5.2 |
| July | | 54.55 | 5.965 | 22.3 | 27.7 | 33.1 | 5.4 |
| 1972/73 | | | | | | | |
| August | 51.10 | 50.00 | 5.965 | 26.1 | 25.3 | 30.9 | 5.6 |
| April | | 68.63 | 6.100 | 25.3 | 34.0 | 40.6 | 6.6 |
| July | | 87.09 | 6.130 | 25.2 | 43.0 | 54.2 | 11.2 |
| 1973/74 | | | | | | | |
| August | 69.90 | 106.26 | 6.130 | 34.5 | 52.4 | — | — |
| April | | 134.65 | 6.555 | 32.2 | 62.1 | 74.6 | 12.5 |
| July | | 115.05 | 6.815 | 31.0 | 51.1 | 64.0 | 12.9 |
| October 74 ³ | 90.90 | — | 7.220 | 38.1 | — | — | — |
| 1974/75 | | | | | | | |
| August | 100.20 | 111.09 | 7.020 | 43.2 | 47.8 | 61.5 | 13.7 |
| September | | 108.81 | 7.130 | 42.5 | 46.2 | 56.8 | 10.6 |
| October | | 102.35 | 7.220 | 42.0 | 42.9 | 53.1 | 10.2 |
| November | | 100.00 | 7.325 | 41.4 | 41.3 | 51.8 | 10.5 |
| December | | 100.00 | 7.435 | 40.8 | 40.7 | 51.6 | 10.9 |
| January | | 100.00 | 7.550 | 40.1 | 40.0 | — | — |
| February | | 100.00 | 7.620 | 39.8 | 39.7 | — | — |
| March | | 100.89 | 7.735 | 39.2 | 39.4 | 50.0 | 10.6 |
| April | | 103.00 | 7.845 | 38.6 | 39.7 | 49.6 | 9.9 |
| May | | 108.30 | 7.975 | 38.0 | 41.1 | 49.5 | 8.4 |
| June | | 110.00 | 8.070 | 37.6 | 41.2 | 47.0 | 5.9 |
| July | | 114.17 | 8.080 | 36.8 | 42.7 | 48.2 | 5.5 |
| 1975/76 | | | | | | | |
| August | 4 139.05 | 125.67 | 8.310 | — | 45.7 | 50.6 | 4.9 |
| September | | 130.00 | 8.470 | — | 46.4 | 51.5 | 5.1 |
| October | | 130.00 | 8.620 | — | 45.6 | 51.2 | 5.6 |
| November | | 138.70 | 8.620 | — | 48.7 | 51.8 | 3.1 |
| December | | 160.00 | 8.850 | — | 54.7 | 60.7 | 6.0 |
| January | | 172.00 | 9.195 | — | 56.6 | 69.4 | 2.8 |
| February | | 196.00 | 9.370 | 44.9 | 63.3 | 74.0 | 0.7 |

¹ For season indicated, minimum prices are usually announced in August but planting does not begin until about October. Harvesting is usually in full swing in April, but the crop often is not completely marketed until after the end of the U.S. cotton year, July 31.

² Equivalents of cruzeiro quotations converted at exchange rates indicated.

³ Minimum price for 1973/74 crop cotton was raised after end of U.S. cotton year.

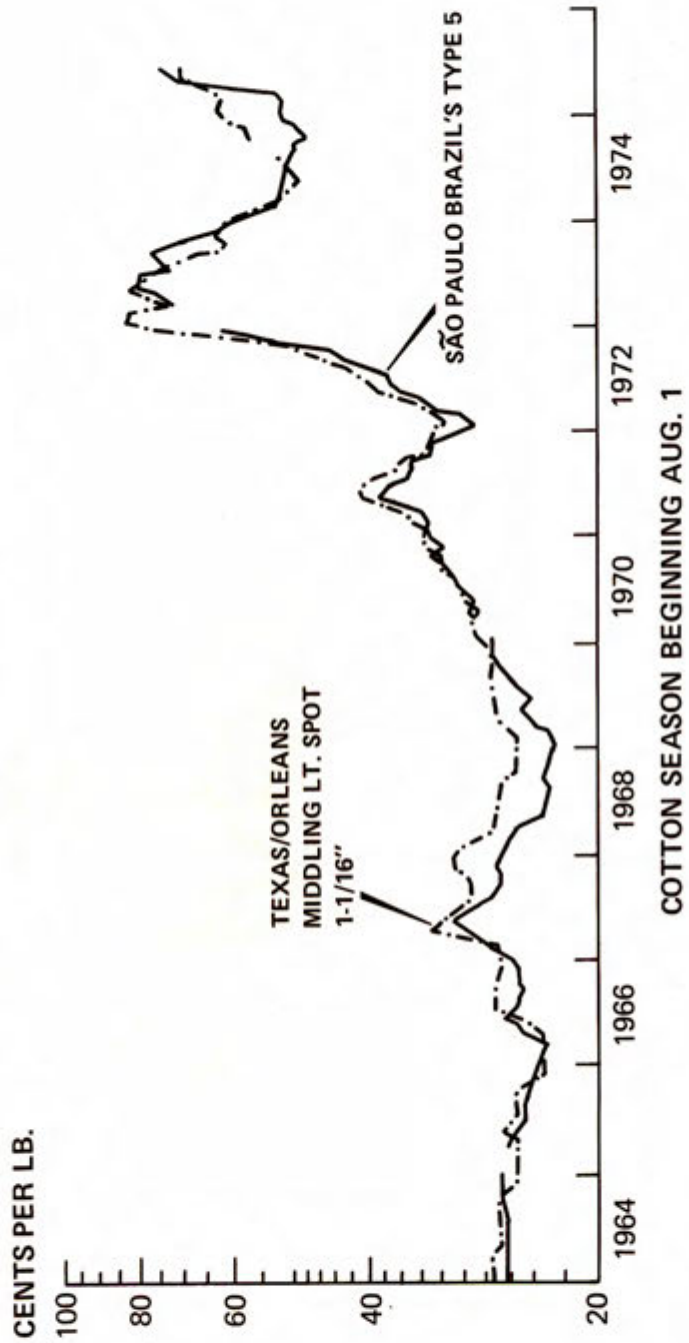
⁴ Minimum for 1975/76 lint cotton to be harvested in March-June 1976 was announced in February 1976.

Sources: Minimum prices are from FAS reports and market prices from the Bolsa de Mercadorias de São Paulo. Exchange rates are cruzeiro purchasing rates at end of month from UN Bulletin of Statistics. North Europe quotations are from Cotton Outlook, Liverpool.

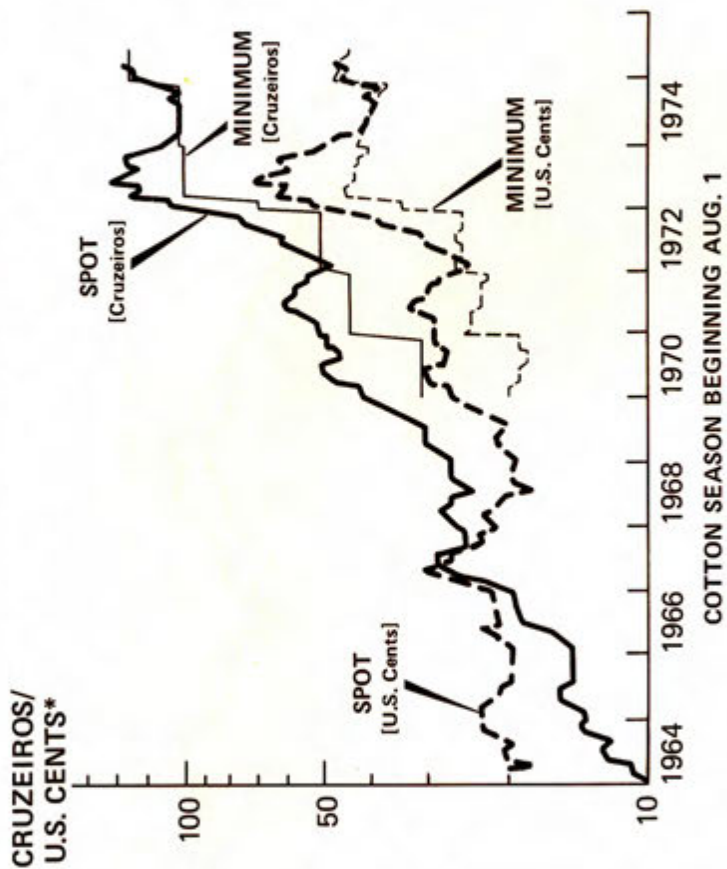
1974/75 cotton down to around 37 cents. (3) The Liverpool A index price for cotton had risen from around 47 cents per pound in March 1975 to around 55.5 cents in August 1975. (4) A former 7 percent value added tax applied by the Government of Brazil to cotton exports

from South Brazil was temporarily cancelled from April 15 to December 31. (5) Exporters were allowed to apply a 7 percent credit on the value of exports against income and certain other federal taxes levied on ginneries, also during the stated period.

