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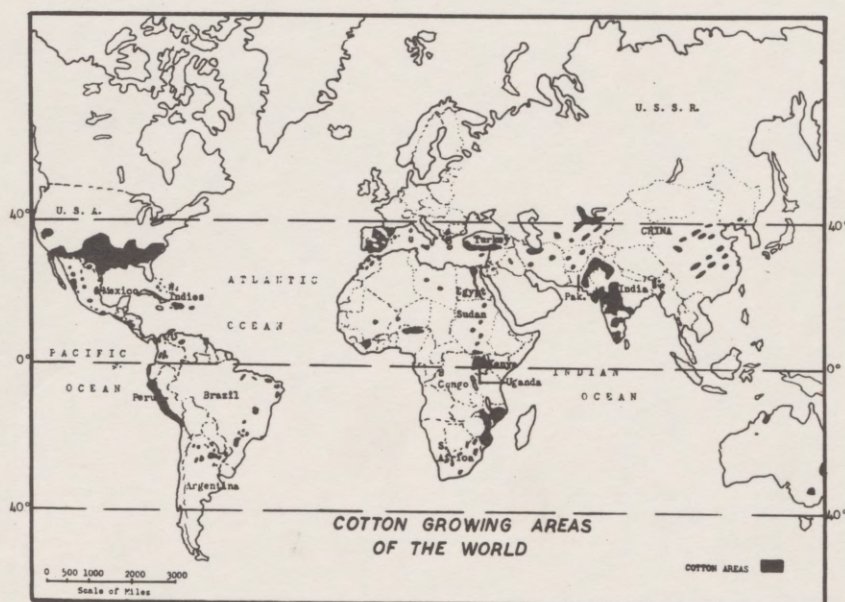
Cotton

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WORLD COTTONS



COTTON ECONOMIC RESEARCH

The University of Texas • Austin



Research Report No. 93

WORLD COTTONS

COTTON ECONOMIC RESEARCH

The University of Texas at Austin

A Part Of

The Cotton Research Committee of Texas

PREFACE

In the United States we have reached that stage of maturity in the Cotton Industry that demands that we look at cotton production as a World Commodity. In this broader concept it is just as important to know what an Arabian producer is shipping through the Port of Oden or the Alta Poulista shipment from West Central Brazil as it is to know facts about cotton shipments from Texas Gulf ports.

It is hoped that this study will enable producers, shippers, and mills to better understand the world cotton picture as it currently appears and perhaps to glimpse what the future holds for cotton on a world-wide basis. The study is an up-dating of Cotton Economic Research Report No. 49 entitled Fiber Properties and Production of World Cottons and Their Value in Merchandising Cotton, dated July 1959. When available, production figures for each cotton-producing country for the period 1934-1938 and the 1958-59 season are given (they were used in the earlier study), along with the figures for 1968-69, for comparison purposes.

We wish to express our thanks to the many United States Agricultural Attaches located throughout the world who furnished much of the data contained in this study. We also wish to express our appreciation to the shippers, mills, breeders and the various cotton marketing or production boards located at home and abroad which furnished the lint samples that were tested by Textile Research Center (a part of the Cotton Research Committee of Texas) for the fiber properties and spinning test results.

Cotton Economic Research
August 1969

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INTRODUCTION

Cotton is a vegetable fiber used in the manufacture of many kinds of textiles the world over. Cotton was used by man as far back as 3,000 years before the life of Christ. In the early times, the cotton plant was called the "wool tree"; and when Columbus came to the New World, he found cotton growing in the Bahama Islands and the natives wearing cotton garments. The cotton plant belongs to the mallow family, genus Gossypium. The usually accepted botanical classifications are:

Gossypium barbadense - This cotton grows in the West Indies. It is known commercially as Sea Island cotton and is desired because of its fineness and its long staple length that varies from $1\frac{1}{2}$ to 2 inches. The present American-Egyptian cottons, such as Pima, are the Vitifolium form of Gossypium barbadense species and are grown in the Trans-Pecos area of Texas. The Egyptian type of cotton produced in the United Arab Republic and Sudan, and the smaller quantities produced in Peru, Russia, and other countries, are also of this species. The Peruvianum form of the Gossypium barbadense is grown mainly in Peru and, to a lesser extent, in some of the other South American countries. Tanguis is the trade name of this cotton which is very long and coarse.

Gossypium hirsutum - This classification includes all the commercial cottons known today as "upland type." This type is commonly used in large amounts by most textile mills in the United States and elsewhere. It is by far the most popular type grown in Texas, the United States, and the world.

Gossypium arborium and Gossypium herbaceum - These species are commonly called "Asiatic type" cottons. Various commercial types of these cottons are grown in India, Pakistan, China, and Russia.

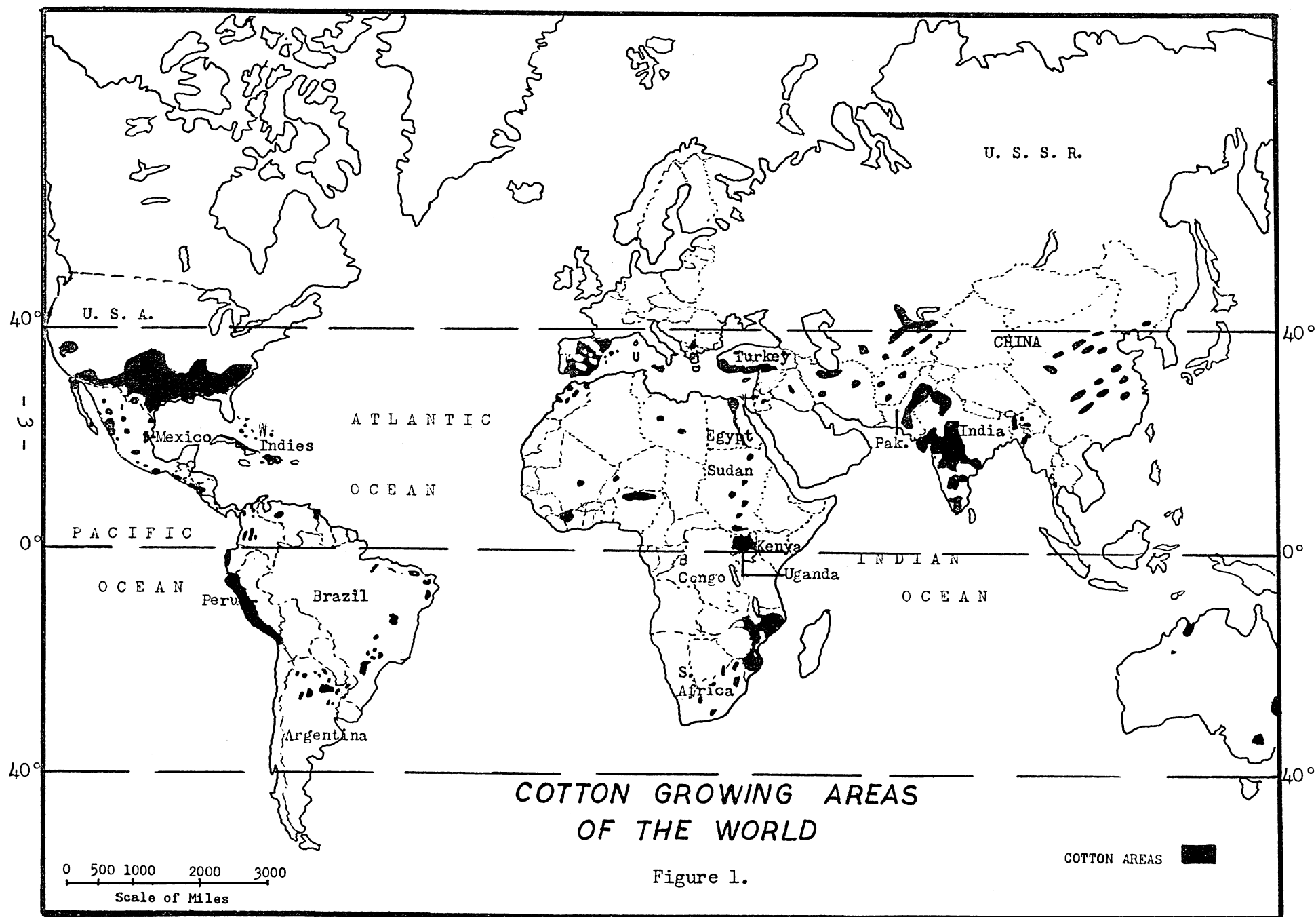
Depending on the variety of cotton planted and the crop environment (soil conditions, relative humidity, rainfall, cloud cover, etc.), the fibers will take from 25 to 30 days to complete their lengthening process. This process starts within six days after the blossom drops off and the boll forms. It is during this time that the cotton plant has its greatest need for water. It takes from 45 to 60 days for the boll to mature completely. The boll then splits open into three, four, or five compartments. The cotton is then ready to harvest. Cotton is 94 percent cellulose with the remaining 6 percent composed of wax, pectic substances, ash, acids, sugars, and other compounds.

The qualities of grade and of staple length are no longer the only qualities which mills consider, or upon which the trading of cotton is solely based. The fiber properties of fineness and strength of the cotton lint have become increasingly important. Fineness is now one of the major qualities upon which cotton is traded. Even the United States Government Cotton Loan Program takes into consideration, through the use of premiums and discounts, the fineness of the lint when the cotton is placed in the loan. The strength of cotton is beginning to be considered in trading,

with the stronger cottons receiving premiums and weak-fibered cottons receiving penalties.

The determination of the properties of fineness and strength have added to the cost of merchandising cotton and have created a bottleneck in the marketing system because of the time required for such tests to be made. As a result, instrument manufacturers have been developing machines which will determine rapidly the required information. The development of these testing devices has increased the automation of cotton marketing. Some organizations are now testing and working with a "line" or conveyor system. At various stations or positions on the conveyor, the cotton sample is tested for grade, staple, color, fineness, and strength; and the results of all these tests are automatically recorded on a data processing card which contains the bale number, source, variety, etc. Such lines are testing over 400 samples per eight-hour day.

Cotton has been, and is, one of the major foreign-currency-producing crops for those nations which grow and export in the world markets. As a result, many nations are endeavoring to expand their production of cotton in order to increase their earnings of foreign currencies. Figure 1 indicates the many countries which produced cotton throughout the world during the 1968-69 season. As can be seen, most of the world cotton is produced in countries which lie between the latitudes of 40 degrees north and 40 degrees south.



COTTONS OF NORTH AMERICA

The majority of the cottons produced in the countries located in the North American Continent (over 99.4 percent in the 1968-69 season) is of the American upland type. Some long staple cottons are produced in this area of the world; Sea Island and American-Egyptian are the major ones.

United States of America

The United States of America is the largest cotton producer in North America. Cotton production during the 1966-67 season declined to about 9.5 million bales, the lowest since 1946. During the 1967-68 season, the production went down even further to about 7.4 million bales, the lowest production in over four decades. Production during the 1968-69 season increased to about 10.9 million bales, which was still some 4 million bales less than was produced in the nation in each of the seven seasons preceding the 1966-67 season. The low production for the last three seasons has been the result of the government cotton program which was in effect and the adverse environmental conditions. This government program was designed to support the price of the cotton at the farm level, assuring the farmer of his fair and necessary return and allowing the cotton to be saleable on the world market at the world market prices. A second feature of the program was to reduce production in the United States and to allow the movement of the large carryover, a majority of which was in the United States Loan, into market trade channels.

In the United States during the last decade, several factors other than United States Government loan programs have affected the production of cotton. Considering the broad United States picture of all fibers consumed in the production of textiles, the amount of cotton used in the manufacture of many kinds of fabrics and the amount of per capita cotton consumption has decreased, while the amount of man-made fibers in these areas has increased. The annual increased demand for textiles and apparel due to the increased population has held the total consumption of cotton in the United States nearly constant until the 1968-69 season. All indications pointed to decreased cotton consumption in the nation in 1968, with man-made fibers taking over cotton's lead as the number-one fiber being consumed.

During the ten-year period 1958-1968, the size of cotton farms, and for that matter all farms, has increased; while the total number of farms, both cotton and general, has decreased. This change has been a result of increased mechanization; which lends itself to the large-size farms rather than to the small ones because of the increased cost of the equipment required and utilized. Mechanization has been the only way to resist and/or decrease the ever increasing cost of farm labor and to still maintain a fair and equitable return to the producer. Old areas of cotton production in the nation, particularly in Texas, are generally not suitable for mechanized cotton production. As a result, the production of cotton is shifting to the newer cotton-producing areas of the state or nation.

At the same time, more and more cotton is being blended with man-made fibers and other natural fibers in the production of fabrics and apparel. The mills doing this state that they must have high quality cottons which are longer than the old-style "bread and butter" cottons of yesteryear. The producers, during the 1968-69 season, listened to this request and produced longer staple cottons with better fineness and greater strength than in any other season in the history of the nation's cotton production. The cotton breeders in the United States, both private and governmental, have been responding to the same request and, in addition to attempting to retain a high yield, insect- and disease-resistant cotton, have been breeding for longer cottons with a fineness of from 3.5 to 4.9 micronaire units and with an increased tensile strength.

The breeders also have developed varieties having a "glandless" seed which will allow its utilization in the manufacture of "high protein" food products for human consumption. This glandless seed is gossypol-free, thus making the derived products edible for man, swine, and other animals not previously able to eat products derived from cottonseed. Because of its usability as raw material for human-consumption food products, the glandless seed should increase in value, thus increasing the return to the producer.

In addition, researchers supported by the Federal government, some state governments, national organizations, private firms, and the producers themselves are seeking ways to reduce the cost of production, processing, and manufacture of cotton. New uses, more dependable durable press, soil release, methods of cross linking, etc., are being researched in an effort to maintain or improve the position of cotton in the market and to enable cotton producers to produce cotton which would give them a fair return.

Production during the 1968-69 season in the United States was about 35,000 bales above that of the 1958-59 season. It is interesting to note the changes that have taken place in the production of the staple lengths. The 1968-69 United States production of cottons 29/32" and shorter (short staple) was .8 million bales less than in the 1958-59 season. The production of 15/16" through 1-3/32" (medium staple) was .6 million less than in the 1958-59 season. Long staple cotton production (1-1/8" through 1-7/32") during the 1968-69 season was more than that of the earlier period by 1.4 million bales. Extra long staples (1-1/4" and longer) production was about 7,500 bales over that of the earlier season. See table 1 for these data by states and staple lengths for the 1967-68 season.

This shift, over the years, in staple length production in the United States is also indicated in percentage form in table 2, which shows the cotton production for the last five years by staple lengths and for earlier periods by five year averages.

To a large extent, of course, the varieties planted determine the staple length, provided environmental conditions are favorable during the growing season. Many of the varieties which were planted before the 1953-54 season are no longer produced in the United States for a number of reasons; the major reason being that they were not suitable for harvesting by mechanical pickers or strippers. Lack of high yield was another prime reason for not producing the earlier varieties. Some of these varieties to which

Table 1. UNITED STATES COTTON PRODUCTION BY STAPLE LENGTH GROUPS, BY STATES, AVERAGE 1967-68

State	Short Staple 29/32" and Shorter		Medium Staple 15/16" 1-3/32"		Long Staple 1-1/8" 1-7/32"		Extra Long 1-1/4" and Longer		Total All Staples	
	Bales	Percent	Bales	Percent	Bales	Percent	Bales	Percent	Bales	Percent
Alabama	296 (-3,598)	*	196,339 (-326,508)	2.64	1,797 (1,731)	.03	-		198,432 (-328,375)	2.67
Arizona	1,133 (315)	.02	379,031 (-312,633)	5.10	28,900 (9,161)	.39	40,712 ^{1/} (-1,446)	.54	449,776 (-304,603)	6.05
Arkansas	10 (-1,975)	*	474,441 (-473,929)	6.38	28,790 (14,347)	.39	- (-81)		503,241 (-461,638)	6.77
California	102 (-298)	*	791,670 (-758,237)	10.65	263,933 (257,281)	3.55	850 ^{1/} (850)	.01	1,056,555 (-500,404)	14.21
Georgia	18 (-1,562)	*	224,889 (-163,111)	3.02	4,342 (4,331)	.06	-		229,249 (-160,342)	3.08
Louisiana	- (-388)		427,815 (82,490)	5.75	2,168 (2,040)	.03	-		429,983 (84,142)	5.78
Mississippi	- (-452)		1,013,256 (-47,755)	13.63	48,267 (39,669)	.65	127 (91)	*	1,061,650 (-8,447)	14.28
Missouri	12 (-346)	*	56,516 (-125,372)	.76	3,560 (2,993)	.05	-		60,088 (-122,725)	.81
New Mexico	770 (-6,989)	.01	25,178 (-52,223)	.34	111,474 (-17,017)	1.50	7,519 ^{1/} (-2,218)	.10	144,941 (-78,447)	1.95

Table 1.—Continued

State	Short Staple 29/32" and Shorter		Medium Staple 15/16" - 1-3/32"		Long Staple 1-1/8" - 1-7/32"		Extra Long 1-1/4" and Longer		Total All Staples	
	Bales	Percent	Bales	Percent	Bales	Percent	Bales	Percent	Bales	Percent
North Carolina	- (-195)		46,791 (-188,449)	.63	989 (470)	.01	-		47,780 (-188,174)	.64
Oklahoma	20,327 (-66,670)	.27	165,799 (-5,204)	2.23	3,285 (2,281)	.05	185 (185)	*	189,596 (-69,408)	2.55
South Carolina	- (-1,537)		170,822 (-174,159)	2.30	13,385 (13,346)	.18	-		184,207 (-162,350)	2.48
Tennessee	5 (-2,529)	*	143,811 (-256,721)	1.94	2,314 (1,100)	.03	- (-12)		146,130 (-258,162)	1.97
Texas	360,863 (-423,138)	4.85	2,109,388 (-450,519)	28.37	206,236 (-22,421)	2.78	45,142 ^{1/} (16,871)	.61	2,721,629 (-879,207)	36.61
All Others ^{2/}	- (-75)		7,327 (-11,555)	.10	3,801 (3,777)	.05	-		11,128 (-7,853)	.15
All States	383,546 (-509,427)	5.15	6,233,401 (-3,263,557)	83.84	723,241 (313,089)	9.75	94,535 ^{1/} (14,240)	1.26	7,434,723 (-3,445,655)	100.00

* Less than .005.

^{1/} American-Egyptian included in this length. All states total is 26,213 upland plus 68,322 American-Egyptian.^{2/} Florida and Nevada.

Note: Figures in parentheses indicate bale change in the 1967-68 season compared to 1957-58 season.

Source: Data adapted from USDA, Cotton Quality Statistics, 1967-68.

Table 2. UNITED STATES COTTON PRODUCTION BY STAPLE LENGTHS, PERCENT OF TOTAL

Staple Length	Five-Year Averages			Seasonal Averages				
	1949-54	1954-59	1959-64	1964-65	1965-66	1966-67	1967-68	1968-69
13/16"	2.3	1.3	*	.3	.1	.1	*	*
7/8"	6.8	4.2	.8	2.5	.7	1.0	.6	.1
29/32"	5.9	4.8	4.6	5.4	6.3	6.8	4.6	1.1
15/16"	7.5	8.2	13.1	10.8	15.5	14.5	10.6	7.3
31/32"	4.9	6.9	6.7	3.8	4.3	4.6	7.3	6.7
1"	10.3	10.7	6.3	5.1	4.7	3.8	5.3	6.9
1-1/32"	23.2	22.4	19.6	23.8	19.2	13.5	9.7	8.5
1-1/16"	29.0	30.9	37.5	34.1	34.0	34.8	28.7	26.5
1-3/32"	7.7	6.8	8.3	11.3	12.3	16.8	23.0	26.2
1-1/8" and longer	2.4	3.8	3.1	2.9	2.9	4.1	10.2	16.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* Less than .5 percent.

Source: Cotton Quality Statistics United States, 1949-1960, and Cotton Quality, 1961-1969, USDA, C&MS, Cotton Division.

large acreage was planted in the period 1925 to 1950 were Rowden, Half & Half, Kasch, Mebane, and Qualla. In table 3 are the principal varieties planted in the United States for selected years from 1953 to 1968.

The United States cotton-growing states are grouped into four general areas--the Southeast, the Mississippi Valley or South Central, the Southwest, and the Far West. These areas are shown in figure 2, along with the major varieties produced in the areas and the United States in the 1968-69 season.

Texas, a state located half-way between the East and West Coasts of the nation, produces one-third of the country's cotton annually. This state has produced some 299 million bales of commercial cotton since production was first started on 100 acres in the year 1822. The 1968-69 crop of about 3.5 million bales was ginned during the season in 1,182 active gins. Texas production was down some 128,000 bales from the 1958-59 period.

In Texas, cotton is planted in the early spring in the Lower Rio Grande Valley. The planting-cultivation-harvesting cycle moves northward in the state so that the last harvesting of cotton in the state, and often in the nation, takes place in the High Plains area in mid-winter. Often, the last of the harvesting in the state is being completed in the northern area when the Lower Rio Grande Valley in the southern part of the state is making preparations for planting the next season's crop.

Average fiber property data for variety samples of cottons grown in the United States in 1967-68 and 1968-69 and sent in for testing are in table 4a. Table 4b lists the average spinning data for these same samples and seasons. Further fiber property test data, from U.S. Department of Agriculture sources, for the same and other varieties can be found in table 5 for the crop of 1968-69. The average fiber property and spinning test results for the crop years of 1966, 1967, and 1968, according to the four producing areas in the United States and the national average, are in table 6.

The future plans for cotton production in the United States are very vague at this time. The 1969-70 crop, to all appearances, will be a larger one than that of the 1968-69 season, particularly in relation to production in Texas. The United States 1969-70 season could very easily produce a 12.5 million-bale crop if the yields continue to increase as anticipated. Such a production would be about a 15 percent increase over the 1968-69 season.