**PRICES: U.S. AND SOUTH BRAZIL COTTONS,
C.I.F., NORTHERN EUROPE**



SPOT AND OFFICIAL MINIMUM PRICES AT SÃO PAULO, BRAZIL



*For Sao Paulo Type 5. Cruzeiros Per 15 Kgs; Equivalent U.S. Cents Per Pound.

Note: Cruzeiro prices have risen more rapidly than prices in U.S. cents because of frequent mini-devaluations of the cruzeiro. Although the official minimum price, announced before planting, usually remains unchanged in Cruzeiros during the season, it can decline significantly in terms of U.S. cents by harvest time.

With the rapid rise in world cotton prices late in 1975, a 13 percent value added tax was reinstated on exports and the 7 percent tax credit may have been withdrawn on January 1.

Minimum prices for South Brazilian seed cotton for 1975/76 were announced in early August 1975 as for other crops. The minimum was 45.45 cruzeiros per 15 kilos, compared with 35.10 for 1974/75. This increase was about in line with increases for other commodities and seemed to assure a reasonable return on cotton but nevertheless, the cotton acreage declined.

Besides minimum prices for seed and lint cotton, the Government of Brazil sets minimum export prices, which are changed frequently. In March 1975, it was reported that the minimum export price for Type 5 cotton f.o.b. was 46 U.S. cents which was considered by a European cotton weekly to be "well above parity with competitive international prices." In April 1975, the minimum was 42 cents; in February 1976, it was 55 cents.

Research and Extension

State governments largely are responsible for research and extension activities but the extent of these activities varies from being almost nonexistent in some states to being on a large scale in others. In addition, private organizations and agencies also are doing noteworthy work.

The State of São Paulo is prominent in the fields of cotton research and extension and must rank as having

one of the best programs for cotton in the world. Cotton breeding and textile work in São Paulo is performed by the Instituto Agronomico of the Secretariat of Agriculture of the State, with headquarters at Campinas. In addition to its headquarters farm, it operates a large network of farms throughout the State's growing areas.

Most of the other states depend upon São Paulo for much of the cotton development work, although a few are becoming more involved in various cotton improvement activities. In the Northeast some cotton improvement work is being conducted by SUDENE, the Superintendency for the Development of the Northeast, in cooperation with State agricultural departments. Recently a new Embrapa Cotton Research Center was inaugurated in Paraiba.

In the private sector, Indusfibre, financed by the cotton marketing firms in Paraná, has been working with cotton growers in that State for many years with a small but effective staff. In the Northeast, the Instituto Nordestino Para O Fomento de Algodao e Oleaginosas (Northeast Institute for the Development of Cotton and Oilseeds or INFAOL) is a private organization founded in 1971 and financed by the cotton and oilseed industries. The organization operates on a budget of around 16 million cruzeiros a year and has an effective program of cotton selection and adaptation, development of improved agricultural technology, rural extension, technical assistance, demonstration farms, and promotion.

In addition, the co-ops often engage in extension activities as do private fertilizer, insecticide, and herbicide companies.

TRENDS IN QUALITY

South Brazil

Almost all cotton grown in South Brazil is classed by officially designated agencies. Until about 1972, each state had its own standards but since then uniform official standards have been adopted that apply throughout the region. The Bolsa de Mercadorias de São Paulo is the officially designated agency for that State. It classes all cotton grown in São Paulo, as well as practically all Goiás cotton, two-thirds of Mato Grosso's, and 10 percent of Paraná's. Paraná's remaining cotton is classed by the Serviço de Acôrdio de Classificação of the State Secretariat of Agriculture.

In most States, the law requires each bale to be sampled at the gin and the sample to be sent to the official classing agency. As a consequence, Brazil has excellent statistics as to the quality of the cotton produced and exported. Most cotton, however, is sold

on the basis of private types prepared by shippers, particularly cotton for export.

Brazil's classing systems are different from the national U.S. system and it is difficult to make precise comparisons. In the United States, cotton is classed twice, once for grade—which takes account of color, trash, and ginning preparation—and again for staple length, with separate standards for each. In Brazil, both grade and staple length are combined in a single standard. If the staple length falls below a required minimum the grade will be lowered.

The highest official type for South Brazil cotton for which statistics are given is Type 2; the lowest Type 9. Higher grades include cotton that is superior to Type 5, the base grade in color characteristics and low trash content, as well as in staple length. How South Brazil cotton would be rated in the United States is indicated by Table 13.

TABLE 13. RESULTS OF U.S. TESTS ON SOUTH BRAZILIAN COTTON FROM 1971 CROP

| South Brazilian type | Color | | U.S. grade equiv. | Picker and card waste | | U.S. staple length equiv. inches |
|----------------------|----------|------------|--------------------------|-----------------------|-------------------|----------------------------------|
| | Grayness | Yellowness | | Percent | U.S. grade equiv. | |
| 5 | 1-2 | 4-5 | M White | 6.2 | SLM to LM | Largely 1-1/16 |
| 5/6 | 2-3 | 3-5 | M White | 8.1 | SGO | Largely 1-1/16 or 1-1/32 |
| 6 | 2-3 | 3-5 | SLM White, M Lt. Spotted | 9.6 | Below GO | Mostly 1-1/32 or 1-1/16 |
| 6/7 | 3-5 | 3-5 | SLM White to SLM spotted | 11.4 | Below GO | 1-1/32, 1-1/16, 1-3/32 |
| 7 | 4-5 | 5 | SLM Spotted | 13.3 | Below GO | 1-1/32 |
| 7/8 | 5 | 5 | SLM spotted | 11.8 | Below GO | 1-1/32 |

Source: Based on analysis of 91 samples compiled from "The World's Cottons," Foreign Agricultural Service, FAS-M-250, March 1973, p. 27.

The modal grade of South Brazil cotton is usually Type 6, but variations occur from 1 year to the next because of weather conditions. The 1974/75 cotton crop, with cotton harvested in the spring of 1975, was one of the best in many years for quality. Some 79 percent (preliminary) was classed as Type 6 or better, compared to 50 percent in 1973/74, 66 percent the year before that, and 58 percent in 1971/72, Table 14. According to a commercial report, the 1974/75 staple length was mostly a full 1-1/16" in the higher grades and 1-1/32" in Type 7 and below.

Several of the South Brazilian cotton States make a sample check of staple lengths for statistical purposes. Data for a number of years for São Paulo State indicate that the staple length rose from 28 millimeters or less in 1955 to an average of 30-32 millimeters since the mid-1960's, Table 15.

In a good crop, a substantial percentage can be in the 32-34 mm. bracket. Opinions vary as to how much staple lengths have increased in terms of U.S. staple length measurements. Exact mathematical conversions do not give tenable results. Based on commercial ideas of equivalents it appears, however, that South Brazilian staple lengths have advanced from being largely 1" or under to being largely in the 1-1/32" to 1-1/16" range with some of the crop a little longer, Table 16.

Cotton grown in all of the South Brazilian States is quite homogenous as to staple length, most of it being in the 1-1/32" to 1-1/16" category. Cotton grown in Goiás runs a little longer in staple length than the average. Cotton in Minas Gerais is less uniform with more of the production both longer and shorter than the rule.

The Bolsa de Mercadorias runs micronaire tests on several thousand samples of cotton each year, mostly from São Paulo but some from Goiás. Micronaire readings vary considerably from year to year, depending on the weather, but generally are low in comparison to those on U.S. cotton. In the 3 years ending in 1973/74, 45 percent of the São Paulo samples gave a reading below 3.5, compared to 36 percent in Texas, 3 percent in Mississippi, and 8 percent in Arizona during the same years. On the other hand, cotton grown in Goiás did better with only 6 percent under 3.5. Hardly any of the Brazilian cotton gave readings of 4.5 and over, while much of the U.S. cotton was in this category.

Most of the cotton grown in São Paulo and Goiás in the 3 years ending in 1973/74 had a strength of 75,000 to 79,000 pounds per square inch according to tests on several thousand samples. This is well below the U.S. average of 84,000 pounds in 1972/73 and 85,000 pounds in 1973/74.

Spinning tests on South Brazilian cotton from the 1971 crop¹⁴ indicated picker and card waste considerably above the U.S. average, as well as the average for Texas cottons. Average waste on samples of Types 5 and 6, South Brazil cotton, was 8.7 percent; on samples of Types 6/7 and 7/8, 11.7 percent. The South Brazilian samples averaged below the U.S. average in 22's yarn strength but were not too different from short and medium staples in Texas in this regard. In yarn appearance, results were below the U.S. average but in some years were on a par with those of Texas cotton.

¹⁴ "The World's Cottons," FAS-M-250, March 1973.