The size of crops after the 1969-70 season are indefinite as Congress is currently considering a limitation of payments to a given cotton producer or farm, which, depending on the content of the final legislation, could reduce the amount of cotton being produced annually. The loan rate, in relation to world cotton prices may also affect production. During the 1969-70 season, the producers are reportedly shifting back to cottons of 1" to 1-1/32" in staple length rather than staying with the longer ones produced the previous season. Research, coupled with emerging new varieties, should create, regardless of legislation, an increase in the yield per harvested acre for the next few crops produced in the United States. The final decision will

Table 3. PRINCIPAL COTTON VARIETIES PLANTED IN THE UNITED STATES
FOR SELECTED SEASONS, DATA IN PERCENT

Variety	1968-69	1963-64	1958-59	1953-54
Acala	21	14	25	21
Coker	8	7	10	15
Deltapine	19	25	25	31
Lankart	9	9	13	3
Paymaster	7	4	1	*
Stoneville	21	8	2	4
Delfos	*	*	3	*
Empire	*	*	6	4
Gregg	*	7	**	--
Rex	*	6	**	--
Dixie King	*	3	**	--
Others	15	17	15	22

* Included in others.

** Less than .5 percent.

Source: Cotton Varieties Planted 1950-1968, USDA, C&MS, Cotton Division.

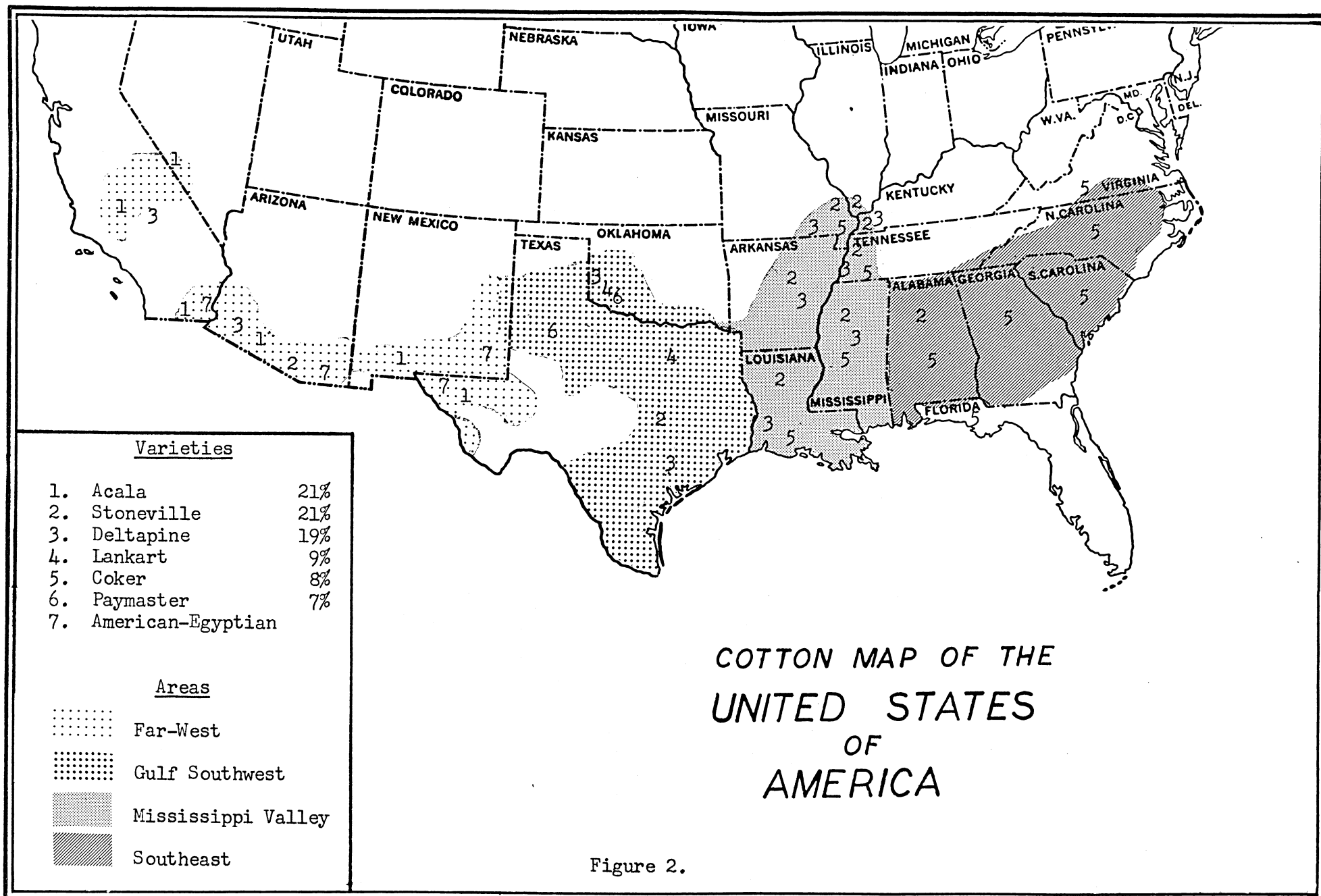


Figure 2.

Table 4a. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN THE UNITED STATES BY VARIETIES AND REGIONS OF GROWTH, CROP OF 1967-68

Variety and Location	Average Fiber Properties							
	Equivalent		2.5% Span Length (Inches)	50/2.5 Uniformity Ratio (Percent)	Ten. Str. Thousands Psi Zero Gauge	Fineness (Micronaire Units)	Colorimeter Readings	
	Grade	Staple					Rd	+b
<u>Texas</u>								
Western Stormproof	SLM+	31.0	.98	44	76.7	3.2	74.0	8.8
Western Stormproof BR	SLM+	31.5	1.00	42	78.2	2.9	71.7	9.3
Western Stormproof*	LM+	31.7	1.00	47	91.4	4.5	68.9	7.9
<u>South Carolina</u>								
Coker	SLM	38.4	1.20	45	84.6	4.0	71.7	7.7
<u>California</u>								
Acala 4-42	SLM+	35.0	1.10	45	91.6	4.5	75.6	8.2
Acala SJ-1	SLM+	36.0	1.12	45	102.7	4.5	74.6	8.0
<u>North Carolina</u>								
NcNair 1032	M	35.0	1.09	46	85.0	4.4	75.0	8.8
<u>Arkansas</u>								
Rex Smoothleaf	SLM	35.0	1.11	45	81.7	3.9	74.8	7.4

* 1968-69 crop

Source: Original data.

Table 4b. AVERAGE SPINNING DATA OF COTTONS GROWN IN THE UNITED STATES BY
VARIETIES AND REGIONS OF GROWTH, CROP OF 1967-68

Variety and Location	Average Spinning Test Data							
	Waste		Yarn Count	Yarn Strength (Pounds)	Break Factor	Yarn Appearance (Index)	Yarn Coefficient of Variation (Percent)	Neps Per Grain of Card Web
	Shirley Total	Picker & Card Total						
<u>Texas</u>								
Western Stormproof	3.2	2.94	22's	84.8	1866	100	22.38	.32
Western Stormproof BR	3.2	4.87	22's	87.6	1929	100	20.74	1.07
Western Stormproof*	3.5	--	--	--	--	--	--	--
<u>South Carolina</u>								
Coker	5.9	7.08	22's	122.1	2687	112	17.49	1.06
	--	--	50's	39.8	1990	94	23.87	--
<u>California</u>								
Acala 4-42	4.0	7.54	22's	127.1	2797	115	19.31	1.24
	--	--	50's	39.7	1985	85	24.88	--
Acala SJ-1	4.3	7.96	22's	130.5	2871	115	18.37	1.10
	--	--	50's	41.4	2071	80	25.50	--
<u>North Carolina</u>								
McNair 1032	3.3	8.51	22's	105.4	2320	110	20.60	.63
<u>Arkansas</u>								
Rex Smoothleaf	3.8	--	--	--	--	--	--	--

* 1968-69 Crop

Source: Original data.

Table 5. AVERAGE FIBER TEST RESULTS FOR SELECTED VARIETIES OF COTTON GROWN
COMMERCIALY IN THE UNITED STATES, CROP OF 1968-69

Variety	Lots Tested (Number)	Equivalent		Average Fiber Properties			
		Grade	Staple	2.5% Span Length (Inches)	50/2.5 Uniform- ity Ratio (Percent)	Ten. Str. Thousands Psi Zero Gauge	Fineness (Micronaire Units)
Lankart 57	3	SLM	30.0	.93	45	78	4.9
Paymaster 202	6	SLM	31.0	.94	46	84	3.8
Lankart 3840	4	M	33.0	1.02	46	87	5.0
Lockett 4789	13	M Sp	31.8	.99	46	89	4.8
Paymaster 111	6	SLMLtSp	32.5	1.03	45	82	3.5
Dixie King II	6	LM+	34.2	1.05	45	84	4.4
DPL 45A	7	SLM	35.2	1.11	46	83	4.3
Stoneville 7A	13	SLMLtSp	34.4	1.10	45	88	4.5
Stoneville 213	13	SLMLtSp	34.9	1.10	45	84	4.5
Coker 201	10	M Sp	33.8	1.06	46	87	4.7
Coker 413	33	SLM	34.7	1.12	45	90	4.0
DPL 16	21	M LtSp	34.9	1.11	44	83	4.6
Acala SJ-1	30	M Sp	35.9	1.13	46	95	4.4
Acala 4-42	6	SLM+	35.5	1.09	46	91	4.1
Stoneville 508	7	LM+	35.5	1.14	43	85	3.7
Acala 1517C	6	SLM+	36.8	1.15	44	88	3.6
Acala 1517V	2	M+	37.5	1.20	45	90	3.5

Source: Compiled from Summary of Cotton Fiber and Spinning Test Results, Crop of 1968, USDA, C&MS,
Cotton Division, April 1969.

Table 6. AVERAGE RESULTS OF CLASSIFICATION, FIBER, AND PROCESSING TESTS FOR AMERICAN UPLAND COTTON SAMPLES FROM SELECTED GIN POINTS, CROPS OF 1966, 1967, AND 1968*

Area and Crop Year	Lots Tested No.	Classification Grade** Index	Staple 32nd"	Fiber Test Results					Spinning Test Results			
				Fibrograph		Micro- naire Rdg.	Fiber Strength O-gauge Mpsi	Shirley Analyzer Nonlint Pct.	Picker & Card Waste Pct.	Skein Strength 22s Yarn Lbs.	Appear- ance 22s Yarn Index	Yarn Imperfec- tions 22s No.
				2.5% Span In.	50/2.5 Unif. Pct.							
<u>Southeast</u>												
1966	156	93.4	33.8	1.07	46	4.7	82	2.8	5.4	104	106	22
1967	69	92.0	34.0	1.08	44	4.0	79	3.3	6.3	107	100	27
1968	64	93.2	34.1	1.07	45	4.2	90	2.7	5.8	113	113	17
<u>South Central</u>												
1966	243	93.3	34.4	1.09	45	4.4	82	3.1	5.6	107	110	22
1967	160	92.3	34.7	1.09	44	3.9	79	3.5	6.1	111	108	29
1968	146	93.0	34.6	1.09	45	4.5	84	3.0	5.9	110	116	19
<u>Southwest</u>												
1966	204	92.0	31.2	.99	45	3.9	78	3.6	6.3	95	106	31
1967	129	94.3	31.8	.99	45	4.2	82	3.3	5.6	97	117	23
1968	144	93.2	32.4	1.02	45	4.3	84	3.5	6.4	104	116	24
<u>West</u>												
1966	107	95.8	34.8	1.10	45	4.1	91	3.3	6.0	120	109	25
1967	63	95.2	35.1	1.11	44	4.2	93	3.1	6.0	123	113	24
1968	82	96.1	35.9	1.13	45	4.1	91	2.8	6.6	127	113	21
<u>U.S. Average</u>												
1966	710	93.3	33.4	1.05	45	4.3	82	3.2	5.8	105	108	25
1967	421	93.3	33.7	1.06	44	4.1	82	3.3	6.0	108	110	26
1968	436	93.7	34.1	1.07	45	4.3	86	3.1	6.2	111	115	21

* Based on a limited number of samples of modal quality.

** See grade index conversion table 32.

Source: Summary of Cotton Fiber and Spinning Test Results, Crops of 1966, 1967, and 1968, USDA, C&MS, Cotton Division.

still rest, for the most part, with the American producers who must decide if the anticipated price for the cotton they will produce will be enough to return a profit for their labors.

Mexico

The neighbor to the immediate south of the United States is Mexico, the second largest cotton producer in the northern half of the Western Hemisphere. During the 1968-69 season, Mexico produced 2.3 million bales of cotton. This cotton was mostly of the American upland type belonging to the Deltapine varieties. Some long staple cotton of the Acala 1517 variety was planted in the Juarez Valley area adjacent to El Paso, Texas, where Acala is also produced. The total cotton production in Mexico was about 45,000 bales less in 1968-69 than was produced for the 1958-59 season, and acreage has decreased 757,000 acres.

The amount of cotton produced south of Mexico City and near Guatemala, has increased since the 1958-59 season. See figure 3 for the major cotton-growing areas of Mexico during the 1968-69 season. In 1968, at a time when Mexico was deeply concerned with the costs of building and preparing for the Olympic games, cotton production increased 16 percent over that of 1967.

Average fiber property data of cotton produced in Mexico for such varieties as Deltapine, Acala 1517, and Rowden are in table 7a. Spinning test data for the Rowden sample furnished are located in the same table, part b. The samples of the other varieties produced in Mexico were not large enough to warrant the running of spinning tests.

The Secretariat of Agriculture has increased the funds for the expansion of rural education and extension work in Mexico. This should increase the Mexican cotton producer's chances of producing a more profitable cotton crop in future years. Cotton acreage is expected to remain relatively stable, barring any sharp price increases in the world market. Cotton is an important cash crop, both to the farmer as a means of livelihood and to the nation as a means of earning foreign currencies. About 65 percent of the cotton produced is exported from Mexico and amounts to about 30 percent of all its agricultural commodities exported annually. It is anticipated that yield in Mexico will increase as more new agricultural practices become common knowledge.

There are no plans anticipated for expanding cotton production in Mexico through new or additional acreage at the present time. The Mexican farmer is allowed to plant cotton as he sees fit, based on his anticipation of the gross return for his production, minus his cost of producing the crop.

British West Indies

The two main varieties produced in the British West Indies are Sea Island and Marie Galante. The latest production figures are for the 1967-68 season, in which 607 bales of 500-pound gross weight Sea Island cotton and

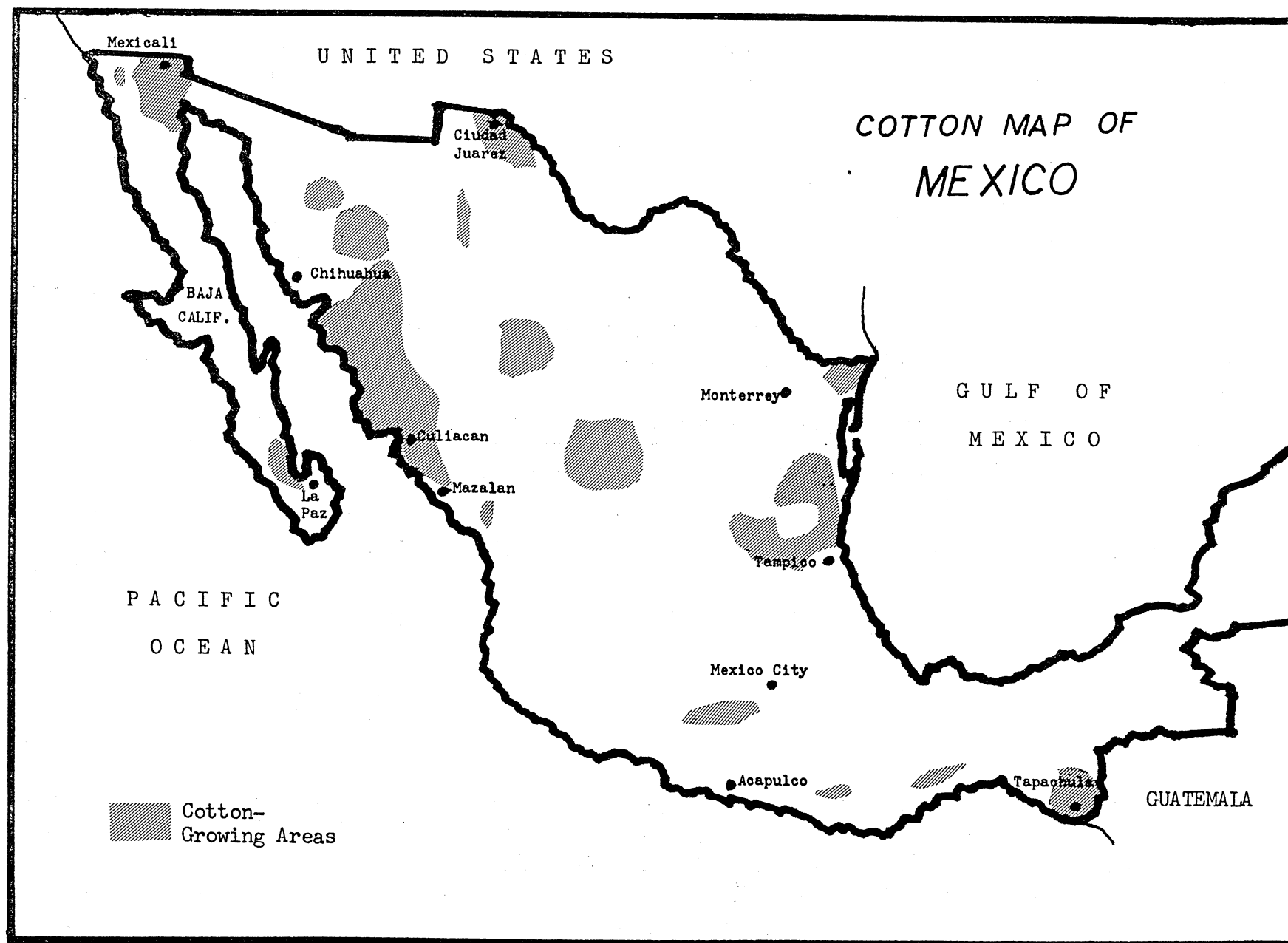


Figure 3.

Table 7a. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN MEXICO, BY VARIETIES AND REGIONS OF GROWTH

Variety and Location	Average Fiber Properties							
	Equivalent Grade	Staple	2.5% Span Length (Inches)	50/2.5 Uniformity Ratio (Percent)	Ten. Str. Thousands Psi Zero Gauge	Fineness (Micronaire Units)	Colorimeter Readings Rd	+b
<u>Deltapine</u>								
Mexicali	M+	32.7	1.03	45	87.7	4.7	77.0	8.4
Sonora	M+	34.7	1.08	46	85.3	5.0	77.5	8.6
Laguna	GM	34.3	1.08	43	75.6	4.0	78.8	9.8
<u>Acala 1517C</u>								
Juarez	GM	38.3	1.20	45	89.0	3.7	80.5	9.4
<u>Rowden</u>								
Baja California	SM	31.3	.99	44	76.0	4.0	77.0	9.3

Table 7b. AVERAGE SPINNING DATA OF COTTONS GROWN IN MEXICO, BY VARIETIES AND REGIONS OF GROWTH

Variety and Location	Average Spinning Test Data							
	Waste Shirley Total	Picker & Card Total	Yarn Count	Yarn Strength (Pounds)	Break Factor	Yarn Appearance (Index)	Yarn Coefficient of Variation (Percent)	Neps Per Grain of Card Web
<u>Deltapine</u>								
Mexicali	1.8	--	--	--	--	--	--	--
Sonora	2.1	--	--	--	--	--	--	--
Laguna	2.3	--	--	--	--	--	--	--
<u>Acala 1517C</u>								
Juarez	2.1	--	--	--	--	--	--	--
<u>Rowden</u>								
Baja California	1.6	4.51	22's	90.9	1999	122	20.46	.60
	--	--	36's	47.0	1691	130	24.26	--

188 bales of 500-pound gross weight Marie Galante cotton were reported.

Yield for the 1967-68 season was as follows: Sea Island, 119 pounds per acre and Marie Galante, 138 pounds per acre. Acreage planted to Sea Island and Marie Galante during the season was 304,000 and 90,000 acres, respectively. No samples of these varieties were received for testing.

The 1968-69 production of Sea Island cotton is expected to decrease, while the production of Marie Galante is expected to increase, provided labor is available at the time of harvest.

Guatemala

Cotton production in Guatemala amounted to 365,000 bales in the 1968-69 season. This crop was produced on 135,500 manzanas, which equals 234,415 acres. Yield for the season averaged 742 pounds per acre, which is the largest nation-wide average yield of any nation in North America.

The planting of cottonseed takes place in late July and early August. Harvesting and ginning starts in December, with the peak of the ginning season being during the months of February, March, and April.

Cottons produced in Guatemala are American upland types, with Deltapine Smoothleaf, Stoneville 7A, and Stoneville 213 being the predominate varieties. Most of the production (59 percent of the total) is concentrated in the Departments (areas) of Escuintla and Retalhuleu. The cotton-producing areas of Guatemala are shown in figure 4.

Guatemala produced only about 1,000 bales annually during the 1934-1938 period and 75,000 bales in the 1958-59 season. The production in the 1968-69 season represents nearly a 490 percent increase over the 1958-59 figure.

Domestic consumption is estimated at 45,000 bales for the 1968-69 season. Exports for the season are forecast at 305,000 bales, with Japan and Italy being the leading purchasing nations.