TABLE 14. COTTON CLASSED IN SOUTH BRAZIL BY TYPES OR GRADES, SEASONS BEGINNING AUGUST 1, 1971-74

[In percent]

| Type | 1971/72 | 1972/73 | 1973/74 | 1974/75 ¹ |
|----------------|---------|---------|---------|----------------------|
| 4 | 1 | 1 | — | 1 |
| 4/5 | 3 | 5 | 2 | 7 |
| Subtotal | 4 | 6 | 2 | 8 |
| 5 | 10 | 13 | 8 | 20 |
| 5/6 | 19 | 21 | 15 | 29 |
| 6 | 25 | 26 | 25 | 22 |
| Subtotal | 54 | 60 | 48 | 71 |
| 6/7 | 21 | 18 | 21 | 12 |
| 7 | 13 | 9 | 13 | 6 |
| 7/8 | 5 | 4 | 9 | 2 |
| 8 | 2 | 2 | 4 | 1 |
| 9 | 1 | 1 | 2 | |
| Below 9 | | | 1 | |
| Subtotal | 42 | 34 | 40 | 21 |
| Total | 100 | 100 | 100 | 100 |

¹ Preliminary.

Source: Annual reports of Bolsa de Mercadorias, includes data for São Paulo, Paraná, Minas Gerais, and Goiás.

TABLE 15. PRODUCTION OF COTTON IN STATE OF SÃO PAULO BY STAPLE LENGTHS

| Brazilian staple lengths | Approximate U.S. equivalent ¹ | Season beginning August 1 | | | | | | |
|--------------------------|--|---------------------------|-------|-------|------------------|-------|-------|-------|
| | | 1955 | 1960 | 1965 | 1970 | 1971 | 1972 | 1973 |
| <i>Millimeters</i> | <i>Inches</i> | | | | <i>Percent</i> | | | |
| 27 or less | 15/16 or under | 22.6 | .2 | .2 | .1 | .1 | .1 | .3 |
| 28 | 1 | 68.6 | 9.1 | .1 | (²) | .1 | .3 | .3 |
| 29 | 1 | 8.8 | 59.1 | 1.8 | .1 | .4 | 1.5 | .9 |
| 30 | 1-1/32 | (²) | 25.6 | 27.7 | 4.7 | 3.4 | 4.6 | 6.2 |
| 30-32 | 1-1/32 - 1-1/16 | — | 4.5 | 70.2 | 89.3 | 80.1 | 67.3 | 81.2 |
| 32-34 | 1-1/16 - 1-3/32 | — | 1.5 | — | 5.8 | 15.9 | 26.2 | 11.1 |
| | Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

¹ Mathematical equivalents would be higher but these are based on commercial estimates from Brazil.² Less than 0.5 percent.

Source: Annual report of Bolsa de Mercadorias de São Paulo, 1974.

TABLE 16. STAPLE LENGTH, MICRONAIRE, AND FIBER STRENGTH OF BRAZILIAN COTTON, WITH U.S. COMPARISONS, AVERAGES FOR SEASONS BEGINNING AUGUST 1, 1971-73, AS PERCENTAGES OF TOTAL PRODUCTION
[Percent]

| State | 27 mm. and below or 15/16" and below | 28 mm. or 31/32" | 29 mm. or 1" | 30 mm. or 1-1/32" | 30-32 mm. or 1-1/32" - 1-1/16" | 32-34 mm. or 1-1/16" - 1-3/32" | 34-36 mm. or 1-3/36" - 1-1/8" | 36-38 mm. or 1-5/32" | 37 mm. and higher or 1-3/16" and higher | Total |
|--|--------------------------------------|------------------|--------------|-------------------|--------------------------------|--------------------------------|-------------------------------|----------------------|---|-------|
| STAPLE LENGTH¹ | | | | | | | | | | |
| São Paulo | — | — | 1 | 5 | 76 | 18 | | | | 100 |
| Paraná | — | — | — | 6 | 90 | 4 | | | | 100 |
| Minas Gerais | 1 | 3 | 21 | — | 37 | 20 | 18 | | | 100 |
| Goiás | — | — | — | 1 | 64 | 34 | 1 | | | 100 |
| Rio Grande do Norte ² | — | — | 24 | | 2 | 16 | 35 | 16 | 7 | 100 |
| Pernambuco | 2 | — | 16 | 21 | 11 | 45 | 5 | — | — | 100 |
| Ceara | — | — | 1 | — | 14 | 76 | 8 | 1 | | 100 |
| U.S. COMPARISONS: | | | | | | | | | | |
| Mississippi | — | — | — | 2 | — | 44 | 54 | — | — | 100 |
| Texas | 34 | 25 | 18 | 9 | — | 10 | 3 | 1 | — | 100 |
| Arizona | 1 | 1 | 3 | 5 | — | 45 | 44 | 1 | — | 100 |
| | Reading: 2.6 and below | 2.7-2.9 | 3.0-3.2 | 3.3-3.4 | 3.5-3.9 | 4.0-4.4 | 4.5-4.9 | 5.0-5.2 | 5.3 and higher | Total |
| MICRONAIRE³ | | | | | | | | | | |
| São Paulo | — | 4 | 19 | 22 | 46 | 9 | — | | | 100 |
| Goiás | — | — | 2 | 4 | 36 | 52 | 6 | | | 100 |
| U.S. COMPARISONS: | | | | | | | | | | |
| Mississippi | — | — | 1 | 2 | 9 | 34 | 43 | 10 | 1 | 100 |
| Texas | 5 | 11 | 13 | 7 | 17 | 22 | 18 | 5 | 2 | 100 |
| Arizona | — | 2 | 3 | 3 | 11 | 28 | 43 | 9 | 1 | 100 |
| | 1,000 pounds per square inch: | | | | | | | | | |
| | 64 and below | 65-69 | 70-74 | 75-79 | 80-84 | 85-89 | 90-94 | 95-99 | 100 and higher | Total |
| FIBER STRENGTH, IN PRESSLEY O GAUGE⁴ | | | | | | | | | | |
| São Paulo | | 1 | 19 | 58 | 21 | 1 | | | | 100 |
| Goiás | | 1 | 10 | 57 | 31 | 1 | | | | 100 |
| U.S. COMPARISONS | | | | | | | | | | |
| Mississippi | | — | 3 | 25 | 44 | 22 | 5 | 1 | | 100 |
| Texas | — | 2 | 13 | 29 | 30 | 18 | 6 | 2 | — | 100 |
| Arizona | | — | — | 7 | 38 | 41 | 11 | 11 | 2 | 100 |

¹ Brazilian data based on annual surveys. Mm. designations are as originally reported. Inch designations are equivalents as reported commercially in Brazil but there is some variance of opinion.

² For year beginning August 1, 1973 only.

³ Brazilian data are results of 4,000 to 5,000 samples in the two states annually.

⁴ Brazilian data are results of around 1,900 tests annually.

Northeast Brazil

As noted in the section on varieties, cotton grown in the Northeast is sold according to variety and commercial name. Tree or Moco cotton accounts for around three-fourths of the production with less than one-fifth termed Serido cotton commercially, and around three-fifths Sertão. The difference between Serido and Sertão is a matter of grade and staple length and sometimes the distinction is unclear.

Usually Serido cotton is 1-1/8" and longer and has micronaire readings of around 3.6 to 3.7. This fairly fine, fibered cotton is comparable in this regard to American Pima, though shorter in staple length. Serido cotton, reportedly, has a Pressley strength of 75,000-82,000 pounds per square inch but tests by the U.S. Department of Agriculture show strength as high as 92,000 pounds. Practically all Serido cotton is used domestically, frequently in blends with polyester fiber. Reportedly, it has not been well received in export markets because of lack of uniformity.

Sertão cotton is reported commercially to have micronaire readings and Pressley strength in the same range as Serido. Commercially it may be a little lower in grade and a little shorter in staple length 1-1/16" to 1-3/32", but the differentiation can be indistinct. It is considered good "bread and butter" cotton. The bulk of cotton exports from the Northeast has been of this kind of cotton.

Mata or annual cotton has a staple length from 13/16" to 1". It produces micronaire readings of 3.8-4.1 and has a Pressley strength of 74,000-83,000 pounds. Mata now comprises around 25-30 percent of Northeastern cotton production.

Current trends in production of Serido, Sertão, and Mata cotton are indicated in Table 17. If anything, the quality of these cottons has declined in the last few years. Formerly the tree cotton and annual cotton zones were quite distinct. Now annual cotton is planted frequently in some of the tree cotton areas. Not only does the seed become mixed but some of the annual cotton is mixed with tree cotton in the marketing process. A few years ago, some São Paulo annual seed was brought in but it has been allowed to deteriorate and some of it has been grown under conditions in which it could not do well from a quality viewpoint.

A number of the Northeastern states have cotton classing organizations and now have adopted standards prepared by the Bolsa de Mercadorias in São Paulo for nine types or grades of Moco or tree cotton that are applicable to all states. For annual Upland cotton, São Paulo types are generally used. Some use is made of the official types in actual commercial selling, but generally cotton is sold according to private types.