The Guatemalan Government has not established any specific production goals for the nation at this time; however, increased acreage amounting to 7.5 percent is anticipated. Most of this added acreage will be new land not previously utilized for cotton production. Increased production is expected as this new land is put in use. Coupled with this, the farmers are making a concentrated effort to improve their cultural practices and to reduce their production costs. Banking interests are now providing good credit facilities to most of the large cotton producers. It is anticipated that the new acreage will also be planted to the same varieties that are currently being grown in the country.

Honduras

Cotton production in Honduras was only 40,000 bales for the 1968-69 season, but this was a 120 percent increase over the amount produced 10 years earlier. The major production area of Honduras is shown in figure 4. This area produces the varieties of Deltapine Smoothleaf, Stoneville 7A, and Stoneville 213. The same types are produced by Honduras's northwestern neighbor, Guatemala.

The government of Honduras has established no anticipated production goal, but it is felt that production will increase due to larger yields achieved by more frequent use of modern cultural practices. The growers also are receiving adequate credit assistance from the local Honduras banks.

A cottonseed oil mill located in Choluteca has begun operations and has reported a crushing capacity of 25,000 to 30,000 tons annually. Cottonseed will probably be imported from Nicaragua to assist in supplying the needs of this mill.

El Salvador

El Salvador, during the 1968-69 season, produced about 200,000 bales of cotton, which is an 11 percent increase over the amount produced during the 1958-59 season. Yield for the season is reported at 737 pounds per harvested acre. El Salvador is shown in figure 4 with its major cotton producing areas indicated.

Principal varieties planted in El Salvador are Deltapine Smoothleaf and Copal 65. There has been a tendency to increase usage of the Stoneville 7A and Stoneville 213 varieties, which are being produced in the neighboring countries.

El Salvador had established a target level of 100,000 manzanas (173,000 acres) and 225,000 bales for the 1968-69 season. Since this goal was not reached during the 1968-69 season, it is felt that the same goal will be set for the 1969-70 season. It is believed that, for future years, El Salvador would like to stabilize the acreage devoted to cotton production at a figure between 100,000 and 125,000 manzanas (173,000 to 216,250 acres). The theory has been to recover some of the production lost since the 1964-65 season when 350,000 bales were produced. Acreage to be utilized for this increased production will come from lands formerly used for cotton production. The decline that occurred was chiefly in the Departments of San Miguel and La Union in the eastern part of the cotton belt. Encouragement will be added by more attractive credit terms and government programs to reduce the costs of production through better insect control.

Nicaragua

South of Honduras is Nicaragua, which produced about 3,000 bales of cotton annually during the period 1934-1938. During the 1958-59 season, Nicaragua production increased to 215,000 bales. Ten years later, the

production had increased another 146 percent to reach 530,000 bales of cotton. Cotton-producing areas of Nicaragua, based on the 1968-69 season data, are indicated on figure 4.

Only American upland types are produced in Nicaragua. Deltapine Smoothleaf leads the varieties with 66 percent, followed by Stoneville 213, with 33 percent. There is also one percent of Parsons Acala being grown in the Department of Resto. The major cotton-growing departments in Nicaragua are Chinandega, Leon, and Resto. The Nicaraguan average yield for the 1968-69 season is reported at 734 pounds per acre. Cotton has been the number-one foreign exchange earning crop in recent years.

No established national production goal has been set for Nicaragua. The government would like to keep the production level, if at all possible, at about 500,000 bales annually. To accomplish this, the government has been providing adequate credit to the growers through the National Bank. Assistance is being given in the form of a concentrated insect control program to reduce the cost of production. Increased use of irrigation is foreseen as a means of overcoming dry periods which could reduce yield. Some new lands may be utilized as a replacement for some marginal acreage now under production. The National Cotton Commission anticipates the increased use of the Stoneville 213 variety during the next few years. There has been a slight shift in production from other departments to the northern and eastern parts of Chinandega and Leon Departments as these areas are made more accessible by new roads.

Costa Rica

The nation of Costa Rica, located to the south of Nicaragua, is not a large cotton producer in relation to the other nations thusfar reported in this study. Costa Rica did not produce cotton during the period 1934-1938, or, if it did, the amount was too small to be officially recorded. During the 1958-59 season, 6,000 bales were produced. During the 1968-69 season, 20,200 bales of cotton were produced. All cotton was produced in the Province of Guanacaste, which is located in the northwestern part of the nation. See figure 4 for cotton growing areas of Costa Rica. The only varieties produced are Deltapine and Delfos, both American upland types.

Yields are good in Costa Rica, but cotton is not a profitable crop because of the serious insect problem. To effectively combat the insects, the grower must spray the crop by air 15 to 20 times, and this requirement takes all the profit out of the production. It is for this reason that the amount of acreage and number of bales produced are not expected to increase in the future. The government has no national plans for cotton expansion at this time, as most authorities feel that Costa Rica has reached its peak insofar as cotton production is concerned.

COTTON MAP OF GUATEMALA - HONDURAS EL SALVADOR - NICARAGUA



Figure 4.

General

Some 14,379,000 bales of cotton were produced by the nations included in the section of the world designated here as North America during the 1968-69 season. Of this total, 99.4 percent of the production was of American upland type cottons. This area produced over 27 percent of the total world production during the season.

Most of the nations in this area do not have an increased production goal which would affect the total world production. Major fluctuations, if any, will occur in the United States of America production as a result of environmental conditions and future Federal legislation, when enacted. Such legislation will both directly and indirectly influence the crops starting with the 1970-71 season and will cause decreases or increases in the world cotton production.

COTTONS OF SOUTH AMERICA

Seventy-five percent of the cotton produced in the countries located on the South American Continent is of the American upland type. Sixteen percent is of the perennial tree-type cottons, while nine percent is of the Peruvian types. Only about 35 percent as much cotton was produced in the South American countries as was produced in the North American countries during the 1968-69 season.

Venezuela

Cotton production in Venezuela was minimal during the period 1934-1938, while 32,000 bales were produced during the 1958-59 season. During the 1968-69 season, production increased to 70,000 bales. The cotton produced is of the American upland varieties, and the acreage planted to Deltapine in future years is expected to increase at the expense of the other varieties currently being planted. Cotton-producing areas are shown in figure 5.

The government of Venezuela has no goal of cotton production or target date, but it is promoting the production of long staple cotton and would like to see the production of cotton equal the consumption. Thus cotton production in this country is reported as currently in a state of confusion.

The government of Venezuela is interested in assisting all agricultural development. This assistance is being carried out through an agricultural extension program which calls for improved land usage. The government is assisting in improving the transportation and marketing systems and increasing credit to farmers. Also, land drainage and irrigation projects which will benefit the farmer are underway. Some 40,000 additional acres will possibly be planted to cotton. Some feel that possibly by 1975, cotton production could equal consumption. Some high yield farmers are doing satisfactorily; but for most, the present average seed cotton yield of 750 kilograms per hectare is too uneconomical. Acreage increase and increased use of irrigation, insecticides, etc., will determine the actual production increase possible.

Colombia

To the southwest of Venezuela is located the nation of Colombia which produced an annual average of 21,000 bales of cotton for the period 1934-1938. During the 1958-59 season, this nation produced 150,000 bales of cotton; and during 1968-69, production increased 300 percent to reach 600,000 bales. The Colombian national average yield for this season was 503 pounds per acre, the highest for any nation in South America.

The cottons produced during the 1968-69 season were American upland types. Deltapine Smoothleaf led the way with 70 percent, followed by Acala 1517 BR with 14 percent. Deltapine 45 was third with 13 percent, while

Deltapine 15 was fourth with 2 percent. These cotton varieties are shown according to their area of production in figure 5.

The Colombian Government does not have a production goal. The government does maintain a favorable support price policy and an adequate supply of credit to the cotton producers. The credit and support policy, facilitating an increase in cotton acreage, and an improved yield, have resulted in a nearly annual increase in cotton production. Yield increases have been the result of improved varieties, favorable growing conditions, and more technical assistance to the grower. If the present governmental policies are continued, it is expected that the production of cotton in Colombia will continue to increase for at least the next few years.

Ecuador

Ecuador is located south of Colombia on the Pacific Coast of South America. Cotton production was minimal during the 1934-1938 period for this nation. Ecuador's production reached 12,000 bales during the 1958-59 season. This figure increased 108 percent by the 1968-69 season, when production reached 25,000 bales. Of this total, 69 percent produced was of the American upland Coker variety, while 30 percent was Criollo "tree" type, and about one percent was Tanguis. New planting seed is imported from Mexico and some of the most recent varieties are Coker Queen, Coker 201, and Coker 413. Ecuador cotton-producing areas are shown in figure 5.

The Ecuadorian Government has an established production goal of 45,000 bales to be attained in 1973. This goal is prompted by a desire to improve the grower's lot and to reduce the importation of cotton for a growing textile industry. It is part of Ecuador's program of "Economic and Social Developments of the 1964-1973 Period." Involved are land settlement and reform policies, expanded agricultural credit, and improved cultural practices. The greatest increases in cotton production are planned for the medium and long staple cottons.

The government of Ecuador also establishes the official prices for the selling of seed cotton at the gin level and the selling price for lint cotton placed at the gin. This system of establishing prices before each harvest is intended to create an incentive for the grower to plant better or improved varieties and to plant more cotton. The price of the native "tree" cotton is decreased every year. It is felt that Ecuador will succeed in attaining its production goal by the date set under such programs as previously noted.

Peru

Peru is just south of Ecuador and Colombia on the west coast of South America. Peru was the second largest producer of cotton during the period 1934-1938, with an annual average of 386,000 bales. Production during the 1958-59 season reached 503,000 bales and then decreased to 425,000 bales during the 1968-69 season. Peru's record level of cotton production was in the calendar year 1963, when 668,000 bales were produced. Production has

been declining since 1963. Peru's cotton production usually parallels the international demand for Peruvian cottons.

Cotton is a true native of Peru. Tanguis variety is produced in the central part and represented 60 percent of the production in 1969, while Pima is produced in the northern part and represented 36 percent in the same year. Pima production in 1967 and 1968 was reduced due to severe drought in the Piura area where it is produced. Del Cerro, Karnak, and Aspero are produced in Peru and represent the remaining 4 percent of the 1969 crop. Figure 5 locates the major cotton-producing areas of Peru and identifies the varieties produced therein.

Cotton production utilizes about 10 percent of the total cultivated land and represents 20 percent of the country's agricultural output and 7 percent of the national income. Average fiber property data of Peruvian Tanguis and Pima as determined from the samples submitted are contained in table 8.

Peru has not established a target level of cotton production nor a target date. Since Peruvian cotton production is related to world demand and price, it is felt that production in this country will closely follow these forces. It is felt that the Pima acreage will increase in 1969-70 and Tanguis acreage will decrease.

Brazil

Brazil is located in the northeastern part of South America and touches the southeastern part of Venezuela. Cotton production in Brazil during the 1934-1938 period was 1,793,000 bales for the first place nation on the South American Continent. During the 1958-59 season, 1,400,000 bales were produced. By the 1968-69 season, cotton production had increased 139 percent in Brazil for a record total of 3,350,000 bales.

Of the cotton produced in Brazil, 72 percent is from the south and is all upland type of American upland variety parentage. In the northern part of Brazil, an additional 5 percent of the national production consists of the upland type called "Matas." Thus, approximately 77 percent of the total Brazilian production is of upland type. The remainder is of perennial "tree" types called Sertao and Serido. These are not distinct varieties, but rather districts in which this type of cotton is grown.

The Brazilian national government has not established a target production figure or date. The state governments have consistently done more for cotton and its production than the Federal government. This fact is best illustrated by the state government of Sao Paulo. The Agronomy Institute of Campinas (ICA), which is a part of the Sao Paulo Department of Agriculture, is the primary force in the production of cotton in the southern part of Brazil and in the State of Sao Paulo, in particular. United States stock selections, or Auburn 56, Rex, Deltapine, and Acala, are proved out and/or crossed with others before they are released for general use. Some other states have similar organizations for improving cotton production. One of the newest varieties being released in the south for

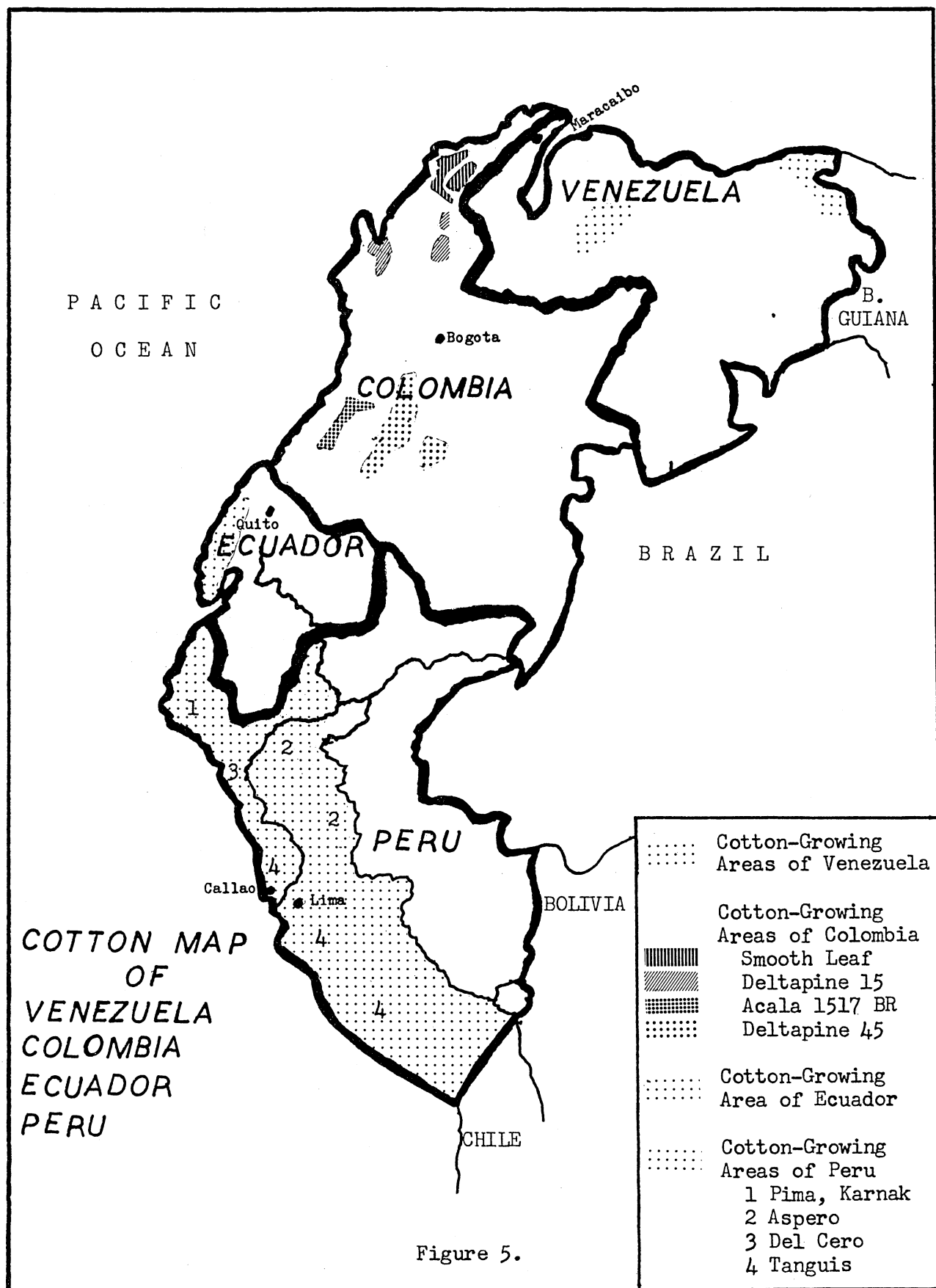


Figure 5.

commercial production is IAC-13. It is felt that nearly all of southern Brazil will be planted to this variety within three years. This type will replace the IAC-10 and IAC-12. Figure 6 indicates the major cotton-producing states of Brazil and major cotton-producing areas within the states.

Because very little is being accomplished in northern Brazil by Federal, state or private organizations to improve the lot of cotton, production in this area is declining at best, or is stagnant. Most of the increases in cotton production will be in the south, primarily in the States of Sao Paulo and Parana. In this area, the grower is very cognizant of modern cultural practices, including good seed, fertilizer, and insect control. Cotton farms in the south range in size from a few acres to several thousand acres.

Table 9 lists the average fiber property data for such cottons as Sertao and Serido (tree type), plus Mata (upland) from northern Brazil. Also included are Sao Paulo type and IAC-12 variety from southern Brazil.

With new varieties being developed and improved cultural practices being initiated in the south, it is quite possible that the overall Brazilian production will increase if environmental conditions are not adverse.

Paraguay

Production in Paraguay during the 1934-1938 period averaged 18,000 bales annually. Production increased after that period and reached 45,000 bales for both the seasons of 1958-59 and 1968-69. All cottons grown are of the American upland types. Varieties produced during recent seasons are Deltapine 15, Empire, and Carolina Queen (grown for experimental use only). Empire is the predominate variety grown in most areas, while the Deltapine 15 is grown exclusively in the Chaco (Paraguay) for the colony of Mennonites.

The major cotton-producing areas of Paraguay are shown in figure 7. The fiber property data for Empire cotton produced in Paraguay during the 1966-67 season are shown in table 10. Cotton production in Paraguay could increase if world prices remain the same and if environmental conditions do not become adverse.

Argentina

Cotton production in Argentina during the period 1934-1938 averaged 275,000 bales annually. Production increased to 530,000 bales during the 1958-59 season and then decreased to 450,000 bales during the 1968-69 season. All cottons produced in Argentina in the recent seasons were of the American upland types. Major cotton-producing areas are shown in figure 8. Most varieties being produced are from American Fox, Stoneville, and Deltapine parentage and their crosses. Information on the cotton varieties being produced in Argentina and the areas of their growth is given in table 11.

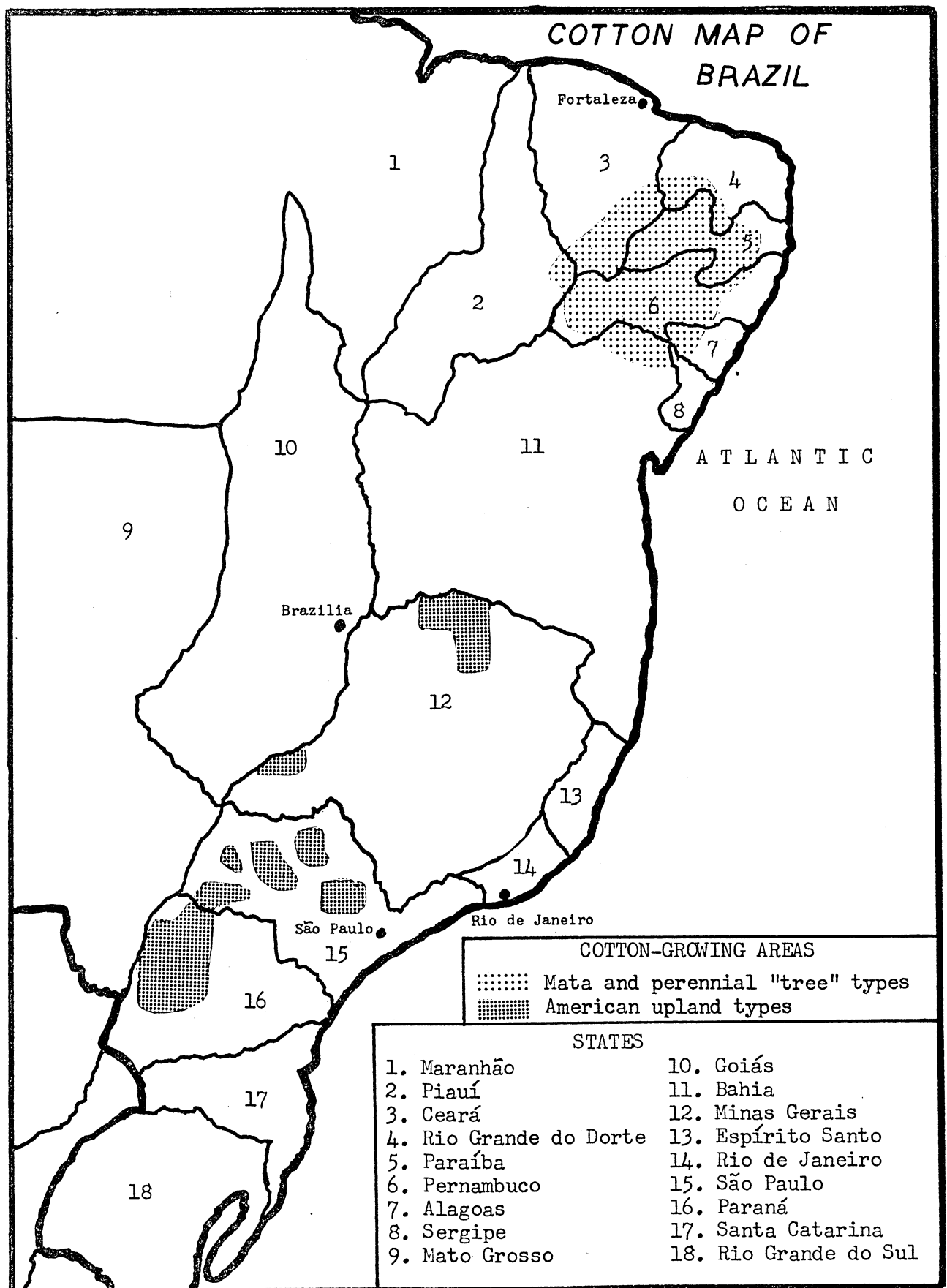
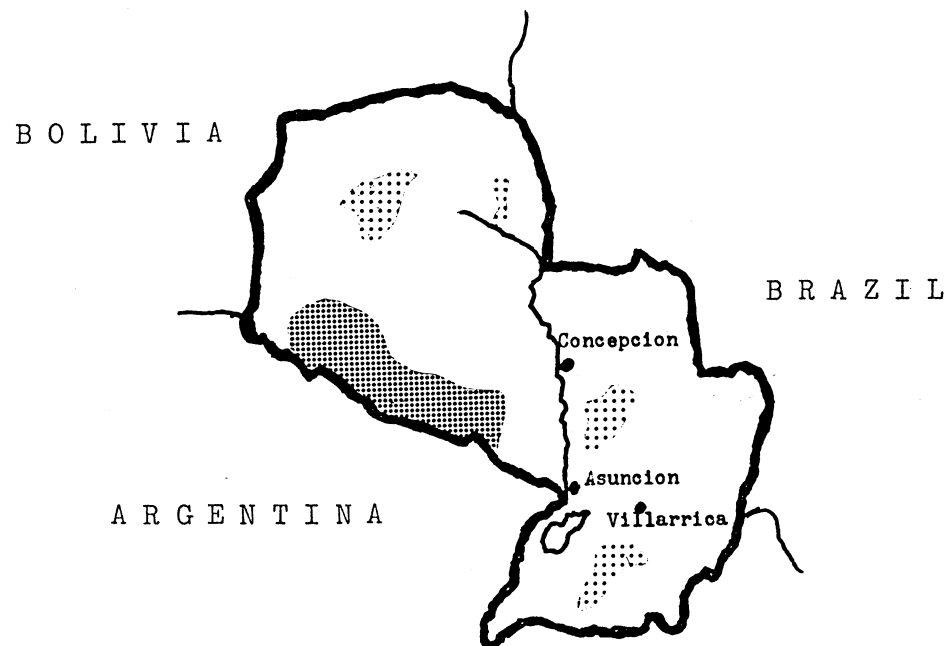


Figure 6.