Statistical data indicate Types 4 and 5 account for three-fourths of all of the cotton in Pernambuco and Ceará and Types 3 and 4 account for 90 percent in Rio Grande do Norte. Not much shifting in grade occurs from 1 year to the next. In 1970/71, 8 percent of the production in Pernambuco was in Type 3 or higher, 12 percent in 1971/72, 18 percent in 1972/73, and 13 percent in 1973/74.

Checks and tests on samples of Types 3 to 5, Serido and Sertão cottons by the U.S. Department of Agriculture gave results ranging from Strict Middling White to Middling Spotted and Strict Low Middling White for color, but ranging from a nonlint content equal of Good Ordinary downward. Serido samples produced yarn strengths that would be high for U.S. medium staple cotton and Sertão samples produced strengths that would be low to average.

TABLE 17: PRODUCTION OF COTTON IN NORTHEAST BRAZIL BY STAPLE LENGTHS

| Item | 1969/70 | 1970/71 | 1971/72 | 1972/73 | 1973/74 |
|--------------------------------------|---------|---------|---------------------------|---------|---------|
| Production | 819 | 375 | <i>1,000 bales</i> 870 | 880 | 980 |
| By staple lengths: | | | <i>Percent</i> | | |
| Total | 100 | 100 | 100 | 100 | 100 |
| Serido (1-1/8" - 1-3/16") | 18 | 23 | 17 | 17 | 16 |
| Sertão (1-1/32" - 1-3/32") | 65 | 48 | 55 | 58 | 56 |
| Mata (13/16" - 1") | 17 | 29 | 28 | 25 | 28 |

Source: Staple length percentages compiled from Brazil's reports to ICAC Plenary Meetings except data for 1973/74, which are based on commercial sources.

MARKETING

The South Brazilian farmer usually sells his cotton as seed cotton directly to the gin but sometimes through a middleman. In the Northeast, farmers usually sell seed cotton to a c.i.f. cotton broker who then delivers and sells seed cotton to the gin. Less than 5 percent of Brazil's cotton is custom ginned, unlike in the United States where practically all is custom ginned.

Classers examine seed cotton as it is received at the gins and producers are paid on the basis of quality. In determining quality use is made of four or five official seed cotton grades. Legally, a farmer can obtain a loan on seed cotton so the Government loan level on seed cotton sets a minimum below which no farmer will sell.

Farmers usually sell on a call basis, which means the farmer delivers the seed cotton to the gin under a contract that allows him to fix the price, usually 45-60 days but sometimes longer. As noted elsewhere, this is usually to the farmer's advantage because cruzeiro prices generally move up as the season advances because of devaluation of the cruzeiro.

In the past, gins usually belonged to the large traditional exporters but now more and more are owned individually or by co-ops. Anderson-Clayton, a U.S. firm that came to Brazil in 1934, is said to have marketed about half of Brazil's cotton production for many years. As it had already done in the United States, Anderson-Clayton decided not long ago to go out of the cotton business in Brazil. The company owned 285 gins in Brazil in 1971 but only 15 by 1974. By the end of 1975, all of the gins were to be sold.

Volkart, another large international firm, also has discontinued operating gins, but still does a substantial cotton business. Some of the other large exporters, however, including Sanbra, Esteve, and McFadden continue to operate substantial numbers of gins. Some of the textile firms also own gins in Brazil. An estimated 10-12 percent of South Brazil's cotton now is being ginned by co-ops, compared with around 5-6 percent in 1970. There are five co-ops in São Paulo, four in Paraná, and many small ones in Minas Gerais.

The Cooperative Central Agropecuaria Campinas, headquartered in Campinas, began in 1960 as a coffee co-op, but now handles cotton, corn, and soybeans. This cooperative, with a total of 10,000 members grouped in 21 regional co-ops, now operates nine cotton ginning plants, two compresses, classing, testing, and warehouse facilities and is able to handle 200,000 Brazilian bales (of around 420 lb) annually. The co-op also delints planting seed; supplies fertilizer, insecticides, and herbicides; and imports and resells cotton picking machines. Most of the co-ops provide extension services and market cotton.

In the Northeast, between 10-20 percent of the cotton crop is handled by co-ops. A large central co-op in Ceará collects from five or six small co-ops and produces 14,000 metric tons of lint. In addition to this large cooperative, there are some smaller ones in the Northeast, and with Government help, the tendency is for further development.

Ginning facilities in Brazil are generally adequate to process the cotton crop. Shifts in the location of the industry have meant at times, however, an abundance of facilities in some areas and shortages in others. Practically all cotton is saw-ginned except for longer staple Serido, 1-5/32" to 1-3/16", which is roller ginned. A report for 1971/72 indicates that the State of Paraná had 86 gins with 425 stands and 36,158 saws. São Paulo had approximately 161 active gins in 1973/74.

One of the four manufacturers of cotton ginning machinery in the United States recently moved to Brazil. This manufacturer is not only now supplying the Brazilian market but doing a substantial export business as well.

Formerly the companies doing the cotton ginning financed production by many farmers and the farmer then sold to the company involved. Now bank financing is important and with the development of better highways and an increasing number of trucks, there is greater competition among gins for the farmer's business.

The typical pattern is for gins not owned by the large cotton merchants to sell to merchants or brokers who then sell to domestic mills or for export. Some mills gin the cotton they spin. Co-ops usually sell through agents to export firms or to mills but are not in the export business to any great extent. No data are available on sales to domestic mills, but in 1974 over 70 percent of the cotton exported from São Paulo was by seven firms: Sanbra, 20 percent; Saad, 11 percent; Matarazzo, 10 percent; McFadden, 10 percent; Esteve, 10 percent; Anderson-Clayton, 6 percent; and Hohenberg, 5 percent.

Seed cotton is usually brought by truck or tractor and wagon to the gin. From the gin to the warehouse, movement in South Brazil is around 20 percent by rail and 80 percent by truck, the latter being said to be quicker and cheaper. Practically all of the recompressing in South Brazil is done in the city of São Paulo. Movement from the compress to the port of Santos, for export is all done by rail.

In the Northeast, practically all cotton moves by truck, both to local mills and to mills in South Brazil, despite the fact that the latter involves a trip of more than 1,000 miles. Brazil has made great strides in developing a highway system in recent years but

attention now is being given to modernizing the rail system.

Costs of handling cotton between the farmer and the overseas buyer have been rising rapidly in Brazil as they have in the United States. As indicated by data in Table 18, freight rates from typical cotton growing points to port in São Paulo now are around \$3.50 per 480-pound bale. This is somewhat less than for most cotton ginning locations in the United States where, however, the distance from the sea is often much greater. Compression, warehousing, and port charges all appear to be lower in Brazil. Ocean freight rates to Northern Europe and Japan were about the same as from the United States in 1971/72. In April and May 1975, however, they were somewhat lower from Brazil to Western Europe than from the United States and rates to Japan were much lower.

Brazilian cotton bales are usually wrapped in light-weight cotton bagging with distinctive stripes in the national colors of Brazil. The newly wrapped bales are cut, however, and the bagging damaged for the purpose of obtaining samples, as soon as the bales come out of the gin press box. Specifications of Brazilian cotton bales are given in Table 19.

São Paulo bales weighed 192.6 kilograms per bale gross in 1972/73 and 191.9 in 1973/74. The average for all of South Brazil in 1973/74 was 194.7 kilograms, about equal to 421.5 pounds on a net basis, compared with the standard U.S. bale of 480 pounds net. In Northeast Brazil, the bales in Ceará weighed 182.9 kilograms net in 1973/74; in Pernambuco, 180.6 pounds net; and in Rio Grande do Norte, 187.6 pounds net.

TABLE 18. HANDLING CHARGES AND FREIGHT RATES FOR COTTON, BRAZIL AND UNITED STATES, FOR DATES INDICATED

| Item | Brazil | | United States | | |
|--|----------------------------------|---|--|--|--|
| | São Paulo | | Memphis | Lubbock | Fresno |
| 1975 | | <i>Equivalent U.S. dollars per bale¹</i> | <i>U.S. dollars per bale¹</i> | <i>U.S. dollars per bale¹</i> | <i>U.S. dollars per bale¹</i> |
| Interior freight | <i>Cr. per 200 kgs.</i> 23.80 | 3.50 | 4.45 | 4.60 | 2.02 |
| Compression | 19.41 | 2.85 | 3.25 | 3.25 | 3.25 |
| Warehousing and interior charges | 7.50 | 1.10 | 3.80 | 2.80 | 2.75 |
| Port charges and costs | 10.00 | 1.45 | 3.15 | 2.65 | 2.55 |
| Total | 60.71 | 8.90 | 14.65 | 13.30 | 10.57 |
| OCEAN FREIGHT RATES: | | | | | |
| Northern Europe | | | | | |
| 1971/72 | — | 13.52 | 13.71 | 13.71 | 15.25 |
| April, May 1975 | — | 24.35 | 29.10 | 29.10 | 29.10 |
| Japan | | | | | |
| December 1969 | — | 10.45 | 10.89 | 10.89 | 9.42 |
| 1971/72 | — | 13.13 | 14.96 | 14.96 | 13.13 |
| April, May 1975 | — | 19.40 | 34.70 | 34.70 | 30.25 |
| December 1975 | — | 19.75 | 28.95 | 28.95 | 25.04 |

¹ Bales of 480 lb. net.

Source: Trade data. There was some variation in figures from various countries. Data given are exclusive of taxes which in Brazil are substantial.

TABLE 19. SPECIFICATIONS OF BRAZILIAN COTTON BALES

| Item | Type a | Type b | Type c |
|--|---------|---------|-------------------------|
| Dimensions of bale | | | |
| Length (inches) | 41 | 41 | 41 |
| Width (inches) | 19 | 20 | 19 |
| Depth (inches) | 24 | 23 | 23 |
| Bale weights, gross (lb) | | | |
| Average | 430 | 459 | 430 |
| Range | 375-463 | 419-485 | 331-441 |
| Bale density (lb per cubic foot) | 40 | 44 | 41 |
| Fabric | | | |
| Fiber | Cotton | Cotton | Mostly cotton some jute |
| Weight per bale (lb) | .79 | .88 | .66, .88 |

Source: International Cotton Advisory Committee, Doc. 16-XXVI, 1967.

EXPORTS

Exports of raw cotton from Brazil reached an alltime peak of 1,935,000 bales in 1969/70. Since then, however, exports have declined rapidly, totaling only 661,000 bales in 1973/74 and 269,000 bales in 1974/75, Table 20.

Less cotton has been available for export from Brazil since the 1968/69 peak, while consumption has risen rapidly and production has actually declined considerably.

In 1974, world prices fell rapidly, just as the Southern crop was coming on the market. Support prices became out of line with the world price level and exports came to a near stop.

Prospects were for some recovery in exports in 1975/76 as world prices moved up, the cruzeiro continued to be devalued, and beginning domestic stocks in Brazil were at a high level.

Like the United States, Brazil exports cotton to a large number of countries. It was the fourth largest

world exporter of cotton in 1972/73; the seventh in 1973/74.

Brazil exports more cotton to other countries in Latin America than does the United States, having an advantage in duties because of membership in the Latin America Free Trade Association.

The most important export destinations for Brazilian raw cotton, however, are Japan and other countries in the Far East and Western Europe. Generally, the United States, which has a much larger total volume of exports than Brazil, sells more cotton to countries outside Latin America, except for the Netherlands, Portugal, Ethiopia, and South Africa.

Very little of the longer staple Serido cotton grown in Northeast Brazil is exported because of the demand from domestic mills. Some Sertão cotton from the Northeast is exported as is, of course, much of the Upland cotton grown in South Brazil.

TABLE 20. EXPORTS OF COTTON FROM BRAZIL FOR SEASONS BEGINNING AUGUST 1

[1,000 bales of 480 lb net]

| Country | Averages | | | | 1970 | 1971 | 1972 | 1973 | 1974 |
|-----------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | 1950-54 | 1955-59 | 1960-64 | 1965-69 | | | | | |
| OTHER AMERICA | | | | | | | | | |
| Argentina | 1 | (¹) | 1 | 10 | 1 | 67 | (¹) | (¹) | 0 |
| Canada | 4 | (¹) | (¹) | 5 | 3 | 11 | 12 | 7 | (¹) |
| Chile | 6 | 4 | 1 | 8 | 2 | 17 | 7 | 12 | 1 |
| Ecuador | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 |
| Jamaica | 0 | 0 | 0 | 0 | 0 | (¹) | 1 | 0 | 0 |
| Uruguay | 9 | 9 | 2 | 6 | 12 | 19 | 19 | 29 | 18 |
| Venezuela | 0 | 0 | (¹) | 1 | (¹) | 0 | 19 | 15 | 0 |
| Subtotal | 21 | 13 | 4 | 30 | 18 | 114 | 58 | 76 | 19 |
| EUROPEAN COMMUNITY | | | | | | | | | |
| Belgium | 14 | 11 | 54 | 76 | 40 | 63 | 70 | 24 | 26 |
| France | 70 | 27 | 74 | 84 | 27 | 60 | 45 | 17 | 3 |
| Germany, F.R. | 106 | 56 | 201 | 250 | 70 | 136 | 70 | 46 | 7 |
| Italy | 43 | 15 | 17 | 62 | 26 | 74 | 65 | 31 | 8 |
| Netherlands | 26 | 13 | 101 | 112 | 56 | 86 | 70 | 74 | 12 |
| United Kingdom | 150 | 43 | 81 | 53 | 15 | 50 | 42 | 13 | 4 |
| Subtotal | 409 | 165 | 528 | 637 | 234 | 469 | 362 | 205 | 60 |
| OTHER WESTERN EUROPE | | | | | | | | | |
| Austria | 2 | 1 | (¹) | (¹) | 2 | 10 | 4 | 2 | 1 |
| Finland | 6 | 0 | (¹) | 1 | 2 | 1 | 3 | 0 | (¹) |
| Malta | 0 | 0 | 0 | 2 | 0 | 1 | 2 | 2 | 0 |
| Norway | (¹) | (¹) | 1 | 3 | 4 | 4 | 3 | (¹) | (¹) |
| Portugal | 11 | 1 | 1 | 9 | 1 | 31 | 105 | 44 | 5 |
| Spain | 44 | 21 | 24 | 35 | 17 | 48 | 24 | 9 | 1 |
| Sweden | 13 | 7 | 6 | 4 | 20 | 13 | 2 | 1 | 1 |
| Switzerland | 3 | (¹) | 5 | 6 | 2 | 8 | 7 | 1 | 0 |
| Yugoslavia | 9 | 9 | 5 | 3 | (¹) | 2 | 1 | 0 | 0 |
| Subtotal | 88 | 39 | 42 | 63 | 48 | 118 | 151 | 59 | 8 |
| EAST EUROPE AND USSR | | | | | | | | | |
| Bulgaria | 0 | 0 | 1 | 21 | 1 | 0 | 0 | 0 | 0 |
| Czechoslovakia | 5 | 6 | 2 | 9 | 2 | 0 | 0 | 0 | 0 |
| Germany D. R. | (²) | 0 | 0 | 17 | 2 | 0 | (¹) | 0 | 0 |
| Hungary | 3 | 7 | 8 | 14 | 0 | 0 | 0 | 3 | 0 |
| Poland | 6 | 21 | 6 | 5 | 0 | 31 | 12 | 2 | 0 |
| Romania | 0 | 0 | 5 | 4 | 0 | 14 | 14 | 8 | 1 |
| USSR | 0 | 0 | 85 | 32 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 14 | 34 | 107 | 102 | 5 | 45 | 26 | 13 | 1 |
| JAPAN | 130 | 127 | 127 | 205 | 302 | 316 | 209 | 102 | 65 |
| OTHER FAR EAST | | | | | | | | | |
| Bangladesh | 0 | 0 | 0 | 0 | 0 | 51 | 3 | 5 | 14 |
| China, P.R. | 13 | 6 | 1 | (¹) | 0 | 0 | 133 | 35 | 0 |
| China, Taiwan | (¹) | 0 | 8 | 55 | 173 | 85 | 132 | 0 | 6 |
| Hong Kong | 26 | 23 | 86 | 97 | 94 | 49 | 89 | 55 | 25 |
| Indonesia | 0 | 0 | 0 | (¹) | 0 | 0 | 1 | 1 | 9 |

See footnotes at end of table.

TABLE 20. EXPORTS OF COTTON FROM BRAZIL FOR SEASONS BEGINNING AUGUST 1—Continued

[1,000 bales of 480 lb net]

| Country | Averages | | | | 1970 | 1971 | 1972 | 1973 | 1974 |
|---------------------------|----------|------------------|------------------|------------------|-------|-------|-------|------|------|
| | 1950-54 | 1955-59 | 1960-64 | 1965-69 | | | | | |
| OTHER FAR EAST— | | | | | | | | | |
| Continued | | | | | | | | | |
| Korea | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 |
| Malaysia | 0 | 0 | (³) | (¹) | 1 | 6 | 18 | 11 | 8 |
| Philippines | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 1 |
| Singapore | 0 | (¹) | (¹) | 4 | 7 | 13 | 14 | 7 | 2 |
| Thailand | 0 | 0 | 4 | 19 | 45 | 47 | 36 | 16 | 30 |
| Subtotal | 39 | 29 | 104 | 176 | 321 | 252 | 427 | 131 | 97 |
| OTHER | | | | | | | | | |
| Ethiopia | 0 | 0 | 0 | 3 | 3 | 5 | 12 | 4 | 0 |
| Israel | 0 | 0 | 0 | 4 | 0 | 1 | 0 | 0 | 0 |
| Morocco | 0 | (¹) | (¹) | (¹) | 0 | 6 | 4 | 2 | 0 |
| Somali Republic | 0 | 0 | 0 | (¹) | 0 | 0 | 1 | 0 | 0 |
| South Africa | 1 | 2 | 26 | 66 | 64 | 76 | 82 | 33 | 6 |
| Other | 23 | 10 | 12 | 11 | 16 | 7 | 1 | 36 | 13 |
| Subtotal | 24 | 12 | 38 | 84 | 83 | 95 | 100 | 75 | 19 |
| Total | 725 | 419 | 950 | 1,297 | 1,011 | 1,409 | 1,333 | 661 | 269 |

¹ Less than 500 bales.² Included in West Germany prior to 1952.³ Included in Singapore.