COTTON MAP OF PARAGUAY





-  Deltapine 15
-  Various varieties

Figure 7.

Table 8. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN PERU, BY VARIETIES

Variety	Equivalent Grade Staple		Average Fiber Properties						
			2.5% Span Length (Inches)	50/2.5 Uniform- ity Ratio (Percent)	Ten. Str. Thousands Psi Zero Gauge	Fineness (Micronaire Units)	Colorimeter Readings		Shirley Non- lint Content (Percent)
Tanguis	SM	39.0	1.23	47	86.8	5.4	76.5	9.2	1.30
PPS-1	M Ting	45.0	1.40	50	94.2	3.8	66.2	12.4	2.39
PPS-2	M Sp	44.7	1.39	50	96.9	3.9	69.2	11.6	2.00

Table 9. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN BRAZIL, BY VARIETIES

Variety and Location	Equivalent Grade Staple		2.5% Span Length (Inches)	50/2.5 Uniform- ity Ratio (Percent)	Average Fiber Properties				
					Ten. Str.	Fineness	Colorimeter	Shirley Non-	
					Thousands	(Micronaire	Readings	lint Content	
					Psi Zero Gauge	Units)	Rd	+b	(Percent)
<u>North Brazil</u>									
Mata	SIMLtSp	31.0	.96	47	83.4	4.0	69.6	10.6	8.2
Sertao	M Sp	37.5	1.18	44	86.4	3.5	72.2	11.0	7.0
Serido	M LtSp	37.5	1.19	44	84.9	3.5	73.2	11.0	5.6
<u>South Brazil</u>									
Sao Paulo	M LtSp	33.0	1.03	41	77.9	3.0	73.5	9.7	4.6
IAC 12	SIMLtSp	34.2	1.09	44	73.4	3.6	70.2	10.0	6.0

Table 10. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN PARAGUAY, BY VARIETIES

Variety	Equivalent Grade Staple		Average Fiber Properties						
			2.5% Span Length (Inches)	50/2.5 Uniform- ity Ratio (Percent)	Ten. Str. Thousands Psi Zero Gauge	Fineness (Micronaire Units)	Colorimeter Readings		Shirley Non- lint Content (Percent)
Empire	M Sp	32.2	1.01	44	79.6	3.4	73.2	10.6	2.8
--		32.0	1.02	44	77.5	3.5	72.5	10.3	3.8

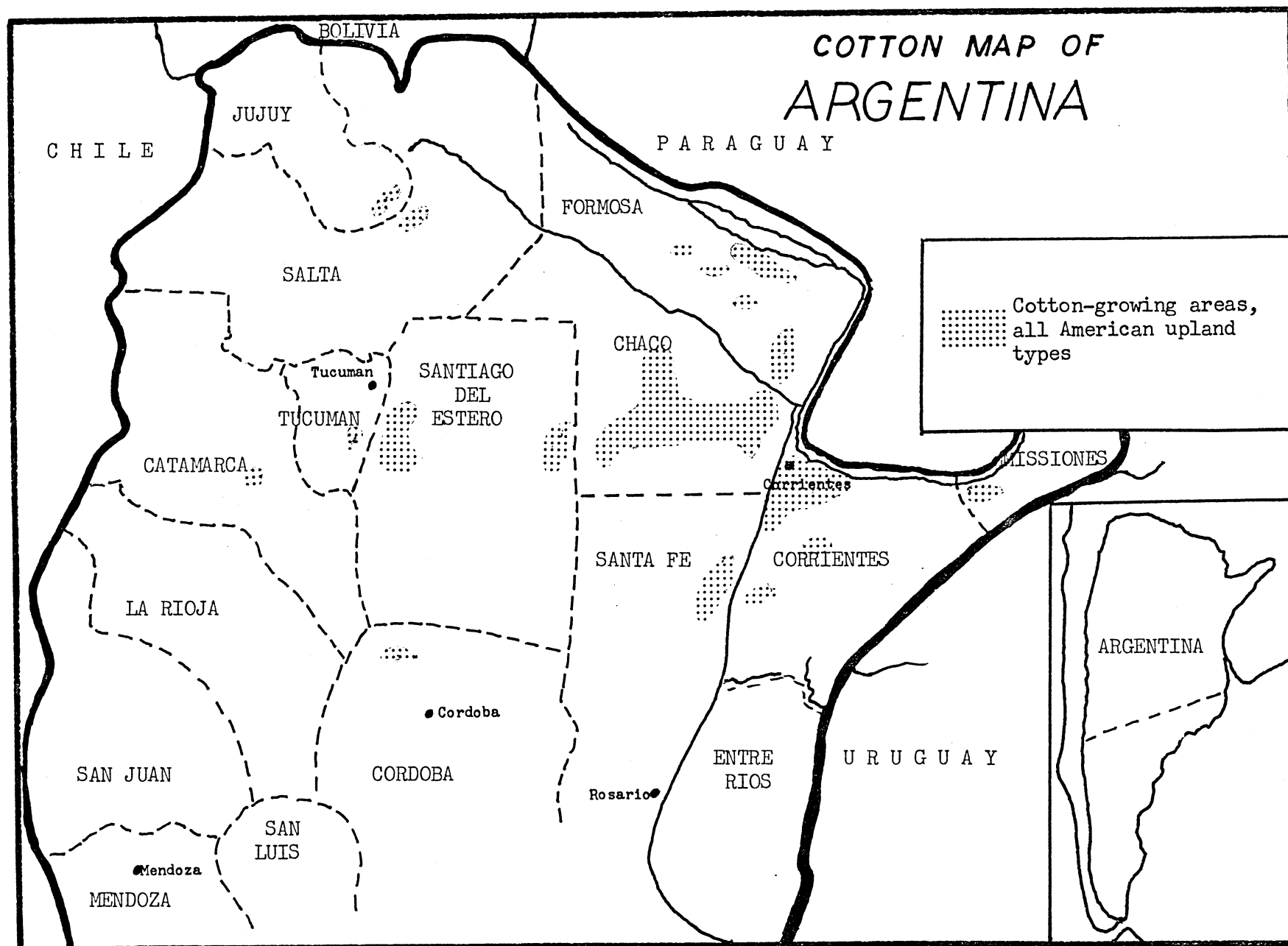


Figure 8.

Table 11. COTTON VARIETIES UNDER CULTIVATION IN ARGENTINA

Province	Variety	Where Grown and Remarks
<u>Chaco</u>	Toba (INTA)	All of Chaco
	Saenz Pena M.58	East of Chaco
	Fox 4	Northeast of Chaco, This variety tends to disappear
	Guaycuru	All of Chaco
	Saenz Pena 85	Very little, tends to disappear
<u>Formosa</u>	Fox 4	All of Formosa
	Toba (INTA)	All of Formosa
	Saenz Pena 85	Center of Formosa (Ibarreta)
<u>Santa Fe</u>	Toba (INTA)	Indistinctly
	Fox 4	Indistinctly
<u>Santiago del Estero</u>	La Banda 56	All of Santiago del Estero
<u>Corrientes</u>	Toba (INTA)	All of Corrientes
	Guaycuru	All of Corrientes
	Saenz Pena M.58	East of Corrientes, Coast of the Parana River
<u>Cordoba</u>	La Banda 56	All of Cordoba
<u>Salta</u>	La Banda 56	All of Salta

VarietyOrigin or Parentage

Saenz Pena 85	A selection from Stoneville
La Banda 56	Deltapine x Stoneville
Toba (INTA)	Fox 4 x Saenz Pena 85
Fox 4	A selection from Deltapine
Guaycuru	A selection from Saenz Pena M.58
Saenz Pena M.58	A selection from Stoneville

Source: Data furnished by Assistant Agricultural Attache, Buenos Aires, Argentina.

Argentina has a production goal of approximately 669,000 bales projected for the 1974 season. This goal is an attempt to achieve the production figures which were reached by Argentina in the 1957-58 season. A production plan is now being studied by the Instituto Nacional de Tecnologia Agropecuaria (INTA National Institute of Agricultural Technology). This organization is analogous to the U.S. Department of Agriculture, Agricultural Research Service. Involved in this plan is thought to be an increase of 65,000 hectares (160,615 acres) for cotton production. Some of this land will be new cotton land. Also included, will be the use of improved varieties, more fertilizer, improved loans or credit to growers, and better insect control practices.

Argentina is a net exporter of cotton lint, cottonseed oil, and linters. The Province of Chaco produces over half of the nation's cotton; and the surrounding Provinces of Formosa, Corrientes, Santa Fe, and Santiago del Estero are the next largest producers in the country. The best quality of cotton comes from the irrigated areas of the northwest provinces.

It is felt that if new and improved varieties are used, combined with the improved cultural practices, the goal of 669,000 bales set for 1974 could be accomplished, providing world cotton prices do not decrease and adverse environmental conditions are not encountered.

Other Countries

The countries of Chile, Bolivia, and Uruguay produce small amounts of cotton which, for the most part, are of American upland type parentage. The production of these other countries in South America amounted to about 11,000 bales during the 1968-69 season. Their production is not likely to increase in any substantial amount in the future.

General

It is anticipated that with the increased usage of modern cultural practices covering such items as improved varieties, fertilizer, and insect control, the yield, and possibly the production, of many of these nations will increase over the next few years. One adverse factor which could cause reduction in this production would be the decrease in the world price of cotton.

COTTONS OF EUROPE

The countries in Europe, excluding the U.S.S.R., produced two percent of the world's cotton during the 1968-69 season. This production amounted to 843,000 bales. Of this total, slightly over 99 percent was of American upland types; the rest was Egyptian cotton grown in Spain. Greece is the leading producer in this part of the world, followed by Spain. The cotton-growing areas in the various countries in Europe are shown in figure 1.

Spain

Growers in Spain produced an annual average of 10,000 bales during the period 1934-1938. During the 1958-59 season, they were able to increase their production to 195,000 bales. The Spanish crop of 1966-67 was the largest to be recorded with 410,000 bales. Production then declined to the preliminary figure of 285,000 bales for 1968-69, which has been further reduced to 260,000 bales for the 1968-69 season.

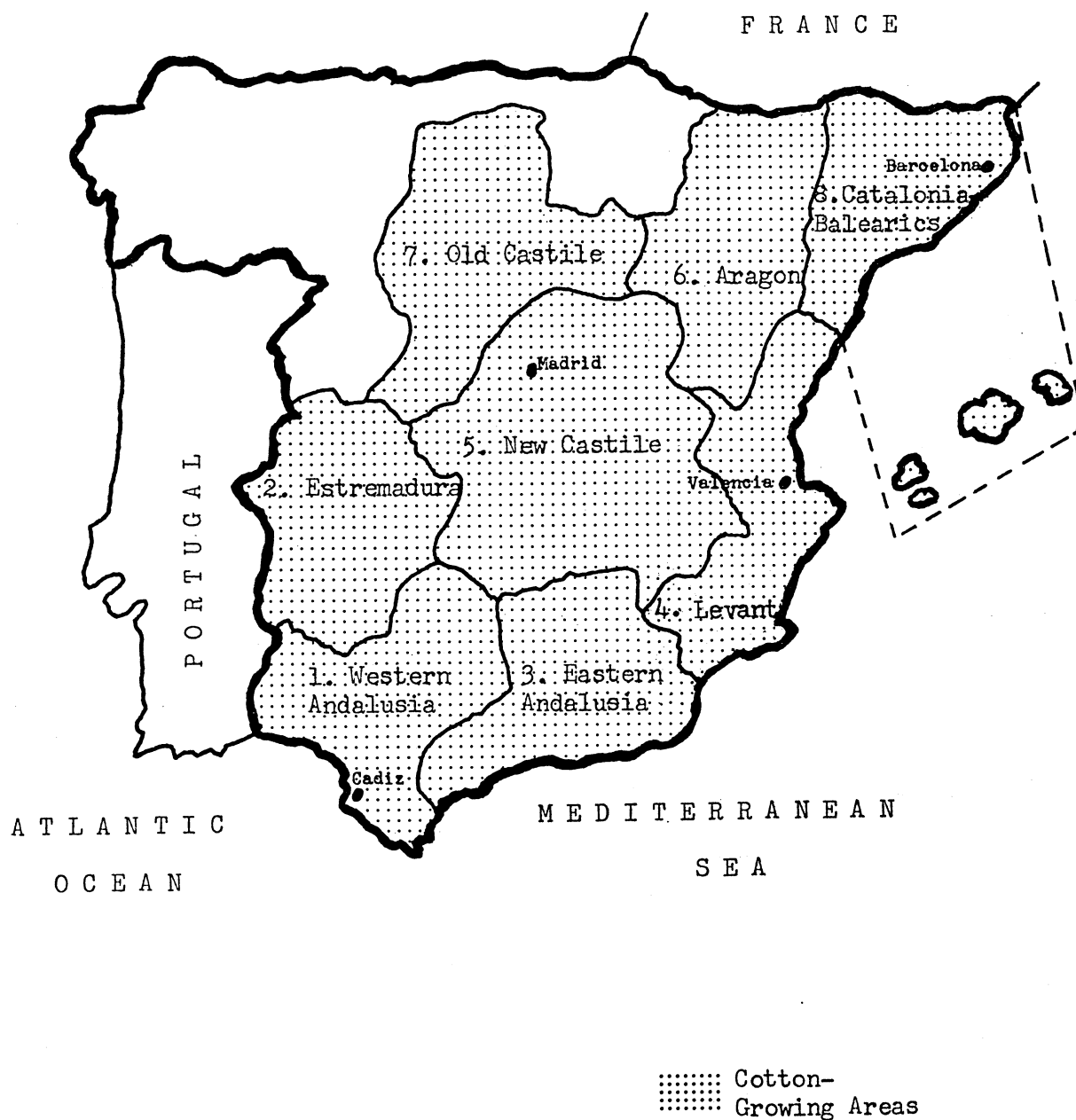
The eight cotton-growing regions of Spain are shown, and are numbered in order of decreasing production, in figure 9. The largest and most important cotton-producing area is that of Western Andalusia in the southwestern part of the country, adjacent to Portugal and the Atlantic Ocean.

Spain has a production goal of 450,000 bales, with a target date of the 1971-72 season. This is to be an effort to return to the country's maximum production of the 1966-67 season. Increased acreage will be involved, but most of the land to be used will not be new cotton-producing land. Much of the increased production will be by the use of improved and new varieties, more irrigation and fertilizer, and better insect control. The increased acreage is reportedly between 70,000 and 120,000 acres.

Commercial cotton varieties in production in Spain are Acala 4-42, Antequera (Spanish hybrid developed from United States upland varieties), Carolina Queen, Paymaster, Rex, Stoneville 213, Talavera (Spanish designation for Russian "108-F" upland variety), and Giza 7 (Egyptian type). Not enumerated above are the varieties of Coker and Texacala which are being replaced by the varieties of Carolina Queen, Giza 7, Stoneville 213, and Antequera in the current season and all future seasons.

With the use of improved seed and the other cultural practices indicated and with the past record of 410,000 bales in the 1966-67 season, it is probable that the established target can be reached if no adverse weather conditions are encountered and if world cotton prices do not decline.

COTTON MAP OF SPAIN



NOTE: Numbers before names of regions indicate relative importance of each region based upon largeness of planted acreage in 1968-69.

Figure 9.

Albania

Production of cotton in Albania during the 1958-59 season is indicated at 27,000 bales. Production increased to 35,000 bales during the 1968-69 season. Varieties grown are of the upland type.

No future plans for production increases are known. Many of the cotton needs of Albania are supplied by U.S.S.R. and other communist nations; and with the expanding production of Russia, it is quite likely that some of the land currently used for cotton production in Albania could be shifted to other crops and that the needed cottons could be imported from Russia.

Bulgaria

Bulgarian production of cotton during the period 1934-1938 amounted to 14,000 bales annually. The 1958-59 season cotton production reached 65,000 bales, and production increased further to reach 100,000 bales during the 1968-69 season. Varieties produced are upland type, some of American origin and others from Russia.

Future cotton production goals for Bulgaria are not known. It is known, however, that the imports of cotton from Russia have increased; and with the increased cotton production in Russia, and if imports continue to increase, less cotton will be produced in Bulgaria.

Greece

Cotton production in Greece during the 1934-1938 period averaged 75,000 bales annually. During the 1958-59 season, Greek production increased to 290,000 bales. The production for the season 1968-69 is reportedly 395,000 bales; thus placing Greece in first place as the largest producer in this part of the world for the current season.

All cotton produced was of the American upland type. Most of the cotton produced in Greece for the last few seasons (68 percent to 74 percent) has been Strict Middling cotton. The staple length of most of the cotton produced (90 percent to 99 percent) was 1-1/16" and 1-3/32".

The exporting of Greek cotton has decreased almost annually for the last several years. Greece is still importing cotton to meet her internal needs.

The yield has increased to 531 pounds per harvested acre for the 1968-69 season. This has been the result of improved cultural practices.

Little is known at the present time about the future plans of cotton production in Greece. It is anticipated that this year, the production will increase slightly over the 1968-69 season as the internal demand continues to increase. Much of the anticipated increase probably will come from increased use of improved seed and modern cultural practices.

Italy

Cotton production in Italy has been concentrated in Sicily, almost exclusively in the provinces of Agrigento and Caltanissetta. Production during the 1958-59 season amounted to 38,000 bales, while in the 1968-69 season, production reached only 10,000 bales. American upland are the types of cotton produced, and planting seed is imported from the United States of America.

At present, there are no prospects for increased production or acreage. It is felt that future cultivation and production of cotton will be limited to between 20,000 or 25,000 acres. Cotton is grown in the dry areas, and the staple most widely produced is around 1 inch. Chances for expansion are limited, unless the importation of cotton is taxed beyond the turnover tax (IGE) of six percent of value.

Yugoslavia

Two thousand bales of cotton were produced during the period of 1934-1938 in Yugoslavia. During the 1958-59 season, almost 10,000 bales were produced; and this figure climbed to over 18,000 bales during the 1968-69 season. Varieties grown are of the upland type, and all cotton production is located in the Macedonia area of the country.

A goal of 21,313 statistical bales (480 pounds gross weight) has been established for cotton production in Yugoslavia with a target date of 1970. This is to be accomplished through the use of 7,413 additional acres, some of which is new cotton production land. The planned increase is to be aided by increased yield accomplished through use of new varieties, irrigation, and more fertilizer, especially for the private farms. Total acreage is to be 37,065 acres, a substantial increase over the 1969 figure of 29,652 acres. The government is to continue the existing price support of 0.60 dinars per kilogram (2 cents per pound).

Varieties which will be planted on the expanded acreage are No. 3279, No. 3996, No. 4521 (which are of Bulgarian origin), and No. 1004 (which is of Greek origin).

The planned expansion appears to have a good chance of success, and the goal will probably be reached.

Rumania

Production in Rumania was not indicated during the 1958-59 season; in fact none has been reported since the season of 1960-61, when 1,000 bales were indicated. During the 1958-59 season, 5,000 bales were reported. Cotton production has decreased since this season as cotton land has been diverted to production of food and other crops. It is highly unlikely that any increase in production will take place in Rumania since her needs are met, for the most part, by imports from Russia.

General

With the exception of the increase planned in Spain, little change is expected in the cotton production picture in Europe. Even the Spanish increase, when it materializes, may be offset by declines in production in other countries in this area.

COTTONS OF U.S.S.R.

Cotton production in Russia averaged 2,902,000 bales during the period 1934-1938. The Russian cotton production increased 138 percent by the season of 1958-59, to reach a total of 6,900,000 bales. A total production of 9,500,000 bales was attained during the 1968-69 season, which is a 38 percent increase over the 1958-59 season total. During the 1967-68 season, Russian cotton production exceeded the United States production; the figures were 9,300,000 bales and 7,215,000 bales, respectively. The majority of the cotton produced in Russia is of the American upland type. Figure 1 indicates the large area of Russia on which cotton is produced.

Russia has become an export-cotton-producing nation since the 1958-59 season. During 1967, Russia exported 2,234,000 bales to Eastern Europe. Accompanying the increased production in Russia, has been increased exports and declining imports of cotton. About half of the imported cotton came from the United Arab Republic, and most of the rest from Middle East countries. Total imports in 1967 were 602,500 bales.