CONSUMPTION

Textile Industry

Brazil has one of the largest and most rapidly growing textile industries in the world. In 1973, only four countries had more cotton spindles than in Brazil and only five more cotton looms. The industry employed 310,589 people in 1971, more than any other type of manufacturing in Brazil, and accounted for 9.5 percent of the total value of Brazilian manufactures. The cotton section of the industry for many years has been larger than the combined cotton textile industries of all other countries in South America.

Brazil's textile industry remained in the doldrums for many years with only slow gains in production and much obsolete equipment. About 1970, however, a period of rapid expansion and modernization began, propelled by Government incentives that included substantial financial assistance.

As indicated in Table 21, the number of automatic looms in the cotton textile industry increased from 35,000 in 1969 to nearly 64,000 in 1973. The number of spindles also increased, from 3.6 to 4.0 million, and

those now in place are much more efficient than formerly. In 1974, 218,176 new spindles, and 1,244 open-end rotors were shipped to Brazil. São Paulo had 2,588 rotors in the first half of 1975.

The industry had a setback in 1974/75, however, because of the worldwide textile recession. At least one of the largest textile firms had financial difficulties, but by the fall of 1975 business conditions were improving. Continued further expansion is likely in the years ahead, although perhaps not at the rate of the early 1970's.

Brazil's modern textile industry is concentrated in about a hundred largely integrated mills that own most of the automatic looms and produce around 60 percent of the textiles. This section of the industry reportedly has as modern technology and equipment as any in the world. Much of the industry still is obsolete but many of the smaller companies are closing down. The modernization trend is expected to continue and the older equipment largely phased out by 1980. Brazil and Indonesia, currently are the two largest markets for textile machinery in the world. Imports of textile equipment increased from \$22.6 million in 1967 to

TABLE 21. SPINDLES, AUTOMATIC LOOMS, AND ORDINARY LOOMS IN COTTON TEXTILE INDUSTRY OF BRAZIL, OTHER LATIN AMERICAN COUNTRIES, AND THE UNITED STATES

| Year | Brazil | Other Latin American countries | United States |
|--|--------|--------------------------------|----------------------|
| Spindles in place (thousands) | | | |
| 1965 | 3,600 | 4,962 | 19,363 |
| 1969 | 3,602 | 6,030 | 20,133 |
| 1971 | 3,665 | 6,103 | 19,215 |
| 1972 | 3,852 | 6,154 | 18,089 |
| 1973 | 4,037 | 7,423 | 18,890 |
| Automatic looms in place (number) | | | |
| 1965 | 34,000 | 86,246 | 285,000 |
| 1969 | 35,000 | 99,804 | 240,597 |
| 1971 | 56,875 | 101,062 | 219,964 |
| 1972 | 59,768 | 101,406 | 332,072 ¹ |
| 1973 | 63,820 | 106,059 | 322,287 ¹ |
| Ordinary looms in place (number) | | | |
| 1965 | 59,000 | 27,514 | 0 |
| 1969 | 52,000 | 21,794 | 0 |
| 1971 | 73,125 | 17,244 | 0 |
| 1972 | 76,845 | 16,326 | 0 |
| 1973 | 76,800 | 20,216 | 0 |

¹ Includes entire textile industry.

Source: International Cotton Industry Statistics, 1973 and earlier volumes, published by International Federation of Cotton and Allied Textile Industries. Brazil and other Latin America figures are partly estimated.

\$159.4 million in 1973. Only new equipment is allowed to be imported.

The city of São Paulo has the largest concentration of textile mills. Nearly half of the cotton consumption is in or near that city. Other important centers are Minas Gerais, Rio de Janeiro, and the Northeast, Table 22. A 5-year plan calls for an investment of \$2 billion for new plants and equipment in the textile and manmade fiber industry in the Northeast. Twenty-eight projects already approved would provide 1.25 million new spindles, as well as new weaving, knitting, and finishing capacity in that part of Brazil. One prediction is that the number of spindles in the Northeast will rise from 600,000 in 1973 to 2.6 million by 1980.

An estimated one-fourth of all new financing for the textile industry comes from overseas. The two largest spinning and weaving investors are from Argentina, but Japanese, French, West German, and U.S. textile firms also have invested in Brazil.

Mill Consumption of Fibers

Under pressure of increased domestic offtake of textiles and increased exports, the mill consumption of all fibers, and cotton specifically, has been rising rapidly. Preliminary data indicate a 42 percent gain in fiber consumption in 1974, compared with that of 1970, while consumption during this period rose 34 percent, Table 23.

Textile Exports

Most of the expansion in production of cotton textiles in Brazil since 1969 has gone into exports. Such exports have been stimulated by Government incentives aimed at increased processing of Brazilian produced raw materials at home in order to provide employment and obtain more foreign exchange. Exporting firms are able

TABLE 22. ESTIMATED COTTON CONSUMPTION IN BRAZIL BY STATES AND CALENDAR YEARS

[1,000 bales of 480 lb net]

| State | Averages | | | 1970 | 1971 | 1972 | 1973 | 1974 (prelim.) |
|------------------------------|------------------|------------------|---------|-------|-------|-------|-------|-------------------|
| | 1960-64 | 1965-69 | 1970-74 | | | | | |
| SOUTH: | | | | | | | | |
| São Paulo | 603 | 565 | 712 | 637 | 624 | 704 | 796 | 800 |
| Parana | (¹) | (¹) | 25 | 19 | 21 | 24 | 26 | 26 |
| Minas Gerais | 206 | 202 | 265 | 216 | 230 | 248 | 298 | 301 |
| Goiás | (¹) | (¹) | 4 | 8 | — | — | 5 | 6 |
| Rio de Janeiro | 103 | 85 | 191 | 83 | 161 | 164 | 203 | 207 |
| Guanabara | 97 | 116 | — | 94 | — | — | — | — |
| Other ² | 54 | 64 | 126 | 80 | 103 | 106 | 172 | 172 |
| Subtotal | 1,063 | 1,032 | 1,323 | 1,137 | 1,139 | 1,246 | 1,500 | 1,512 |
| NORTHEAST: | | | | | | | | |
| Pernambuco | 113 | 90 | 111 | 86 | 99 | 110 | 120 | 122 |
| Ceara | 35 | 31 | 38 | 25 | 28 | 31 | 44 | 46 |
| Paraíba | 26 | 18 | 25 | 12 | 18 | 24 | 32 | 32 |
| Sergipe | 41 | 27 | 28 | 25 | 23 | 28 | 30 | 30 |
| Alagoas | 37 | 21 | 22 | 22 | 22 | 23 | 22 | 22 |
| Bahia | 21 | 17 | 24 | 23 | 23 | 22 | 23 | 23 |
| Other | 20 | 15 | — | — | — | — | — | — |
| Subtotal | 293 | 219 | 248 | 193 | 213 | 238 | 271 | 275 |
| Other | 13 | 7 | 9 | 8 | 8 | 9 | 10 | 10 |
| Total | 1,369 | 1,258 | 1,580 | 1,338 | 1,360 | 1,493 | 1,781 | 1,797 |

¹ Included in other.² Largely Santa Catarina.

Source: Annual reports of Bolsa de Mercadorias, São Paulo.

TABLE 23. MILL CONSUMPTION OF FIBERS IN BRAZIL, 1970-74

| Fiber | Calendar years | | | | |
|----------------------------------|----------------|-------|-------|-------|-------|
| | 1970 | 1971 | 1972 | 1973 | 1974 |
| Cotton | 1,338 | 1,371 | 1,493 | 1,787 | 1,800 |
| <i>1,000 bales of 480 lb net</i> | | | | | |
| Cotton | 291 | 299 | 325 | 389 | 397 |
| Wool | 14 | 16 | 15 | 13 | 11 |
| Linen-ramie | 23 | 24 | 26 | 21 | 20 |
| Rayon | 51 | 58 | 53 | 61 | 61 |
| Manmade fibers | 62 | 82 | 103 | 142 | 174 |
| Total | 441 | 479 | 525 | 626 | 663 |
| <i>Percent</i> | | | | | |
| Cotton | 66 | 63 | 62 | 62 | 60 |
| Wool | 3 | 3 | 3 | 2 | 2 |
| Linen-ramie | 5 | 5 | 5 | 3 | 3 |
| Rayon | 12 | 12 | 10 | 10 | 9 |
| Manmade fibers | 14 | 17 | 20 | 23 | 26 |
| Total | 100 | 100 | 100 | 100 | 100 |

Source: Consular reports.

to import textile machinery and raw materials duty free, instead of having to pay a high tariff. They also receive exemptions from sales taxes, value added taxes, and other corporate taxes, as well as preferential credit terms. In addition, they apparently receive direct subsidies.

The various incentives are said to make possible deductions of up to 45 percent under Brazilian prices when quoting f.o.b. for export. As a consequence, Brazilian textiles have become highly competitive in world markets. For example, in September 1975 Brazilian cotton yarn was selling, delivered in Europe, at 79.4 U.S. cents per pound, compared with prices in New York for U.S. yarn of the same count at \$0.98-\$1.02 and in Osaka for Japanese yarn at 77.6 cents.

Brazil's volume of textile exports including chemical fibers rose rapidly from 40,732 metric tons in 1970 to 133,190 tons in 1973, then dropped slightly to 129,768 tons in 1975, Table 24. Major destinations of the \$145.4 million worth of textiles exported in 1972 were: West Germany, \$22.7 million; United States, \$21.7 million; USSR, \$9.9 million; Netherlands, \$8.7 million; Panama, \$7.3 million; Benelux, \$6.4 million; and the Latin American Free Trade Association countries, which include nearly all of South America plus Mexico, \$19.9 million. In 1973 the value of textile exports rose to \$324.8 million with West Germany taking \$75 million; the United States \$69.2 million; the Netherlands \$32.8 million; and other countries \$147.8.

The European Community (EC) currently is negotiating with Brazil to establish a bilateral textile agreement under the provisions of the Multilateral Fiber Arrangement. The EC has been concerned by the rapid increase in textile exports to the EC and is seeking to limit future

expansion. Some of the EC countries, including France and the United Kingdom, already had restrictions on the import of Brazilian textiles, but these are being superseded by an all-EC bilateral. The United States entered into an agreement in 1970 with Brazil establishing quotas on cotton textile exports and allowing a 5-percent increase each year.

Imports of cotton textiles from Brazil into the United States declined from the equivalent of 93 million square yards in 1972 to 69 million in 1973; 42 million in 1974; and 35 million in 1975. Less than 3 percent of all U.S. cotton textile imports were from Brazil in 1974 and 1975. However, imports of manmade fiber textiles from Brazil rose from the equivalent of 13 million square yards in 1972 to 32 million in 1973, then declined to 21 million in 1974 and 14 million in 1975. Less than 1 percent of all U.S. imports of such textiles are from Brazil.

The developing countries of the world for sometime have been seeking greater and less restricted entry into the textile markets of the developed countries. They have been having some success in this effort. There is, however, intense competition for these markets, not only from the individual developing countries that produce cotton, but from developing countries in East Asia and elsewhere that must import cotton. Brazil thus far has only a very small fraction of the world textile market. There is considerable doubt that present Brazilian export markets could have been won without incentive payments, but this tool also has been used in a number of other cotton-producing, textile-exporting countries. Taking all of these factors into consideration, it appears that over the long run Brazilian textile exports are likely to continue growing, given a continuation of the present economic and political climate in Brazil.

TABLE 24. EXPORTS OF TEXTILES FROM BRAZIL

| Calendar year | Total volume | Cotton volume ¹ | Raw cotton equivalent ² |
|---------------|--------------------|----------------------------|------------------------------------|
| | <i>Metric tons</i> | <i>Metric tons</i> | <i>1,000 bales</i> |
| 1970 | 40,732 | 15,614 | 82.8 |
| 1971 | 50,623 | 18,847 | 100.9 |
| 1972 | 92,166 | 44,393 | 236.9 |
| 1973 | 133,190 | 66,488 | 355.0 |
| 1974 | 132,689 | 60,271 | 321.7 |
| 1975 | 129,768 | ³ 74,507 | ³ 395.0 |

¹ Including estimated proportion of manmade fiber products made of cotton.

² Estimated.

³ Preliminary. Partly estimated.

Source: Brazil's foreign trade statistics.

Cotton textile exports currently account for most of Brazil's total exports of textiles. The quantity of cotton exported in the form of textiles is estimated to have increased from 83,000 bales in calendar 1970 to 355,000 bales in 1973, then declined to 322,000 bales in 1974, and to have increased to nearly 400,000 bales in 1975, Table 24. In comparison, Brazil exported 1,333,000 bales of raw cotton in 1972/73 (August-July), 661,000 in 1973/74, and 253,000 in 1974/75.

Of Brazil's total cotton textile exports in 1974, 47 percent was cotton yarn; 33 percent cotton cloth; 11 percent sheets, towels and other "white goods;" and about 5 percent garments.

Domestic Consumption of Textiles

Even though textile exports have been expanding rapidly, around 80 percent of Brazil's supply of textiles is consumed at home. Imports of textiles are extremely limited and in fact imports of many categories were suspended from February through June 1976. The supply of textiles to the domestic population apparently lagged behind the growth of population in the 1960's, but has been growing almost explosively since 1969. From 1970 to 1973 the supply rose 30 percent, while the population increased by 9 percent and the per capita gross national product, at constant prices, increased 26 percent, Table 25.

TABLE 25. BRAZIL: AGGREGATE AND PER CAPITA CONSUMPTION OF TEXTILE FIBERS BY ULTIMATE CONSUMERS, POPULATION, AND PER CAPITA GNP, CALENDAR 1950-73

| Item | Total | Cotton | Wool | Rayon | Synthetic fibers | Population | Per capita GNP |
|------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------------|----------------|
| | <i>1,000 metric tons</i> | <i>1,000 metric tons</i> | <i>1,000 metric tons</i> | <i>1,000 metric tons</i> | <i>1,000 metric tons</i> | <i>Millions</i> | <i>Dollars</i> |
| Aggregate Average: | | | | | | | |
| 1950-54 | 223.0 | 182.9 | 14.4 | 25.7 | — | 54.5 | 236 |
| 1955-59 | 281.6 | 229.8 | 16.1 | 34.2 | 1.5 | 61.3 | 277 |
| 1960-64 | 332.0 | 268.1 | 13.9 | 41.0 | 8.6 | 74.7 | 337 |
| 1965-69 | 348.6 | 266.0 | 7.4 | 48.0 | 26.4 | 85.7 | 366 |
| 1970 | 387.1 | 274.9 | 5.2 | 50.6 | 56.3 | 93.0 | 426 |
| 1971 | 412.2 | 278.9 | 4.9 | 54.6 | 73.8 | 95.7 | 461 |
| 1972 | 468.8 | 302.1 | 9.3 | 55.2 | 102.2 | 98.4 | 495 |
| 1973 | 503.7 | 315.8 | 7.6 | 56.1 | 124.4 | 101.3 | 536 |
| Aggregate gain by 5 year intervals | <i>Percent</i> | <i>Percent</i> | <i>Percent</i> | <i>Percent</i> | <i>Percent</i> | <i>Percent</i> | <i>Percent</i> |
| 1950-54/1955-59 | 26 | 26 | 12 | 33 | — | 12 | 17 |
| 1955-59/1960-64 | 18 | 17 | -14 | 20 | 473 | 22 | 22 |
| 1960-64/1965-69 | 5 | -1 | -47 | 17 | 207 | 15 | 9 |
| 1965-69/1972 | 34 | 14 | 26 | 15 | 287 | 15 | 35 |
| Percent distribution | | | | | | | |
| 1950-54 | 100 | 82 | 6 | 12 | — | — | — |
| 1955-59 | 100 | 82 | 6 | 12 | — | — | — |
| 1960-64 | 100 | 81 | 4 | 12 | 3 | — | — |
| 1965-69 | 100 | 76 | 2 | 14 | 8 | — | — |
| 1970 | 100 | 71 | 1 | 13 | 15 | — | — |
| 1971 | 100 | 68 | 1 | 13 | 18 | — | — |
| 1972 | 100 | 64 | 2 | 12 | 22 | — | — |
| 1973 | 100 | 63 | 1 | 11 | 25 | — | — |
| Per capita Average: | <i>Kgs.</i> | <i>Kgs.</i> | <i>Kgs.</i> | <i>Kgs.</i> | <i>Kgs.</i> | | |
| 1950-54 | 4.2 | 3.4 | .3 | .5 | — | — | — |
| 1955-59 | 4.6 | 3.7 | .3 | .6 | — | — | — |
| 1960-64 | 4.5 | 3.6 | .2 | .6 | .1 | — | — |
| 1965-69 | 4.1 | 3.1 | .1 | .6 | .3 | — | — |
| 1970 | 4.2 | 2.9 | .1 | .6 | .6 | — | — |
| 1971 | 4.3 | 2.9 | .1 | .5 | .8 | — | — |
| 1972 | 4.8 | 3.1 | .1 | .6 | 1.0 | — | — |
| 1973 | 5.0 | 3.1 | .1 | .6 | 1.2 | — | — |

Source: Fiber and population data are from FAO, Per Caput Fibre Consumption, 1971-73 and earlier reports in same series. In some instances total data include small quantities of flax, not shown separately. Per capita GNP is in constant 1972 U.S. dollars as compiled by U.S. AID Administration.