The present Five-Year Plan under which the U.S.S.R. is operating will end in 1970. Under this plan, production of mineral fertilizer is to be doubled; and seven million to eight million hectares of land in South Ukraine, R.S.F.S.R., and Central Asia are to be reclaimed and irrigated. Also scheduled are increased expenditures for farm machinery and equipment. The agricultural success during the first year of the present Five-Year Plan led some government leaders to believe that less help was needed for agriculture. However, during 1968, agricultural assistance was re-emphasized; and financial investments relating thereto were increased as originally called for.

The 1971-1975 Five-Year Plan calls for increased government expenditures for farm machines, new land, and new drainage and irrigation projects. Additional fertilizer production and other improvements relating to agriculture are also scheduled. The 50 percent bonuses for all grain sales above the planned sales were retained in the new plan. Proposals to extend these bonuses to all other commodities produced in the U.S.S.R. is under consideration. Present prices will be maintained, except on cotton, vegetables, and poultry. As of February 1969, the average cotton procurement price was increased 15 percent. Proposals to distribute as bonuses to workers the premium received by state farms also are under consideration. The U.S.S.R. agricultural goals under the 1971-1975 plan in metric tons are: Cotton, unginned--7 million (about 11.8 million bales); grain--190 million to 200 million; potatoes--115 million; sunflower seed--7 million; sugar beets--90 million; meat--14 million to 15 million; and wool--480,000 to 500,000. These goals, compared with the 1968 output on grain, cotton, potatoes, and wool, represent increases of 10 to 20 percent.

If the expenditures for agriculture are not side-tracked and the fertilizer and land improvement programs are carried out, the U.S.S.R. could, if they are not plagued with adverse environmental conditions, meet the cotton production increases.

COTTONS OF ASIA AND OCEANIA

Cotton production in the Asia and Oceania area represented 35 percent (a little over 18 million bales) of the world total during the 1968-69 season. The three major cotton-producing nations in this area of the world in descending order of production are China (Mainland), India, and Pakistan. American upland types represent 35 percent of the total production. Asiatic types represent 34 percent, and the rest is devoted to Egyptian and Pima types of cotton.

Afghanistan

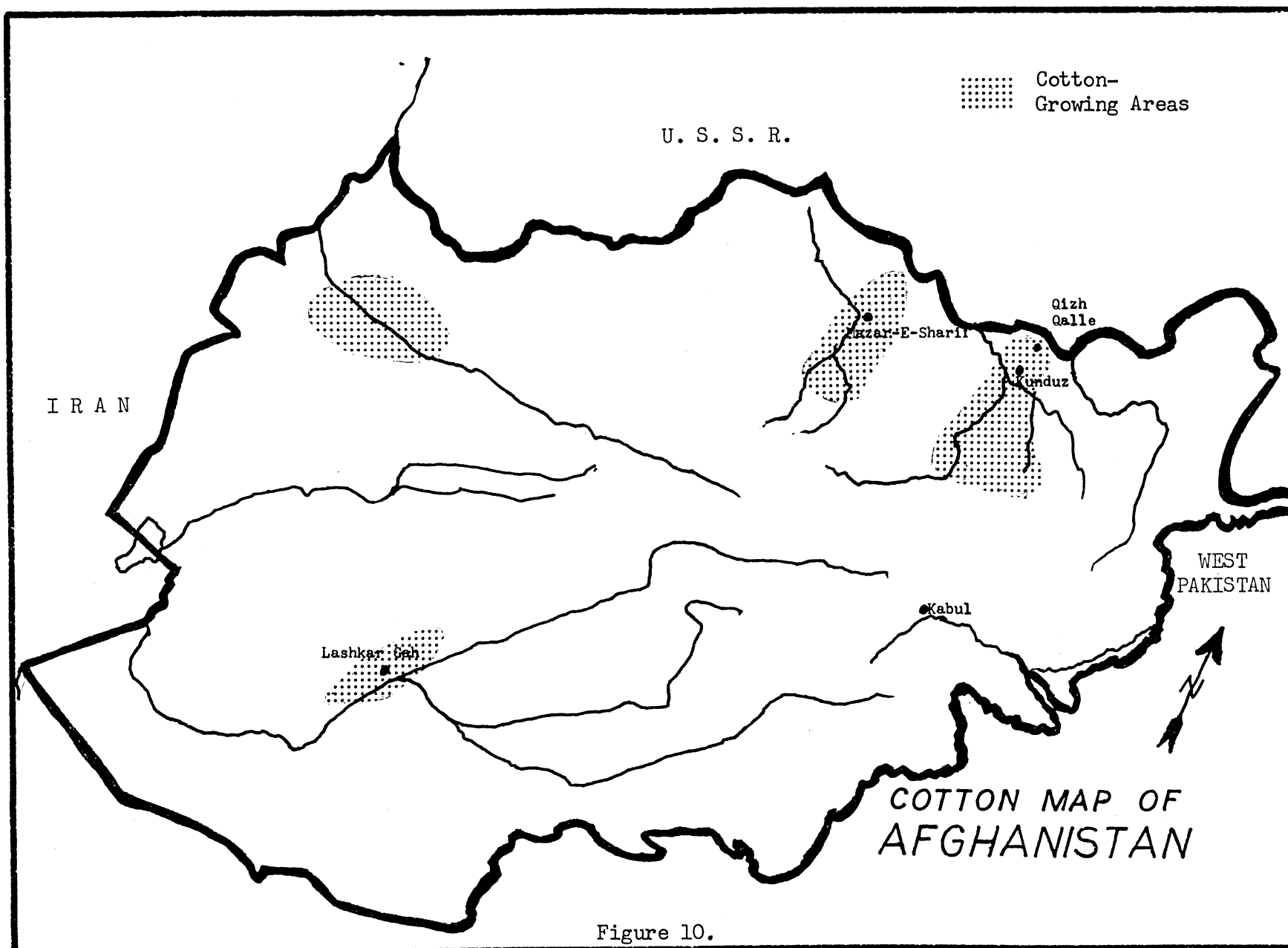
Afghanistan, completely landlocked by the U.S.S.R., Iran, and Pakistan, produced an average of 16,000 bales of cotton annually during the 1934-1938 interval. The 1958-59 cotton production was 55,000 bales; and, by the 1968-69 season, this amount was increased by 80 percent to reach 100,000 bales. The peak production in Afghanistan was 160,000 bales during the 1963-64 season. Most of the cottons grown in Afghanistan are American upland types, primarily consisting of such varieties as Acala 4-42, Coker 100 Wilt, and Deltapine. Cotton-producing areas of Afghanistan are shown in figure 10.

Afghanistan is now under its third Five-Year Plan which calls for further irrigation facilities for agriculture development. The price of cotton received by the producers is determined by the Government. Cotton and wool, most of which are exported via the U.S.S.R., earn foreign exchange and are subject to a direct tax. Since cotton is a raw material for the Afghan domestic textile industry and is a means of earning foreign exchange, the Government is interested in expanding production. Some in the Government would like to see one-fourth of the land planted in cotton. Production financing is furnished to the farmers by the gins.

Australia

Australia, often referred to as "the land down under," produced an average of 12,000 bales of cotton annually during the 1934-1938 period and just 7,000 bales during the 1958-59 season. The 1968-69 season production stands at an all time high for that country of 165,000 bales. The first jump in Australian production took place in the season 1964-65 when 46,000 bales were produced. Cotton production was first tried near Sydney in 1788, and the trials were disappointing. Cotton was next planted in the Moreton Bay area in 1840, and the first bales reached Liverpool in 1854. From then until 1926, cotton production in Australia had its trials and tribulations, but in 1926, the Government started the "bounty," or payment for cotton production, which, in one form or another, has been in operation ever since. Cotton varieties planted are of the American upland types that are being produced in the United States. The major cotton growing areas of Australia are shown in figure 11.

This renaissance of Australian cotton production was the result of the efforts of two California cotton farmers who, by using their "know how," demonstrated that cotton production could be profitable. These men were followed



COTTON-GROWING AREAS

1. Murrumbidgee-Murray Region
2. Macquarie area
3. Namoi Basin
4. St. George area
5. Cecil Plains area
6. Mary River Basin
7. Dawson area
8. Ord River Basin



Figure 11.

by both Australians and other Americans; and through the use of irrigation projects, mechanization, aerial insecticide application, and other improved cultural practices, have increased the production of cotton to its present level. Cotton had been grown previously as a low-capital raingrown crop with low yields and returns to the grower. These men made cotton production a high-capital irrigated crop with greater return to the grower who was willing to spend the money.

Previously, Australia had imported American cotton to fulfill the needs of her domestic textile industry. In the 1967-68 season, however, Australia began exporting cotton; and with continued expansion in cotton production, Australia will become an American cotton production competitor. Yield has increased in Australia to the 1968-69 high of 901 pounds per acre. This is the second highest national yield figure in the world, following that of Israel.

One question of cotton production yet to be answered is whether the grower, as production continues to climb, can produce cotton with less, or possibly without, the bounty payments received in past years. These bounty payments were originally instituted to encourage the Australian producer to grow cotton as an additional source of farm income and to reduce the cotton import requirements of the Australian textile industry. Currently, this bounty totals \$4 million annually divided among the growers of the entire crop, without regard to the size of the crop. Thus as the crop has increased, the bounty per pound, or bale, has reduced with each succeeding year. Whether the Government will continue the bounty is not known. At the present time, the United States is facing a similar production problem.

What the future holds for cotton production in Australia remains to be seen and depends on the producers' resources and capabilities and the world price of cotton.

Burma

Production in Burma during the 1934-1938 period amounted to about 95,000 bales annually and decreased to 65,000 bales in the 1958-59 season. Burmese production returned to 90,000 bales in the 1968-69 season. Top production figures recorded for Burma were during the 1954-55 season, when 117,000 bales were produced.

The government of Burma buys the agricultural products at Government established prices and transports, stores, and resells the products through Government stores and registered private outlets. The Burmese Government is aiding agriculture by increasing the availability of mechanization, credit, and fertilizers to the farmers. The growers are not selling their products to the Government, and agricultural products are going into local rural outlets and utilization.

The 1968-69 yield for Burma is given as 91 pounds per acre. If this yield could be increased, Burma production could return to at least the level of the 1954-55 season, or possibly even higher. Production of upland type cotton is estimated to be over 40 percent of the total during the recent seasons. Cotton production is not likely to increase.

Mainland China

Mainland China has always been one of the major cotton-producing nations of the world. During the period 1934-1938, an annual average of 7,334,000 bales were produced. The peak production period was during the 1958-59 season when 8,700,000 bales were produced. Production then declined to 6,700,000 bales in the 1968-69 season. Approximate cotton-producing areas of Mainland China are indicated in figure 1. The 1968-69 season average yield in China was indicated at 260 pounds per acre. It is believed that over 60 percent of the cottons produced are of upland types.

The actual existence of a goal for cotton production is unknown. Larger amounts of fertilizer for agricultural usage were imported in 1968, and this policy is expected to continue. Two factors which will affect agricultural production in the future, and thus will affect the amount of cotton produced are: 1. The government appears to be scheduling the eventual dissolution of private plots and sideline production; and 2. The government appears to be granting more local autonomy, in the form of more responsibility, to the rural communes or rural social units for their schools, medical centers, industries, tractors, and large agricultural machinery and their usage. Increased cotton production by the Mainland China, at least up to the level of the 1958-59 total of 8,700,000 bales, is possible provided that the weather is cooperative.

India

India is another large cotton-producing nation located in this section of the world. Approximately 5,320,000 bales were produced annually during the period 1934-1938; while the production during the 1958-59 season amounted to 4,220,000 bales. The 1968-69 season production in India returned to 5 million bales. The largest production ever in India was during the 1967-68 season, when 5,330,000 bales were produced. The major cotton-producing areas of India, as well as the primary varieties produced, are shown in figure 12. India's yield per acre during the 1968-69 season is reported as 118 pounds.

Cotton is produced on only 5 percent of the cultivated acreage in India, but this acreage represents 25 percent of the world total acreage planted to cotton in the 1968-69 season. About 90 percent of the cotton produced in India is produced in the northern area of the nation composed of the States of Punjab, Rajasthan, and Uttar Pradesh, where some production is under irrigation. Cotton produced in the central States of Maharashtra and Madhya Pradesh and the western State of Gujarat is raingrown and is rotated with other field crops produced in the area. The same practice is followed in the southern States of Mysore, Andhra Pradesh, and Madras.^a Heavy insect damage is a problem faced by cotton producers in the southern area. Other states of India producing cotton are Assam, Tripur, Orissa, Bihar, and West Bengal.

During the 1968-69 season, about 36 percent of the total cotton production in India was of American upland types, and 64 percent was of Asiatic types. The principal types of American upland grown in India are 320F, Buri/American, Parbhani American, Punjab American, and Digvijay American. The average fiber properties of many of the cottons grown in India are indicated in table 12a. The average spinning test data for these same Indian cottons are

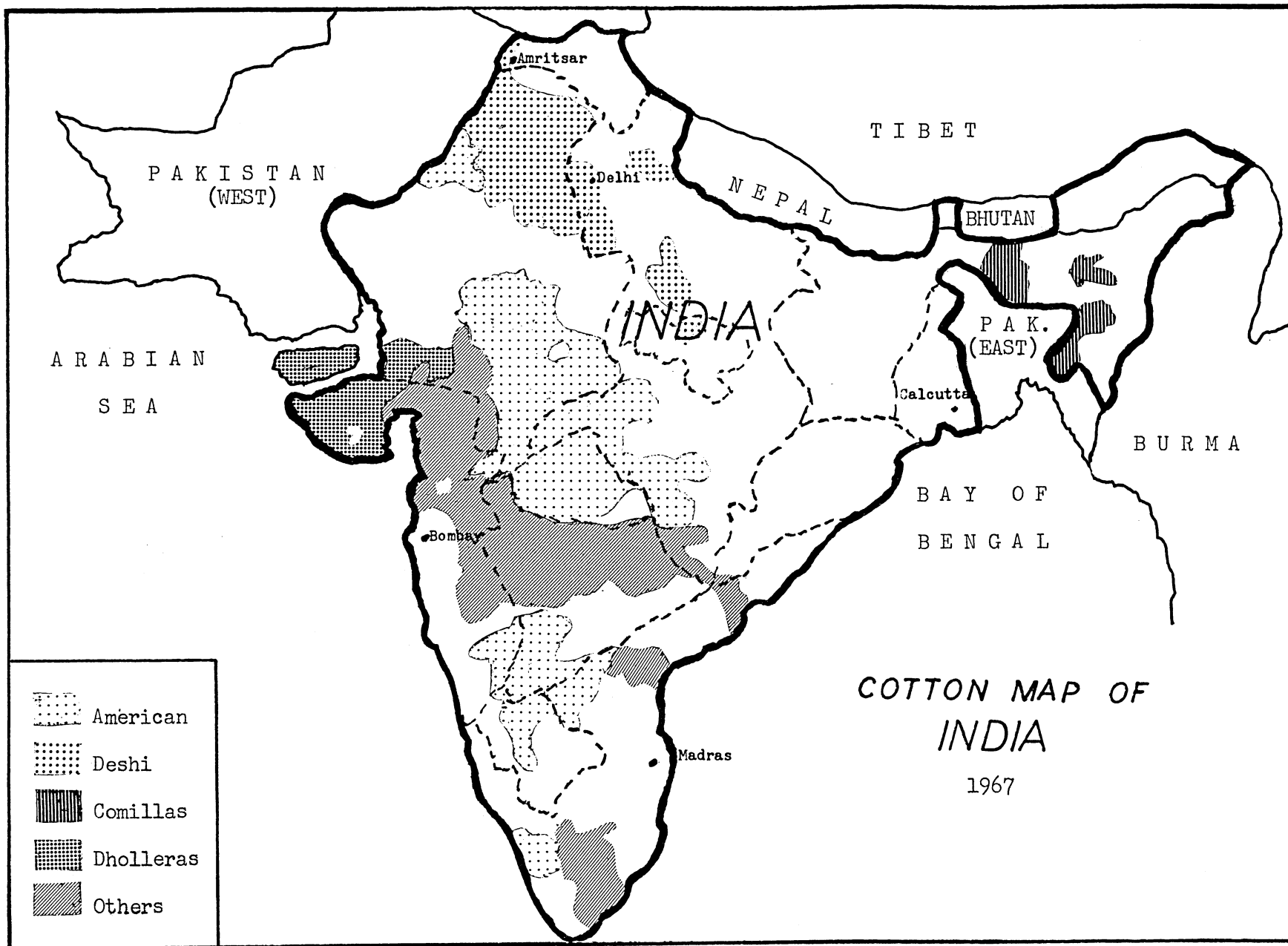


Figure 12.

Table 12a. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN INDIA, BY VARIETIES

Variety	Average Fiber Properties							
	Equivalent		2.5% Span	50/2.5 Uniform-	Ten. Str.	Fineness	Colorimeter	
	Grade	Staple	Length (Inches)	ity Ratio (Percent)	Thousands Psi Zero Gauge	(Micronaire Units)	Readings	
							Rd	+b
Bengal Deshi	SIM Sp	24	.74	50	77.1	7.4	68.0	10.7
Dholleras	SLM Sp	27	.84	50	74.3	5.6	69.5	10.5
Moglai Jarilla	IM Sp	27	.85	48	90.0	6.4	62.0	10.2
Moglai 197/3	IM LtSp	28	.88	49	90.6	6.6	66.0	9.4
Virnar	SIM Sp	29	.91	49	91.5	5.2	67.0	10.0
320 F	SIMLtSp	29	.92	49	86.2	5.1	69.5	9.6
AK-277	SLM Sp	29	.93	47	91.2	5.1	70.0	10.2
Westerns	SLM Sp	30	.93	49	90.4	5.3	65.0	10.5
Jayadhar	SLM Sp	30	.94	50	98.9	5.9	68.5	11.2
Kalyan	IM+LtSp	30	.96	48	81.0	5.3	67.5	9.4
Buri/American	SIMLtSp	31	.97	48	95.4	4.9	70.5	9.5
Laxmi	M Sp	31	.98	50	82.1	3.5	72.5	10.8
Digvijay (A)	M LtSp	32	.99	46	90.2	4.3	74.0	10.1
Gaorani G6	SIMLtSp	32	.99	47	93.4	5.6	69.5	9.2
Digvijay (B)	SIMLtSp	32	1.00	49	98.8	4.0	72.0	9.7
H-14	SLM Sp	32	1.00	47	91.0	4.5	67.0	9.8
L-147	SIMLtSp	32	1.01	48	97.0	5.1	71.5	9.6
Deviraj (CO2-170)	SLM Sp	36	1.13	47	84.5	4.2	68.5	11.4
1007	SIMLtSp	39	1.15	46	88.1	4.7	71.0	9.2
ISC-67	SLM Sp	41	1.29	42	81.8	3.8	69.5	10.2

Table 12b. AVERAGE SPINNING DATA OF COTTONS GROWN IN INDIA, BY VARIETIES

Variety	Average Spinning Test Data							
	Waste		Yarn Count	Yarn Strength (Pounds)	Break Factor	Yarn Appearance (Index)	Yarn Coefficient of Variation (Percent)	Neps Per Grain of Card Web
	Shirley Total	Picker & Card Total						
Bengal Deshi	6.80	6.25	8's	98.9	791	60	30.00	.67
Dholleras	12.60	5.56	22's	45.2	994	70	28.75	.39
Moglai Jarilla	8.70	9.09	22's	49.6	1091	70	29.00	1.18
Moglai 197/3	9.30	7.14	22's	62.1	1366	70	29.55	.95
Virnar	7.10	9.09	22's	76.8	1689	90	24.50	--
320 F	9.00	4.00	22's	82.8	1822	90	25.00	.97
AK-277	7.90	7.69	22's	87.0	1913	110	23.75	1.14
Westerns	12.70	5.66	22's	75.3	1657	110	24.00	1.20
Jayadhar	5.70	5.36	22's	90.0	1981	100	22.02	1.55
Kalyan	12.40	9.80	22's	72.0	1585	110	24.45	1.18
Buri/American	6.80	4.44	22's	89.0	1958	90	22.37	2.01
Laxmi	6.50	6.82	22's	95.6	2103	110	21.90	1.87
Digvijay (A)	4.50	4.44	22's	101.1	2225	80	21.37	1.81
Gaorani G6	9.10	5.77	22's	91.1	2004	110	21.25	1.19
Digvijay (B)	9.70	5.77	22's	100.4	2208	110	23.50	2.46
H-14	10.70	10.00	22's	74.6	1641	70	24.05	1.14
L-147	8.50	8.33	22's	87.8	1931	60	22.75	2.47
Deviraj (C02-170)	6.80	5.36	22's	107.1	2357	90	19.83	2.05
1007	6.10	4.00	22's	94.1	2071	90	21.75	2.25
ISC-67	7.80	5.88	22's	94.3	2081	70	26.75	5.18

contained in table 12b. The growers are endeavoring to develop one-variety communities in each of the areas of production.

Cotton, for the most part, is planted, cultivated, and picked by hand; although, some animal-power is used. Most of the growers cultivate less than five acres; and only about one percent have farms of fifty acres or larger. Much of the Indian soil has low fertility which contributes to the low yields. Cotton is sold by the grower as seed cotton in small lots prior to ginning.