Brazil's per capita consumption of 5.0 kilograms of textile fibers in 1973 compares with 24.9 in the United States; 15.8 in the EC; 4.8 in Mexico; 7.4 in Argentina; 1.9 in Africa, (excluding South Africa, Egypt, Libya, and the Sudan); and 2.4 in South Asia. While Southeast Brazil can hardly now be termed an undeveloped area, a large proportion of Brazil's population still has very low incomes. Food takes first priority and is the largest item in the Brazilian consumer's budget. Next is shelter and then clothing. The country's tropical and semitropical climate also no doubt contributes to a relatively low level of fiber consumption.

As incomes rise, as they appear to be going, the demand for textiles could rise at a fairly rapid rate, if Brazil follows the pattern occurring in other countries. There is a strong demand for informal clothes, and a growing middle class that is fashion conscious. The textile offtake in São Paulo, Rio de Janeiro, and other centers of affluence is probably much higher than the country average.

Domestic consumption of cotton and other textiles in Brazil is held back by value added and industrial processing taxes, which vary with the product but are said to amount to around 25 percent on clothing.

Competition from Other Fibers

As everywhere else, cotton's share of the textile market is declining in Brazil. In the 1950's and early 1960's, cotton comprised over 80 percent of the domestic consumption of fibers but by 1973 cotton's percentage of both mill consumption and domestic cotton offtake was down to 63 percent. By way of comparison, cotton's percentage of the market in 1974 in the United States was 30 percent; in Western Europe it was 31 percent.

At the same time, synthetic fibers are taking a rapidly increasing proportion of the Brazilian market—25 percent in 1973, compared with only 8 percent in 1965-69. Some 30 companies are now manufacturing these fibers in Brazil, including many partly or completely owned by large U.S., West European, and Japanese synthetic fiber producers.

Production of synthetic fibers is being expanded rapidly in Brazil, having nearly quadrupled from 1969 to 1974. More than half the 1974 production was polyester fiber, the synthetic fiber that competes most directly with cotton. One-fourth was polyester staple fiber, which usually is blended with cotton and spun on cotton spinning machinery, Table 26.

Plans call for an annual production capacity of synthetic fibers in Brazil of 284,000 metric tons by the end of 1976, compared with a production of 103,000 tons in 1974. Government policy encourages construction of synthetic fiber plants. For instance, to spur

development in the Northeast, with Government authorization, Brazilian companies can invest 50 percent of what they would otherwise have paid in income taxes in purchasing up to 50 percent of the shares in the new enterprise. Another 25 percent can be obtained from development banks and companies in the respective Brazilian states. The same rule applies to new textile mills.

Principal chemical intermediates used in making polyester fiber are DMT (dimethyl terephthalate) or TPA (terephthalic acid) and ethylene glycol. All of the DMT and TPA used in producing polyester fiber in Brazil is imported, although there are plans to produce these intermediates eventually. In the spring of 1975 the landed cost of DMT or TPA in Brazil was \$732 per metric ton after paying a 15-17 percent duty. At this time, DMT was selling in the United States for \$414. Ethylene glycol is produced in Brazil and sells for \$84.45 per metric ton.

The Brazilian Government has a monopoly on oil, which was selling in the spring of 1975 at \$10.65 per barrel, about parallel with European prices, but considerably higher than the average price in the United States. About 80 percent of Brazil's oil requirements currently are imported. Companies making or planning to make chemical intermediates used in synthetic fiber production are either entirely owned by the Government or one-third foreign owned for the technology, one-third by the Government for the capital it has invested, and one-third private. However, a huge plant to produce ethylene was recently announced that would be entirely owned by U.S. interests.

The price of polyester staple in Brazil rose from \$1.47 per pound in October 1972 to \$1.60 in October 1973, but then fell to \$1.03 in April 1975, which was, of course, far higher than the U.S. price of under 50 cents a pound at the time. Nylon staple in Brazil was priced at only around 90 cents a pound, below Government ceiling, because of slack demand.

Imports of all manmade fibers require a license and are subject to a 55 percent duty imposed in July 1974. This was not considered sufficient protection when world prices began falling in 1974 so a higher "reference price" was set on which the duty was charged. At 90 U.S. cents per pound, this is said to have quite effectively brought imports to a halt for domestic use. If textiles are exported, however, synthetic fibers used in their manufacture can be brought in without paying a duty. Imports of synthetic fibers in 1974 were one-fourth as large as domestic production.

Rayon and acetate fibers have been produced in Brazil for many years, but the expansion appears to have come to a halt in the last few years. These cellulosic fibers accounted for 11 percent of fiber consumption in 1973, compared with 14 percent in 1965-69. The price

TABLE 26. BRAZIL: PRODUCTION, IMPORTS, AND EXPORTS OF MANMADE FIBERS, CALENDAR YEARS

[In 1,000 metric tons]

| Item | Rayon and acetate | | | Synthetic fibers | | | Total |
|----------------------------|-------------------|--------|-------|------------------|--------|-------|-------|
| | Yarn | Staple | Total | Yarn | Staple | Total | |
| <i>1,000 metric tons</i> | | | | | | | |
| PRODUCTION | | | | | | | |
| 1968 | 36.9 | 16.4 | 53.3 | 16.7 | 10.5 | 27.2 | 80.5 |
| 1969 | 34.0 | 14.0 | 48.0 | 18.1 | 11.8 | 29.9 | 77.9 |
| 1970 | 33.3 | 14.6 | 47.9 | 26.9 | 17.2 | 44.1 | 92.0 |
| 1971 | 33.6 | 19.6 | 53.2 | 31.2 | 21.2 | 52.4 | 105.6 |
| 1973 | 36.7 | 17.9 | 54.6 | 44.5 | 28.8 | 73.3 | 127.9 |
| 1974, Total | 35.9 | 17.8 | 53.7 | 68.7 | 47.0 | 115.7 | 169.4 |
| Rayon | 27.8 | 17.8 | 45.6 | — | — | — | — |
| Acetate | 8.1 | 0 | 8.1 | — | — | — | — |
| Nylon | — | — | — | 37.5 | 5.5 | 43.0 | — |
| Polyester | — | — | — | 31.2 | 30.3 | 61.5 | — |
| Acrylic | — | — | — | — | 11.2 | 11.2 | — |
| PRODUCTION CAPACITY | | | | | | | |
| 1975, March | 39.7 | 18.6 | 58.3 | 90.6 | 52.4 | 143.0 | 201.3 |
| 1976, December | 39.7 | 22.2 | 61.9 | 158.9 | 125.4 | 284.3 | 346.2 |
| IMPORTS | | | | | | | |
| 1970 | .5 | .8 | 1.3 | 4.3 | 5.4 | 9.7 | 12.2 |
| 1971 | .7 | 2.5 | 3.2 | 4.3 | 5.9 | 10.2 | 14.8 |
| 1972 | .5 | 3.4 | 3.9 | 14.5 | 14.2 | 28.7 | 32.6 |
| 1973 | .3 | 6.8 | 7.1 | 14.6 | 10.1 | 24.7 | 31.8 |
| 1974 | 3.8 | 6.5 | 10.3 | 18.9 | 12.8 | 31.7 | 42.0 |
| EXPORTS | | | | | | | |
| 1970 | — | .9 | .9 | — | — | — | .9 |
| 1971 | — | .9 | .9 | — | — | — | .9 |
| 1972 | 4.7 | — | 4.7 | — | — | — | 4.7 |
| 1973 | 5.3 | 1.3 | 6.6 | .4 | 2.0 | 2.4 | 9.0 |
| 1974 | 5.3 | 2.6 | 7.9 | — | 1.9 | 1.9 | 9.8 |

Source: *Textile Organon*, except 1974 breakdown by processes. Data excludes olefin fibers and glass fiber. Yarn figures are for continuous filament yarn.

ceiling of under 40 cents a pound is very low, but demand appears to be light. Brazil imports a few thousand tons of rayon and acetate but these are largely offset by exports.

Brazil has no fiber labeling act so consumers must rely on the name of the textile manufacturer or the reputation of the store for assurance of quality. Considerable promotion of manmade fiber products is done but there has been relatively little promotion of the use

of cotton. The Bolsa de Mercadorias of São Paulo and a cotton mill concern, in cooperation with the International Institute of Cotton, did however put on a "Cotton Fashion Summer" promotion in January 1974.

Brazil, like the United States and a number of other countries, is a member of the International Institute for Cotton (IIC), and contributes one dollar per bale for the promotion of cotton in Western Europe and Japan.

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