The Indian Government has a goal of 8,170,000 bales (392 pounds), or 6,650,000 bales (478 pounds net weight), for their future cotton production. This goal is part of the fourth Five-Year Plan with a target date of 1974. Below is a breakdown of this production goal:

<u>Staple Length</u>	<u>Production in Bales</u> <u>(478 Pounds Net Weight)</u>
Superior long staple (1" and above)	984,000
Long staple (7/8" to 1")	3,452,000
Medium staple (above 11/16" and below 7/8")	1,640,000
Short staple (11/16" and below)	<u>574,000</u>
Total	6,650,000

Even with this increase in production, and even if the goal is reached at the expected time, India anticipates importing 287,000 additional bales to meet its expected domestic demand. The Government plans to meet its goal through increasing the present marginal yields. Extra land is not available, so acreage expansion is out of the question. Increased yield is to be achieved by extension of irrigation facilities, increased fertilization, improved plant protection, and improved varieties. All of these will require a financial outlay of considerable magnitude and tremendous amounts of effort on the part of everyone involved. The capability is present, and with luck in relation to the monsoons, it would be possible for India to reach her goal.

Israel

Since the nation of Israel was not in existence during the 1934-1938 period, first production figures for cotton are for the season of 1954-55 when 1,000 bales were grown. Israeli production reached 22,000 bales in the 1958-59 season and continued to increase to the 150,000 bales produced during the 1968-69 season. Previously Israel had to import cotton to fill her domestic mill needs; but with the production of the last few seasons, Israel has become an exporting nation. The cotton exported has been the production over and above domestic requirements.

Acala is the main cotton variety grown in Israel. Deltapine and Pima were planted on only about six percent of the total area. American upland types represent 97 percent of the total production, and Pima was 3 percent of the total. Efforts have been underway to develop a long staple, high-yield cotton suitable to the growing conditions of Israel, and Deltapine and Pima

have not proven to be fully satisfactory. Carolina Queen has been given field tests and appears to be the variety that the growers are seeking. It is felt that Carolina Queen may replace Deltapine and Pima, and possibly Acala. Average fiber property data for the 1967 and 1968 crops of cotton grown in Israel are in table 13a. Average spinning data for cottons grown in Israel are in table 13b.

Israel does not have a production goal except that the Government would like to see the growers continue to produce sufficient cotton to meet the needs of the domestic textile industry. Acreage is not expected to increase unless some of the lands that may be developed under planned irrigation facilities are not required for food crops, in which case, cotton may be planted. Israel utilizes a large amount of machinery including planters, tractors for cultivation, planes for aerial insecticide application, and modern cotton pickers. During 1967, 287 row pickers were employed in harvesting. Yield during the 1968-69 season was 956 pounds per harvested acre, which is the largest national average of any nation in the world. The Israel Cotton Marketing Board, the Plant Protection Service, the Agricultural Research Institute, and the Extension Service of the Ministry of Agriculture all assist the grower in the problems relating to insects, breeding, and cotton production in general.

Iran

Cotton production in Iran was reported as 161,000 bales annually during the 1934-1938 period. Production decreased during the years of World War II and then increased to 330,000 bales during the 1958-59 season. The period of highest production was during the 1965-66 season with 700,000 bales; and in the 1968-69 season, 690,000 bales were produced.

Over 95 percent of the Iranian cotton production is of the American upland types consisting primarily of Coker, which is mostly grown in the Caspian Coastal area. The other varieties produced in Iran are Acala, Filestani, and Boomi. The original seed source of the last two varieties is unknown. Average fiber property data for Coker grown in Iran are in table 14. Some 67 percent of the cotton is grown in the Caspian Coastal area, while 32 percent is grown in the Central East area of Iran. The Central West area and South area produced only seven percent and four percent of the cotton, respectively, during the 1968-69 season.

The Iranian government has a production goal of 800,000 bales set for the year 1972. Expected acreage increase is placed at 395,000 hectares (976,000 acres) which will be mainly in the Caspian area. This increased production is part of the fourth Five-Year Development Plan which began in March of 1968. In addition to the planned 23 percent increase in acreage, yield will be increased through the application of more chemical fertilizers, improved seed supply, loans to growers, and more timely pest control. With cooperation from the elements, it is likely that Iran will achieve its production goal.

Table 13a. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN ISRAEL, BY VARIETIES

Varieties	Equivalent		Average Fiber Properties						
			2.5% Span	50/2.5 Uniform-	Ten. Str.	Fineness	Colorimeter	Shirley Non-	
	Grade	Staple	Length	ity Ratio	Thousands	(Micronaire	Readings	lint Content	
			(Inches)	(Percent)	Psi Zero Gauge	Units)	Rd	+b	(Percent)
Crop of 1967									
Deltapine	LM	32.8	1.03	42	83.0	3.8	69.8	8.3	3.8
Acala 4-42	M LtSp	33.4	1.05	45	91.0	4.1	74.4	9.1	3.1
Acala 1517	SLM+	36.1	1.13	45	93.8	3.7	74.3	8.8	3.2
Pima S-2	(3)	39.5	1.24	43	101.5	3.6	68.0	10.7	3.5
Crop of 1968									
Deltapine	SLM	34.0	1.05	43	83.5	4.4	78.0	6.6	3.4
Acala 4-42	SLM+	34.0	1.07	44	91.4	4.5	77.0	7.1	2.9
Acala 1517	SLM+	37.0	1.16	44	94.7	4.0	77.8	7.1	3.0
Pima S-2	SLM	39.0	1.22	45	98.7	3.7	70.0	8.2	4.5
Pima S-3	SLM	34.0	1.05	45	91.6	4.2	77.0	6.8	2.5
Pima S-4	SLMLtSp	42.0	1.31	44	98.1	3.6	69.0	9.0	4.7
Acala S.J.1	M	37.0	1.14	46	96.9	4.7	78.0	7.6	3.2
Carolina Queen	M	34.0	1.07	44	82.0	3.3	79.0	7.4	3.9

Number in parentheses is U.S. American-Egyptian grade.

Table 13b. AVERAGE SPINNING DATA OF COTTONS GROWN IN ISRAEL, BY VARIETIES

Variety	Average Spinning Test Data							
	Waste		Yarn Count	Yarn Strength (Pounds)	Break Factor	Yarn Appearance (Index)	Yarn Coefficient of Variation (Percent)	Neps Per Grain of Card Web
	Shirley Total	Picker & Card Total						
<u>Crop of 1968</u>								
Deltapine	3.8	3.25	22's	89.2	1963	130	22.50	.28
Acala 4-42	3.1	4.14	22's	110.0	2420	130	20.00	.63
	--	--	50's	36.5	1824	120	26.50	--
Acala 1517	3.2	4.04	22's	107.7	2370	130	19.25	.75
	--	--	50's	33.4	1671	100	26.50	--
Pima S-2	3.5	--	--	--	--	--	--	--

Iraq

During the 1934-1938 period, Iraq produced 8,000 bales of cotton annually. The largest production in Iraq occurred in the 1957-58 season when 66,000 bales were produced. Production declined to 50,000 bales during the 1968-69 season.

Cotton is produced in the middle and northern part of Iraq. Iraq produces only one variety, Coker 100 Wilt. The Government of Iraq has a production goal of 160,000 bales with a target date of 1971. The Ministry of Agriculture helps the growers through its extension program by providing them with seed and fertilizers. The Ministry is also in charge of insect control. The growers pay the costs of these services to the Ministry after the harvest is complete.

The increased production is to be achieved by increasing the acreage planted by 32,000 acres and increasing the yield. The 32,000 acres is not new cotton land. Yield is to be increased by use of certified seed, more fertilizers, better weed control, better insect control, more irrigation, and the application of other modern cultural practices.

If the Iraqi Government can supply the needed items and the grower utilizes the modern cultural practices outlined, it is probable that Iraq will meet its production goal.

Pakistan

Pakistan, like Israel, was not in existence during the 1934-1938 period, since it was a part of India. The first production figures are reported for the season of 1947-48, when 912,000 bales were produced. Production during the 1958-59 season reached 1,270,000 bales and continued to increase to 2,450,000 bales during the 1968-69 season. Thus Pakistan has become one of the major cotton producers of this area of the world.

Cotton-producing areas of Pakistan, along with the major variety divisions, are shown in figure 13. Pakistan is divided into East Pakistan and West Pakistan, with the nation of India in between.

About 93 percent of the cotton produced in Pakistan is of American upland type derivation, and the remainder is of Asiatic (Desi) types. Pakistan upland varieties, many of which were developed from American upland varieties and which were grown during the most recent seasons, are LSS, AC134, 289F, N.T., and 4-F. M4 and M100, which were developed from N.T., were also grown. Fiber property data for Pakistan AC 134 variety are in table 15.

The Pakistan Central Cotton Committee and the Pakistan Institute of Cotton Research and Technology assist the growers, traders, ginner, textile industry, and exporters. Pakistan is now in its third Five-Year Plan, 1965-1970. Pakistan has a production goal of 3,500,000 bales by 1970. This increased production is expected to be accomplished without any increase in acreage through the use of improved seed, increased use of fertilizer, and insect control, along with other cultural practices to increase the yield.

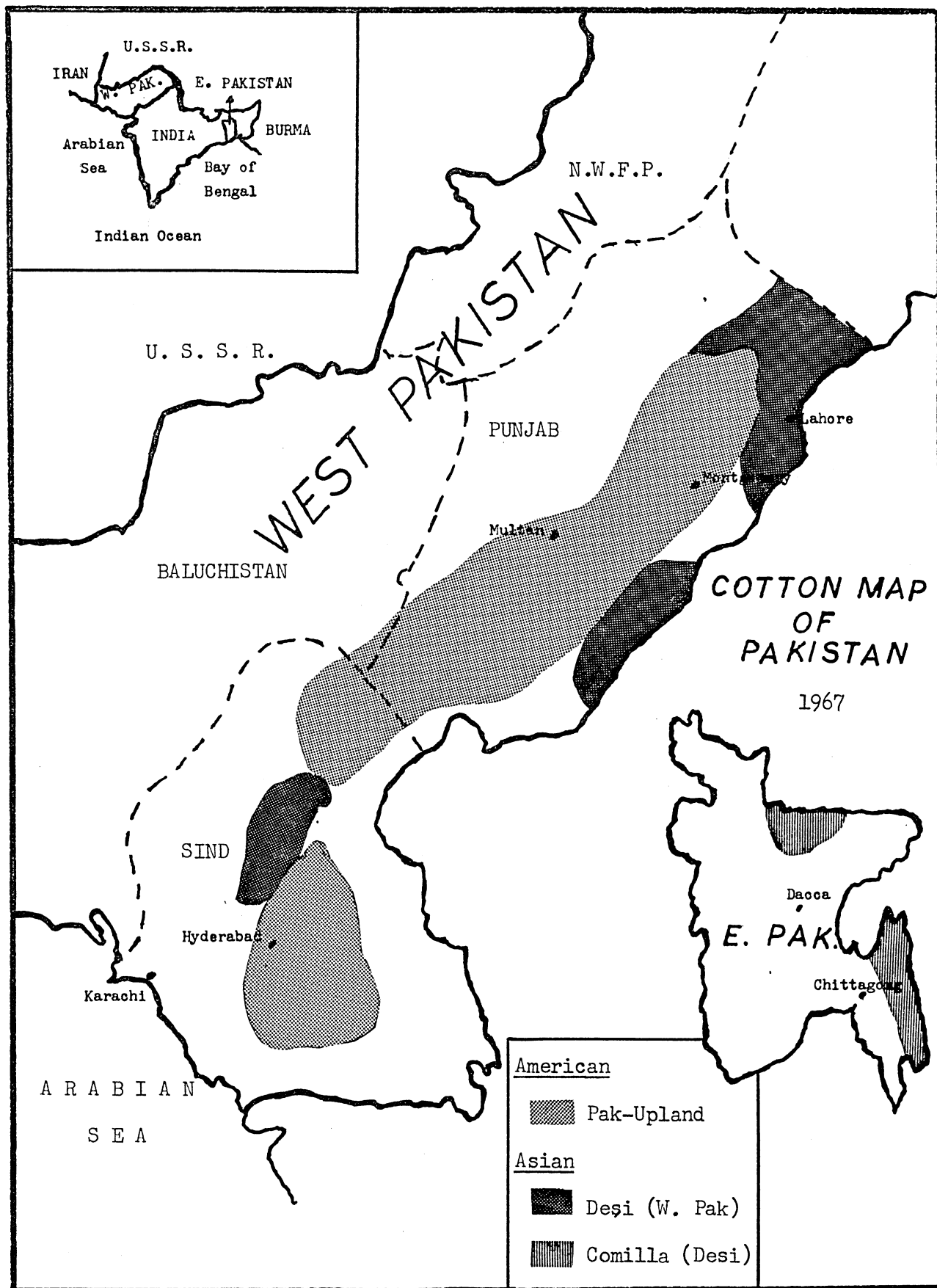


Figure 13.

Pakistan, with a national average yield of 260 pounds per acre, could expand its production through such improved cultural practices, and possibly could reach its production goal. The Government of Pakistan designates the varieties which may be planted in the various cotton-growing areas. The Government is also attempting to maintain the purity of the varieties produced and to prevent the mixing of different varieties at the gins.

Syria

Syrian Arab Republic had an annual average production of 23,000 bales of cotton during the period 1934-1938. Production climbed to 445,000 bales for the 1958-59 season. Top production in Syria was reached in the 1965-66 season, when 830,000 bales were produced. Production then declined to 710,000 bales for the 1968-69 season. Cotton-producing areas of Syria are shown in figure 14. Yield per acre during the 1968-69 season was reported at 522 pounds. Over 90 percent of the cotton produced in Syria is American upland type of the varieties of Coker 100 and of Carolina Queen. Average fiber properties for samples of saw and roller ginned cotton of Syria are in table 16.

Since 1965, the purchasing, ginning, and exportation of cotton in Syria have been nationalized. The Government supports the prices of cotton, wheat, barley, and other agricultural crops. Syria is one of the major cotton exporting nations to the Communist countries of the world. Syrian cotton is her primary source for foreign currency. Syria is a major cotton-exporting country, often exporting 90 percent of her production.

Syria does not have a production goal, but the Government has hoped to increase its production five percent annually for the period 1965-1970. Little or no additional land is scheduled for cotton production. In order to expand cotton production in Syria, there is a need for a greater irrigation capacity, a reduction in soil salinity in several major areas, an increased use of techniques to combat Verticillium Wilt, and more labor.

Thailand

Annual cotton production for Thailand during the period of 1934-1938 was 7,000 bales. Production expanded to reach 48,000 bales in the 1958-59 season. By the 1968-69 season, production had increased 233 percent over the 1958-59 production for a total of 160,000 bales. About 95 percent of the cotton produced in Thailand is of the American upland type, primarily of Stoneville and Reba varieties. In Thailand, these cottons have a staple length of 1-1/16" to 1-3/32".

Thailand has no established production goal, but the Government is trying to help the grower increase production through breeding, research, and credit, in order for Thailand production to equal consumption. Most of the cotton is raingrown and, often, excessive rain decreases possible yield. Primitive production practices need improvement and Thailand is faced with heavy insect and blight problems. Poor seed quality is one of the major problems facing growers. There is now an attempt to cross Cambodian cotton with Deltapine to develop an adapted high quality seed. A cooperative promotion project, undertaken with field representatives from the United Kingdom and

France, has been carried out in recent years and has increased production so that Thailand was able to export for the first time in 1968. Yield is now up to 306 pounds per harvested acre.

Turkey

Turkey has now become the fourth largest cotton producer in the Oceania and Asian area of the world with a production during the 1968-69 season of 1,875,000 bales. This amount was a 126 percent increase over that of the 1958-59 season when 830,000 bales were produced. The 1958-59 season production was a 249 percent increase over the 1934-1938 annual average production of 238,000 bales. Cotton-producing areas of Turkey are shown in figure 14. The three major cotton-producing regions referred to as I, II, III, in figure 14, are Cukurova (49 percent), Aegean (39 percent), and Antalya (8 percent), respectively. The other regions are minor producing areas, and, combined, produce only four percent of the total Turkish production.

Turkey has a production goal of 5,300,000 bales (average bale weight of 472 pounds) with a target date of the year 2000. Also, a target yield of 700 pounds per acre has been established. Yield during the 1968-69 season amounted to 498 pounds per acre. An estimated increase of 1,700,000 acres is required. Most of the increased acreage will be in the region marked IV, in figure 14, with a lesser increase in acreage in region II (Aegean). The Turkish production goals are based on the assumption that the world demand for cotton will absorb this production.

Other proposed measures to achieve the adopted goal are the use of higher yielding varieties, continual research on varieties, increased irrigation, increased usage of fertilizer, more modern equipment (obtained in part through Agricultural Bank loans), Government support programs, improved insect control, and other improved modern agricultural practices.

The Turkish Government operates a highly effective price support program, which is quite different from that of the United States. There are three unions of cooperatives: Cukobirlik for the Cukurova region, Taris for the Aegean region, and Antbirlik for the Antalya region. These unions act as agents for the Turkish Government in carrying out the price support program. The unions maintain a standing offer to buy at a given minimum price set by the Government, thereby establishing a floor price for cotton. The Government, in turn, furnishes credit to the unions and subsidizes any losses the unions may sustain in their operation.

Over 98 percent of the cotton produced in Turkey is of the American upland type. Approximately 45 percent is Deltapine, 53 percent is Coker, and less than 1 percent is Acala. All new cotton varieties developed in the various cotton-producing nations of the world are tested for usability in Turkey; and, if they are better than those now in production, they will replace the present ones in future years. Average fiber property data for cottons produced in Turkey are in table 17.

The goal established by the Turkish Government could be reached if the world demand increases as expected and if world prices do not decrease for too long a period, making it unprofitable for the Turkish Government to subsidize the price paid by the grower unions.

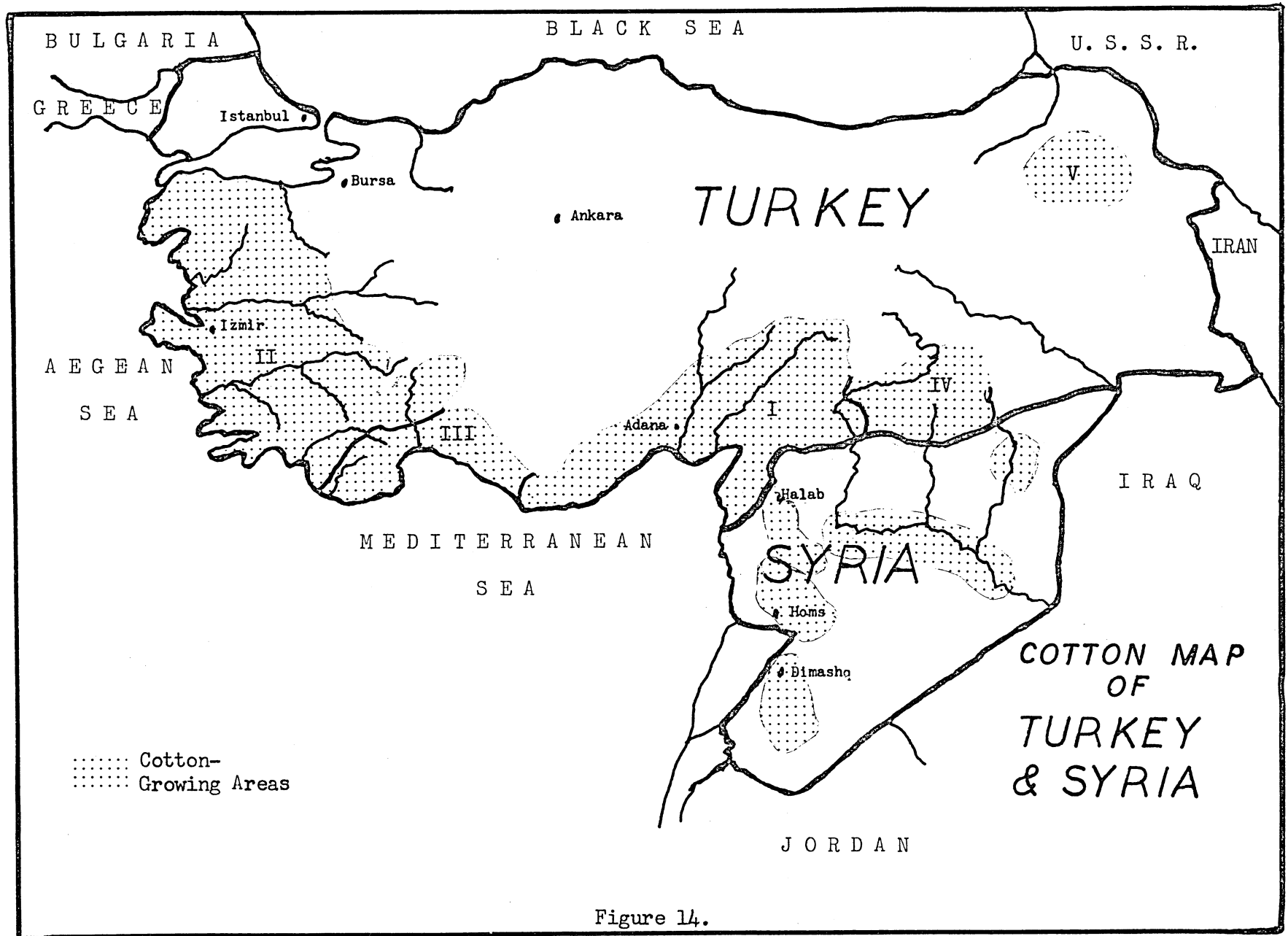


Figure 14.

Table 14. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN IRAN, BY VARIETIES

Variety	Equivalent		Average Fiber Properties						
			2.5% Span	50/2.5 Uniform-	Ten. Str.	Fineness	Colorimeter	Shirley Non-	
	Grade	Staple	Length (Inches)	ity Ratio (Percent)	Thousands Psi Zero Gauge	(Micronaire Units)	Readings Rd +b	lint Content (Percent)	
Coker	M	35.0	1.11	47	86.2	4.1	75.0 9.2	3.9	

Table 15. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN PAKISTAN, BY VARIETIES

Variety	Equivalent		Average Fiber Properties						
			2.5% Span	50/2.5 Uniform-	Ten. Str.	Fineness	Colorimeter	Shirley Non-	
	Grade	Staple	Length (Inches)	ity Ratio (Percent)	Thousands Psi Zero Gauge	(Micronaire Units)	Readings Rd +b	lint Content (Percent)	
Amer. AC 134	SLMLtSp	31	.97	47	93.2	5.3	69.3 9.6	7.6	

Table 16. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN SYRIA, BY VARIETIES

Variety	Equivalent		Average Fiber Properties						
			2.5% Span	50/2.5 Uniform-	Ten. Str.	Fineness	Colorimeter	Shirley Non-	
	Grade	Staple	Length (Inches)	ity Ratio (Percent)	Thousands Psi Zero Gauge	(Micronaire Units)	Readings Rd +b	lint Content (Percent)	
Saw Ginned	M	35.0	1.10	46	79.7	4.4	76.5 8.6	3.5	
Roller Ginned	SLM+	37.0	1.17	48	86.2	4.8	74.0 9.0	4.9	

Table 17. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN TURKEY, BY VARIETIES

Variety	Equivalent		Average Fiber Properties						
			2.5% Span	50/2.5 Uniform-	Ten. Str.	Fineness	Colorimeter	Shirley Non-	
	Grade	Staple	Length (Inches)	ity Ratio (Percent)	Thousands Psi Zero Gauge	(Micronaire Units)	Readings Rd +b	lint Content (Percent)	
Adana	SLM	35.0	1.09	49	78.6	4.4	70.0 8.8	6.3	
Izmir	SLM	36.0	1.13	50	87.5	4.4	74.5 8.4	3.4	

General

Other countries with minor production during the 1968-69 season were Cambodia with 5,000 bales, South Korea with 15,000 bales, and Yemen with 18,000 bales. The combined production of the remaining countries was 19,000 bales. It is not known whether any of these countries have a goal for increased production. It is felt that most of these nations have reached about their maximum production levels as of the 1968-69 season, with the exception of minor increases due to exceedingly advantageous weather conditions.

COTTONS OF AFRICA

During the 1968-69 season, about nine percent of the world total cotton production was grown in Africa. Production was 4,691,000 bales, slightly less than the total amount produced in the South American countries. This total was just a little over one-half million more than was produced in this area during the 1958-59 season. Only about 31 percent of the cotton grown in Africa is of the American upland type. The majority of the cotton produced is of the Egyptian type and represents some 64 percent of the total production. Many of the nations located in Africa did not exist under their present names during the period 1934-1938; as a result, much of the data for nations during this earlier period are not available.

Morocco

Morocco is located on the northwestern tip of the African Continent, directly south of Spain. The first record of cotton production in Morocco was for the 1938-39 and 1940-41 seasons, with 1,000 bales being recorded for both seasons. During the 1958-59 season, Morocco produced 8,000 bales of cotton. The top producing season was 1965-66 with 45,000 bales, which has decreased to 35,000 bales for the 1968-69 season. Cotton-producing areas of Morocco are shown in figure 15.

Cotton has become a major industrial crop, the long and medium staple lengths being exported and United States short staple cottons being imported. A new Five-Year Plan (1968-1972) calls for \$2,300,000,000 for agriculture, public works, selected industries, and tourism. Of this, \$354 million is for direct agriculture development. In conjunction with this Five-Year Plan, is a cotton production goal of 33,600 metric tons of seed cotton (55,000 bales of lint), with a target date of 1972. This increased production will be achieved by an increase of 10,175 hectares (25,142 acres) of land planted to cotton. Increased yield is planned and will be accomplished through planting of higher producing varieties.

The Government of Morocco wants to retain, or to increase cotton production, as it is a major source of foreign exchange. Government support of cotton production is accomplished by three advance payments to the grower—one at planting time, one at the first weeding, and one at harvest time. The final payment is made as soon as possible after the cotton is sold. In the past, some growers had to wait as much as a year before collecting their final payment. This delay had caused some dissatisfied growers to change to the production of another crop which provided immediate payment when sold.

The entire production of cotton in Morocco is of the Egyptian type cottons. The Five-Year Plan calls for increased acreage to be planted to the varieties of Tadla 25 and 29, Karnak, and other varieties. The production of Ashmouni, Giza, and Pima will be reduced in favor of these other varieties with a higher yield. The acreage increases will occur mostly in the Tadla, Doukkala, and Moulouya areas of the nation.

If the money scheduled for agricultural development under the present Five-Year Plan is spent for agriculture, and, if the Morocco Government speeds up its cotton production payments to the growers, thus avoiding future dissatisfaction, growers should be able to reach their production goal by the target date.

Algeria

Algeria, located on the northern coast of Africa and to the east of Morocco, is a minor cotton-producing nation with a production of 4,000 bales noted during the 1941-42 season. The 1958-59 production was 1,000 bales, while the highest production was in the 1954-55 season with 13,000 bales. In the 1968-69 season, 5,000 bales were produced. Most of the cotton produced in Algeria is believed to be Egyptian type, or extra long staple cotton.

The Algerian Government states that it intends to encourage further expansion of cotton. This is to be on irrigated land, but no quantitative goals have been established. Most raingrown cotton is produced in the Anaba-El Arrouche region. Production in the other areas is irrigated. Algerian cotton-producing areas are shown in figure 15. It is quite possible for the production in Algeria to increase to the 13,000-bale level of 1954-55.

Niger

Niger is located south of Algeria and is shown in figure 15. Exact cotton-producing areas were not determined, but Niger produced 1,000 bales during the 1958-59 season and 15,000 bales during the 1968-69 season. The main crop for this nation is peanuts. Agricultural and industrial advancement has not been as rapid in Niger as it has in many other African nations.

Chad

Located to the southeast of Niger is Chad, whose cotton production during the 1958-59 season was 110,000 bales. Production increased to a high of 205,000 bales during the 1966-67 season, while the 1968-69 season production was reported at 200,000 bales. This figure now places Chad in a tie with Mozambique as the fifth largest cotton-producing nation in Africa. Approximate cotton-producing areas of Chad are shown in figure 15. Cotton is Chad's most important commercial crop. All cotton is raingrown and 50 percent of the production is believed to be upland type.

Monopoly rights for the purchase, collection, ginning, and marketing of raw cotton in Chad are held by COTONFRAN, the Franco-Chadian Cotton Company. This firm supplies improved seed, fertilizer, and insecticides at concessional prices in order to increase production and to assure good quality lint. The cotton purchased by COTONFRAN is bought on a guaranteed price which is above the level that Chadian cotton will bring on the world market. Losses incurred by COTONFRAN are supported by the Cotton Stabilization Fund, a Chadian Government agency. The Chad Government hopes to increase cotton production to 75,000 tons (345,000 bales) by 1975. Since there is very

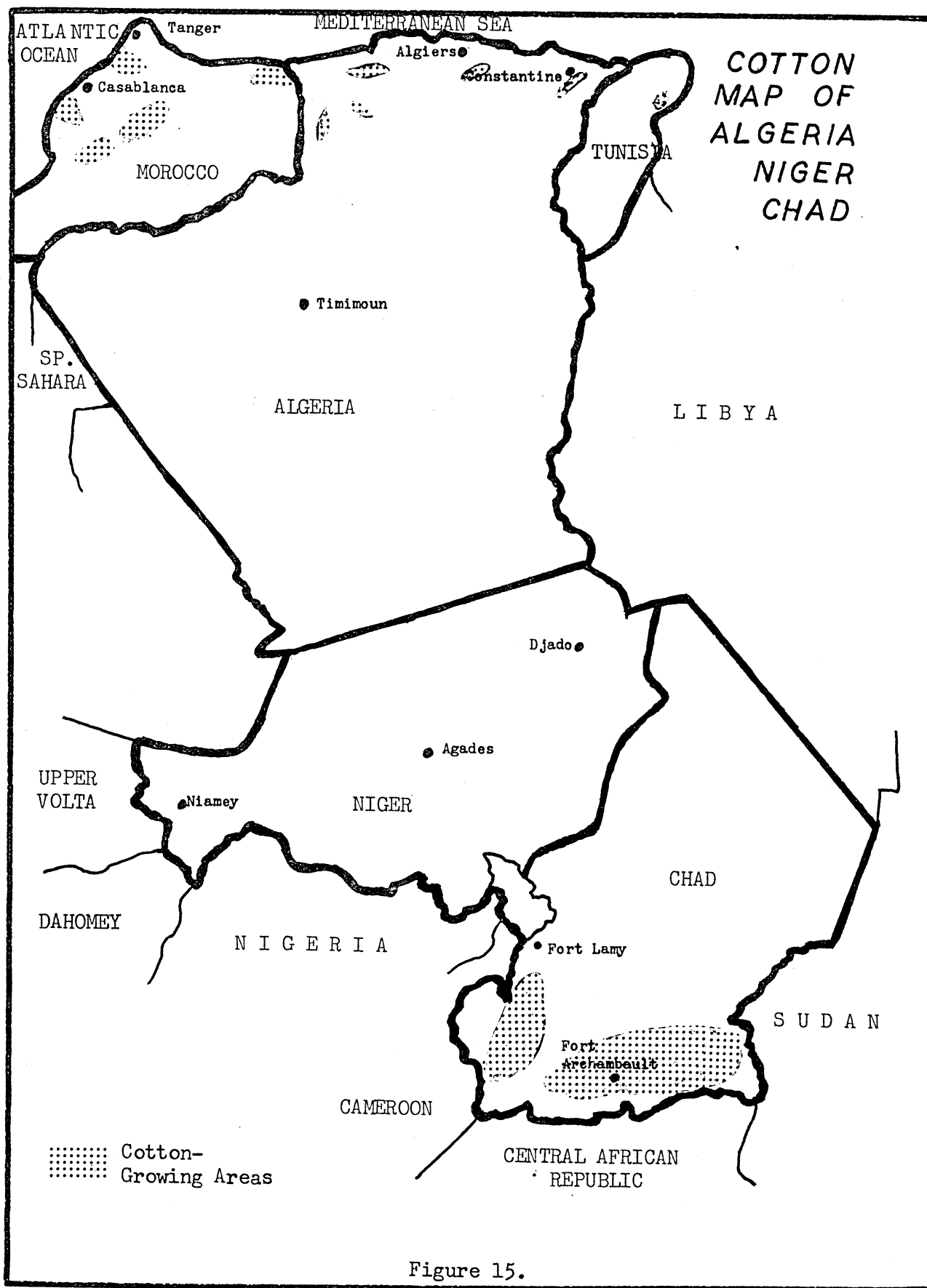


Figure 15.

little irrigation in Chad, chances of success in attaining this production goal depend on weather and are rather doubtful.

Mali

Southwest of Algeria and west of Niger lies the nation of Mali. Cotton production in Mali during the 1958-59 season amounted to 10,000 bales, which has increased to a total of 60,000 bales for the 1968-69 season. The type of cotton produced and the production areas was not reported. Cotton is probably grown along the Niger River which flows through the southern portion of the country (see figure 16).

Upper Volta

Upper Volta produced 5,000 bales of cotton during the 1958-59 season and 35,000 bales during the 1968-69 season. The Government establishes the prices for oil crops, cotton, and subsistence crops. About 75 percent of the cotton produced in Upper Volta is of the Allen variety, which is an American upland type. The remainder of the production is of the Mono variety (G. Barbadosense). The Mono variety is a short fibered cotton with a higher yield than the older local varieties and was the major variety until the introduction of Allen.

Ivory Coast

Cotton has been produced in the Ivory Coast for over 50 years. Prior to the late 1950's, only local varieties were produced and only in small amounts. The 1958-59 season production for the Ivory Coast was only 3,000 bales. The variety of Mono was introduced to the Ivory Coast from Dahomey in the late 1950's and started to replace the old local varieties until the year 1959, when the medium-length, higher-yield variety of Allen was introduced. Campaigns were begun to increase the use of Allen and resulted in the production of 75,000 bales in the 1968-69 season; the highest production ever for the nation. Also, as a result of the campaign, 95 percent of the cotton produced is now of the Allen variety.

Cotton-producing areas of the Ivory Coast are shown in figure 16. The Ivorian Government had projected that cotton production will reach 50,000 tons (seed cotton basis) by 1972-73. This level was reached in the 1968-69 season with the production of 75,000 bales, and a new goal of 100,000 tons (seed cotton basis) has been established for the 1970-71 season. The Ministry of Agriculture is doing all it can to develop cotton production as part of a plan to diversify the Ivorian agriculture, which has been heavily dependent upon coffee and cocoa. Allen cotton is bringing 6.2 cents a pound, seed cotton basis (17.0 cents lint), while Mono brings 5.5 cents a pound, seed cotton basis (15.1 cents lint), to the Ivorian grower.

With the production level reached during the 1968-69 season, the domestic textile industry has sufficient cotton lint to meet its needs; and cotton surplus can start to be exported. If production continues to increase, which

appears probable, the amount of cotton available for export will also increase, giving the Ivorian Government an agricultural product other than coffee and cocoa that will earn foreign exchange. It appears quite likely that Ivory Coast will meet its production goal.

Nigeria

In Nigeria, cotton production in the period 1934-1938 averaged 52,000 bales annually. Production then increased 227 percent to reach the 1958-59 season total of 170,000 bales. A production high of 250,000 bales was reached during the season of 1960-61. The 1967-68 season production of 125,000 bales (lowest for the past 16 years) was due to unfavorable weather, to a low price that discouraged production, and to the civil war. Almost 100 percent of the cotton produced in Nigeria is of the Allen variety of the American upland type.

The Nigerian Government has established a production goal of 644,000 bales of 400 pounds per bale (539,000 bales of 500 pounds gross weight) for the year 1980. The marketing boards set the prices paid to the farmers for agricultural products such as cotton, peanuts, etc. May 1968 prices to be paid to the growers for seed cotton as announced by the Northern States Marketing Board were:

Grade NA 1 - 6 pence (7¢ U.S.) per pound (19.19¢ per pound lint);
Grade NA 2 - 5 pence (5.8¢ U.S.) per pound (15.90¢ per pound lint);
Grade NA 3 - 4.5 pence (5.2¢ U.S.) per pound (14.26¢ per pound lint).

It is expected that these new, higher prices contributed to the upturn in production for the 1968-69 season in comparison with the production of a year earlier. In the northern region of Nigeria, growers receive free cottonseed for planting and can purchase fertilizer at a subsidized price. To reach the 1980 production goal, a 50 percent expansion in acreage is planned with a quadrupling of yields. Yields are to be increased by greater use of fertilizers, insecticides, and improved, treated cottonseed. Extension service assistance to the grower will be increased. The distribution of farm supplies and the need for credit may hamper the program. According to the program, yield is forecast at 525 pounds per acre for the crop of 1980. Allen 26J will be the variety used for most of the anticipated production increase. Areas of Nigeria in which the increase is scheduled are North Western State, North Eastern State, and North Central State.

Before the outbreak of the Nigerian civil war, textile mills were established in Nigeria; and efforts were being made to produce more cotton to feed these mills. But due to the war, cotton production has been hindered; and some textile mills are non-operational and the planned production level may not be reached.

Dahomey

Dahomey is located west of Nigeria on the western coast of Africa. During the 1958-59 season, 4,000 bales of cotton were produced; and production

increased to over 30,000 bales as of the 1968-69 season. The varieties of Mono and Allen are produced in Dahomey. During the 1968-69 season, it is estimated that 68 percent of production will be Allen (American upland type).

A five-year plan, the Economic and Social Development, 1966-1970 called for a production goal of 23,600 bales of cotton to be produced in the year 1970. This goal was exceeded during the 1968-69 season; and, as a result, a new objective of 75,700 bales has been set for the year 1970. Some 77 percent of the 1970 production goal is to be of the Allen variety cotton.

The seed cotton is bought in the local markets and stored there until it is taken to gins where it is stored in silos until ginned. After ginning, lint bales weight 250 kilograms to 370 kilograms (550 pounds to 816 pounds). All cotton produced in Dahomey is raingrown. IRCT (Research Institute on Cotton and Textiles) does most of the research concerning cotton, including agronomical experiments, experiments in varieties, and entomological experiments. The Dahomey Agricultural Department is helped in the development of cotton production by the CFDT (French Company of Textile Fibers Development) which aids in cotton marketing at the producers level, at the gin, and in exportation. The sale and processing of the nation's cotton production is a CFDT monopoly, as they own the five gins in the country. Most of the cotton exported by Dahomey goes to France.

Dahomey's production can grow even larger, as indicated by the goals established. The only handicap will be a continuing decline of prices, which will cause the grower to shift to a crop with a greater financial return.


Central African Republic

The Central African Republic, as its name implies, is almost in the center of Africa and is located just south of Chad. Average annual production during the early period 1934-1938 was 33,000 bales. Production increased 127 percent by the 1958-59 season for a total of 75,000 bales. Production during the 1968-69 season was 80,000 bales. The leading cotton variety is believed to be Allen, as it is in most of the neighboring nations. See figure 17.

Cotton is the number-one agricultural export for the Central African Republic, as it is for many nations of Africa. Technical assistance in relation to agriculture, particularly cotton, is being provided by France. A nation-wide campaign, named "Operation Bokassa," has been initiated for the increased production of cotton. The campaign is to increase the use of fertilizer, insecticides, and mechanical techniques. Also included in the campaign is an educational program for increasing the growers' knowledge as to proper planting time, cultivation schedules, and other modern cultural practices.

The Central African Republic intends to have a new textile complex in operation by 1970, which will consume a large amount of cotton production.

COTTON MAP OF
MALI
UPPER VOLTA
IVORY COAST
GHANA
NIGERIA

 Cotton-
Growing Areas

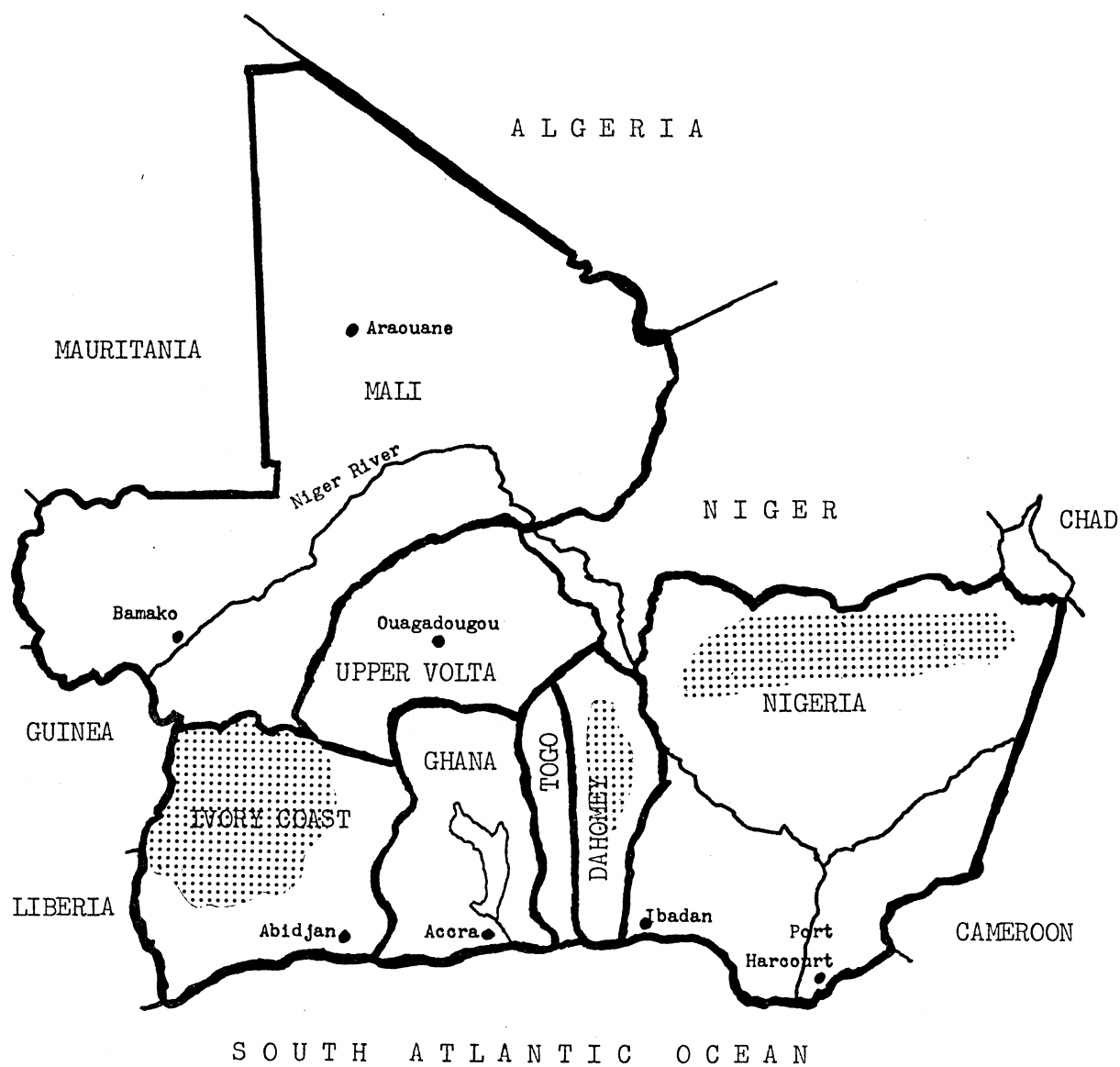


Figure 16.

Cameroon

Cameroon is located just west of the Central African Republic; see figure 17. Cotton production in Cameroon was first officially recorded in the world records as 3,000 bales during the season of 1951-52. By the 1958-59 season, production had increased over 10 times to reach 35,000 bales. By the 1968-69 season, production had increased almost 186 percent over the 1958-59 figure to reach 100,000 bales.

Cameroon is operating under a Twenty-Year Development Plan, with aims of doubling capital income. The overall plan is executed in five-year stages; and Cameroon is currently in the second stage. The second stage calls for agriculture development in the form of farm cooperatives, farm credit, and farm insurance. Four main methods of accomplishing the agricultural development are: 1. Improvement of yields by use of fertilizer and better control of pests and diseases; 2. Extension of areas under cultivation; 3. Specialization of production; 4. Increased culture of certain export crops as well as increased kinds of crops—cotton, rubber, tea, rice, and sugar.

Democratic Republic of the Congo

The Democratic Republic of the Congo is located just south of the Central African Republic and has two major cotton-producing areas, as shown in figure 17. The northern area produced about 39 percent of the total for the 1968-69 season (70,000 bales). The major varieties grown in this area are Bambessa 48 and Reba 50. The southern area produced over 60 percent of the total production during the season consisting of the major varieties NC 8 and 1021.

The Democratic Republic of the Congo established a production goal of 18,100 metric tons (83,000 bales) of lint for the year 1969; and, to all appearances, the goal will be reached. This goal was an effort by the government to get cotton land, abandoned earlier, back into production. Much of the land previously used for cotton production was abandoned at the time of the Congo's independence in 1960 and the rebellions of 1965 and 1967. As a result, even though the 1968-69 season production is up, the amount is still below the production that was accomplished prior to independence in 1960. The 1958-59 season production was 284,000 bales; and 155,000 bales were produced annually in the 1934-1938 period. Most of the reclaimed land for cotton production will be in the south and will be planted to the Reba 50 variety. As conditions stabilize, the cotton companies will re-enter cotton-producing areas and production will further increase. These cotton companies provide the seed, handtools, insecticides, and, most important of all, an assured market for the cotton that is produced.

Angola

The nation of Angola is located south of the Democratic Republic of the Congo and is shown in figure 17. Early production during the 1934-1938 period amounted to an average of 8,000 bales annually. The 1958-59 season production reached 38,000 bales. The greatest production for Angola occurred in the

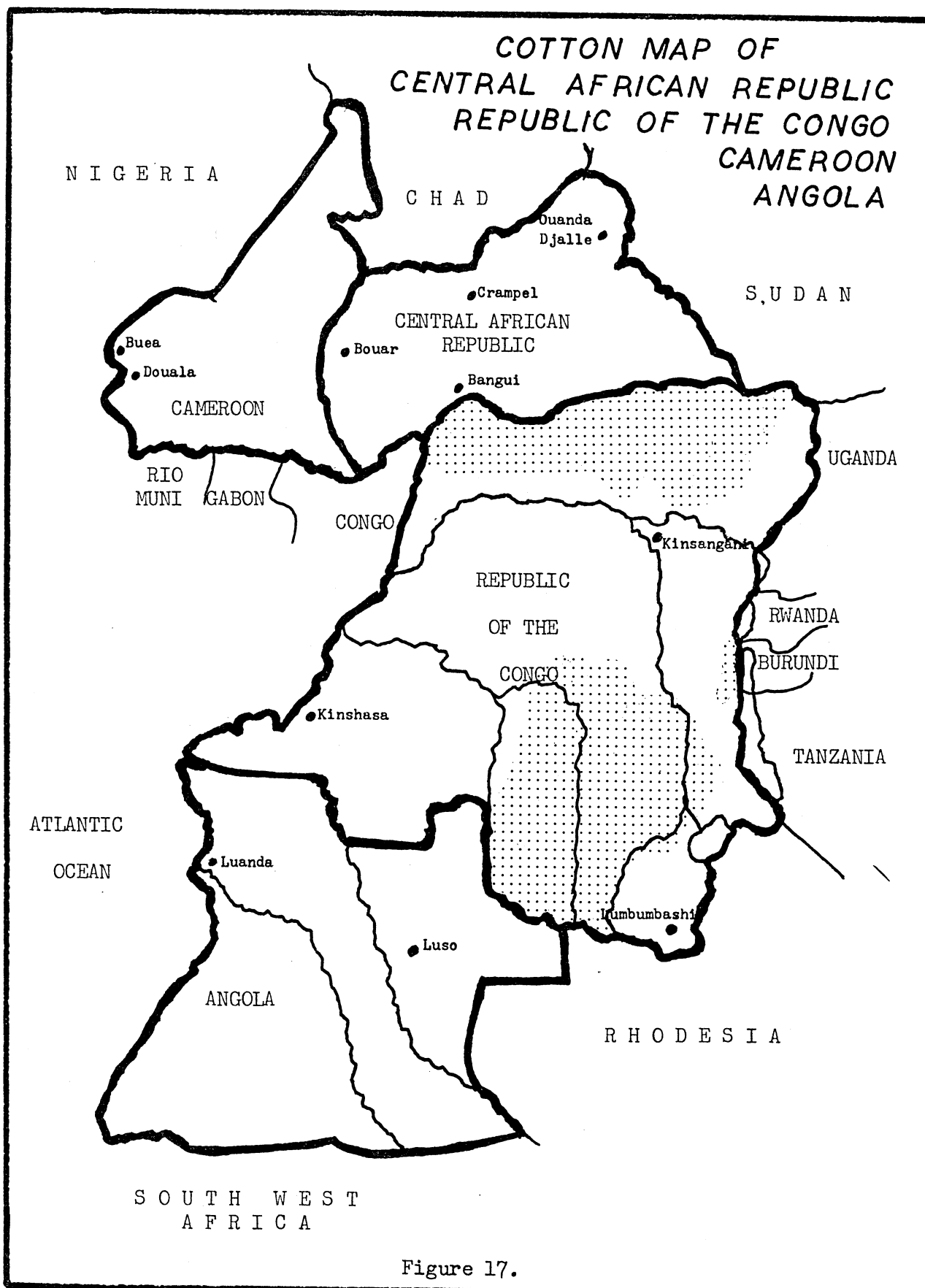


Figure 17.

1966-67 season with 42,000 bales and then decreased to the 1968-69 level of 40,000 bales. All cotton produced is of the American upland type. New areas of production and modern agricultural practices have been utilized in recent years.

United Arab Republic

The United Arab Republic, formerly known as Egypt, has been a large cotton-producing nation throughout history. During the early period of 1934-1938, the U.A.R. was the world's fifth largest cotton-producing nation with an annual average of 1,876,000 bales. During the 1958-59 season, the U.A.R. was in sixth place in the world with 2,057,000 bales, just about 300,000 bales less than was produced in Mexico. The largest producing season for the U.A.R. occurred in 1965-66 when 2,398,000 bales were produced. Production declined to 1,940,000 bales during the 1968-69 season. Cotton production in the U.A.R. is concentrated in the Nile Delta region, along the Mediterranean Sea Coast, adjacent to the Suez Canal, and up the Nile River Valley. The cotton-producing areas are shown in figure 18.

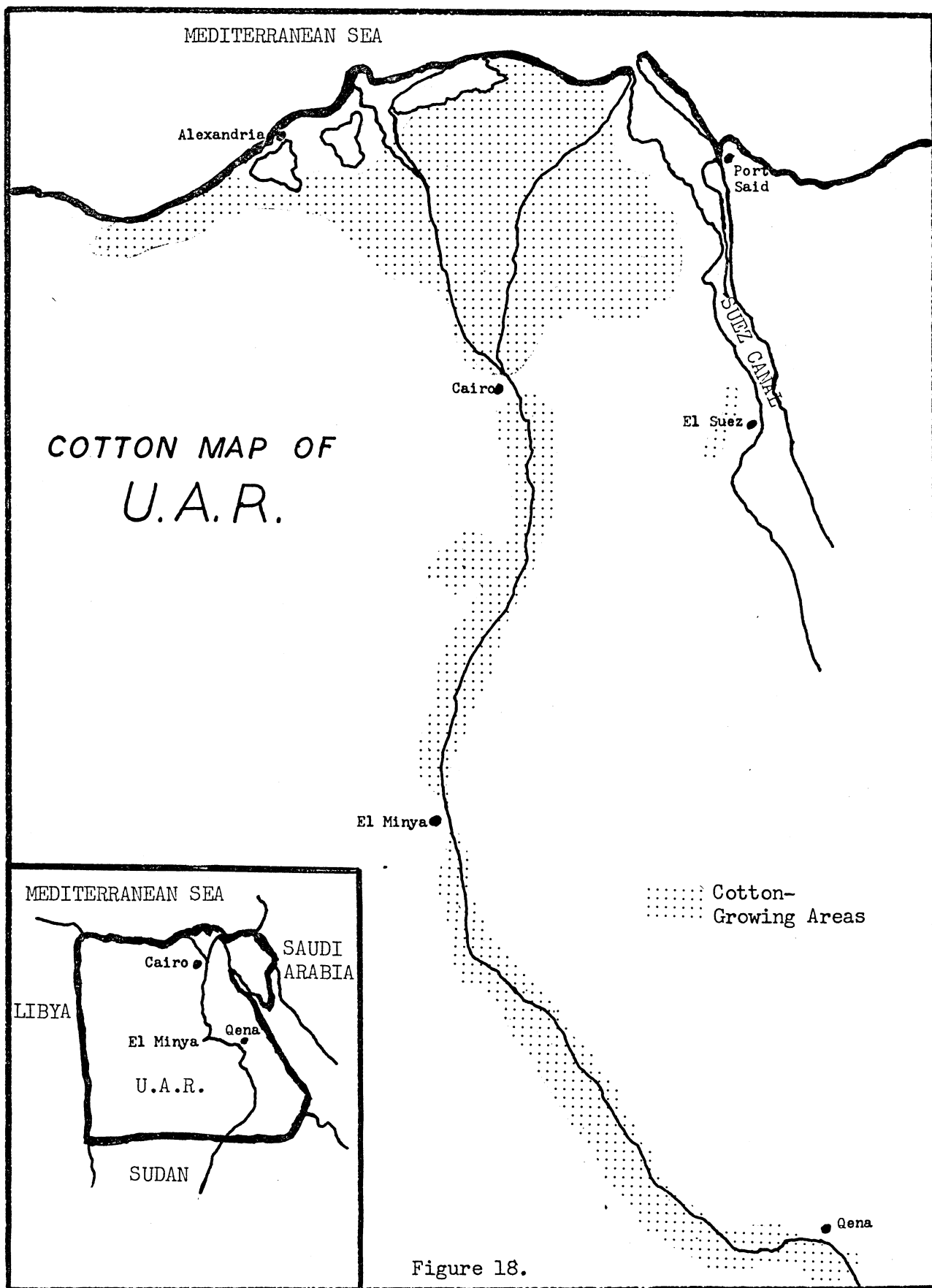
Egyptian type cottons (extra long staple) are produced in the U.A.R., and the average fiber property data for three of the varieties are shown in table 18. The major cotton varieties planted during the 1968-69 season are Giza varieties 45, 59, 66, 67, 68, and 69; Menoufi; Ashmouni; and Dendera. Of these varieties, Menoufi and Giza 66 were the leading ones for the season.

The Government of the U.A.R. is trying to double the national income by 1970 as the population increases at a rapid rate. The Middle East crisis in 1967 has placed an added burden on the Government, along with a loss of tolls from the Suez Canal. An austerity program was implemented shortly after the crisis and will continue through 1969.

The U.A.R., with the completion and filling of the Aswan Dams, will have additional water for irrigation and electricity. Through the use of these, the Government plans to expand agricultural production and diversify its agricultural exports, thus reducing the dependency on cotton as the prime source of exchange. Cotton producers are paid an additional one cent to five cents for the production of quality cottons. Under present plans, the additional irrigated land coming into production as a result of the Aswan Dams will not be utilized for cotton. Rice, citrus fruits, flowers, and winter vegetables will be produced on this new land. It is felt that the U.A.R. will not expand the acreage utilized for cotton but will make every effort to increase yield through the production of new and better varieties, greater use of fertilizer, and insect control, and the utilization of other modern, cultural practices. Thus the production of cotton is expected to remain more or less stable, subject only to seasonal environmental conditions. Acreage is expected to remain slightly less than 1.9 million acres through 1975.

Uganda

Uganda, like the United Arab Republic, has been a cotton-producing nation for many years. The average annual production during the 1934-1938 period was



278,000 bales. In the 1958-59 season, 336,000 bales were produced. The season of highest production in Uganda was 1965-66 when 375,000 bales were produced. The 1968-69 season production amounted to 285,000 bales, placing Uganda third among the cotton-producing nations on the African Continent. The major cotton-growing areas of Uganda are shown in figure 19.

Uganda cotton is roller ginned and baled in 400-pound net weight bales. Staple lengths are from 1-1/16" to 1-1/4". The majority of the cotton is rain-grown and averages 1-1/8" in staple length. Two cotton grades are utilized in Uganda; AR, which is clean, white lint and is free of stain; and BR, which is stained- or spotted-cotton lint. Average fiber property data for three Uganda produced cottons are shown in table 19. Uganda has four major cotton-producing areas. The regions and their percentage of total production for the 1967-68 season are as follows: Buganda, 13 percent; Western, 6 percent; Eastern, 44 percent; and Northern, 37 percent.

Uganda has a production goal of 575,000 bales that they hope to reach during the 1970-71 season. This goal is not to be met by increased acreage, but rather by increased yield. This increased yield will be obtained by planting early, planting at the correct spacing, using improved varieties, weeding early and thinning at the right stage of growth, spraying on time in all areas where spraying is recommended, harvesting on time and completely, uprooting and burning residue, and properly using fertilizers according to regional recommendations. These practices, if followed by the grower, will increase the yield and quality of the cotton produced. By 1970-71, the production of just two varieties is planned; BPA and SATU.

The target production is feasible since the 1968-69 yield per acre was only 60 pounds. The insecticide program alone, if properly carried out, could increase the yield per acre to about 127 pounds, thus reaching the goal.

Sudan

Sudan, the second largest cotton-producing nation on the African Continent, is located south of the U.A.R. on the upper reaches of the Nile River. An annual average of 253,000 bales of cotton was produced during the 1934-1938 period. Production reached 585,000 bales during the 1958-59 season and a high of 1,000,000 bales in the 1961-62 season. Production then decreased to 875,000 bales during the 1968-69 season. Cotton-producing areas in Sudan are shown in figure 20.

About 95 percent of Sudan's foreign exchange is earned through the sale of agricultural products. Cotton lint and cottonseed make up over half of Sudan's annual exports. A Ten-Year Plan calls for the dispersion of land resources and diversification of agriculture. To encourage middle-class people to participate in agriculture, the Government plans to distribute 1,000-acre tracts to these future farmers. Some 500,000 acres suitable for mechanized farming are available under the plan. Plans to irrigate these 500,000 acres will be given high priority by the Sudanese Government. Other irrigation projects to be given special attention are in the Shendi, Dongla, and Merowe regions. Expanded irrigation developments in the Gezira Scheme region are under way. At this government-controlled project (Gezira Scheme), quality,

COTTON MAP OF UGANDA

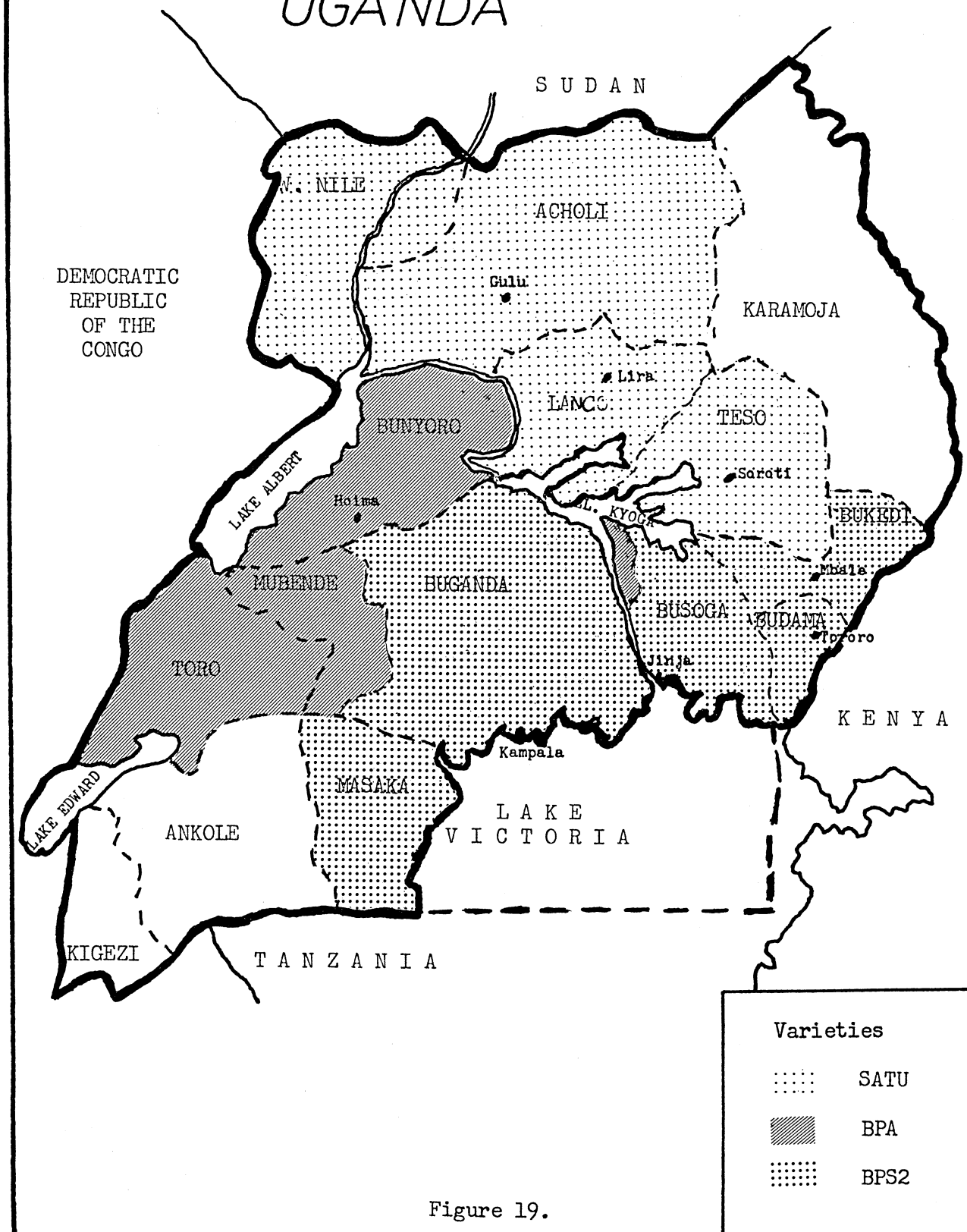


Figure 19.

long staple cotton is to be produced. Under the Ten-Year Plan, production of long staple cotton is to increase by 60 percent.

Over 85 percent of the cotton produced in Sudan is Egyptian type, and the remainder is of American upland types. Seventy percent of the Egyptian cotton is produced under irrigation, while only 3 percent of the American types is produced under irrigation. The major cotton varieties produced in Sudan are, in descending order of importance, Gezira-Lambert, Privates, Gezira-Sakel, and Acala. Average fiber properties for some of these varieties are in table 20.

The statistics indicate that Sudanese cotton production could reach 230,000 metric tons (1,061,000 bales) by 1975. This amount is probable since the 1961-62 season production was 1,000,000 bales. In fact, it is likely that Sudanese production could approach 300,000 metric tons (1,383,000 bales) by 1975, if implementation of increased irrigated acreage and other plans included in the Sudanese Government Ten-Year Plan are successful.

Ethiopia

Ethiopia, located east of Sudan and touching the Red Sea on its eastern coast, is heavily dependent on agriculture. See figure 20. Exact cotton-growing areas are not known. Ethiopia produced 5,000 bales of cotton during the 1958-59 season. The 1968-69 production increased to 10 times the 1958-59 level to reach 50,000 bales. Most cotton in Ethiopia is raingrown and of the American upland type.

The Government plans to mechanize agriculture in areas suitable for large-scale farming. Present knowledge indicates that plans for expanding cotton production are not being considered; but expansion of grains and other food crops, including livestock, are being contemplated by the Ethiopian Government.

Kenya

Kenya, located south of Ethiopia and touching on the Indian Ocean on the southeast, after five years of independence, has been undergoing an agriculture and economic revolution. Kenya cotton-production during the 1958-59 season was 15,000 bales, which was just 1,000 bales above the annual average of the 1934-1938 period. Maximum production for Kenya was 28,000 bales for the 1967-68 season, which then decreased to 25,000 bales for the 1968-69 season.

Cotton is produced in five provinces of Kenya. Figure 20 shows the major cotton-producing areas. The percent of total production in the various cotton-growing provinces for recent years is: Western, 42 percent; Nyanza and Coast, 18 percent, each; and Eastern and Central, combined, 22 percent.

The Government of Kenya has established a production goal of 45,000 bales with a target date of 1974. To achieve this goal, an increase of 80,000 acres of new land, representing a 47 percent increase in cotton land, is planned. In addition, yield is to be increased about 12 percent through

Table 18. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN U.A.R. (EGYPT), BY VARIETIES

Variety	Equivalent		2.5% Span Length (Inches)	50/2.5 Uniform- ity Ratio (Percent)	Average Fiber Properties				
					Ten. Str. Thousands Psi Zero Gauge	Fineness (Micronaire Units)	Colorimeter Readings		Shirley Non- lint Content (Percent)
	Grade	Staple			Rd	+b			
Giza 59	(5)SLMTing	45.0	1.42	51	116.0	3.7	63.0	12.9	2.4
Giza 67	(3) M Sp		1.26	48	98.0	4.8	68.7	11.3	3.0
Menoufi	(2) M Sp		1.38	48	107.3	3.8	67.0	11.9	2.5

Numbers in parentheses are U.S. American-Egyptian grades.

Table 19. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN UGANDA, BY VARIETIES

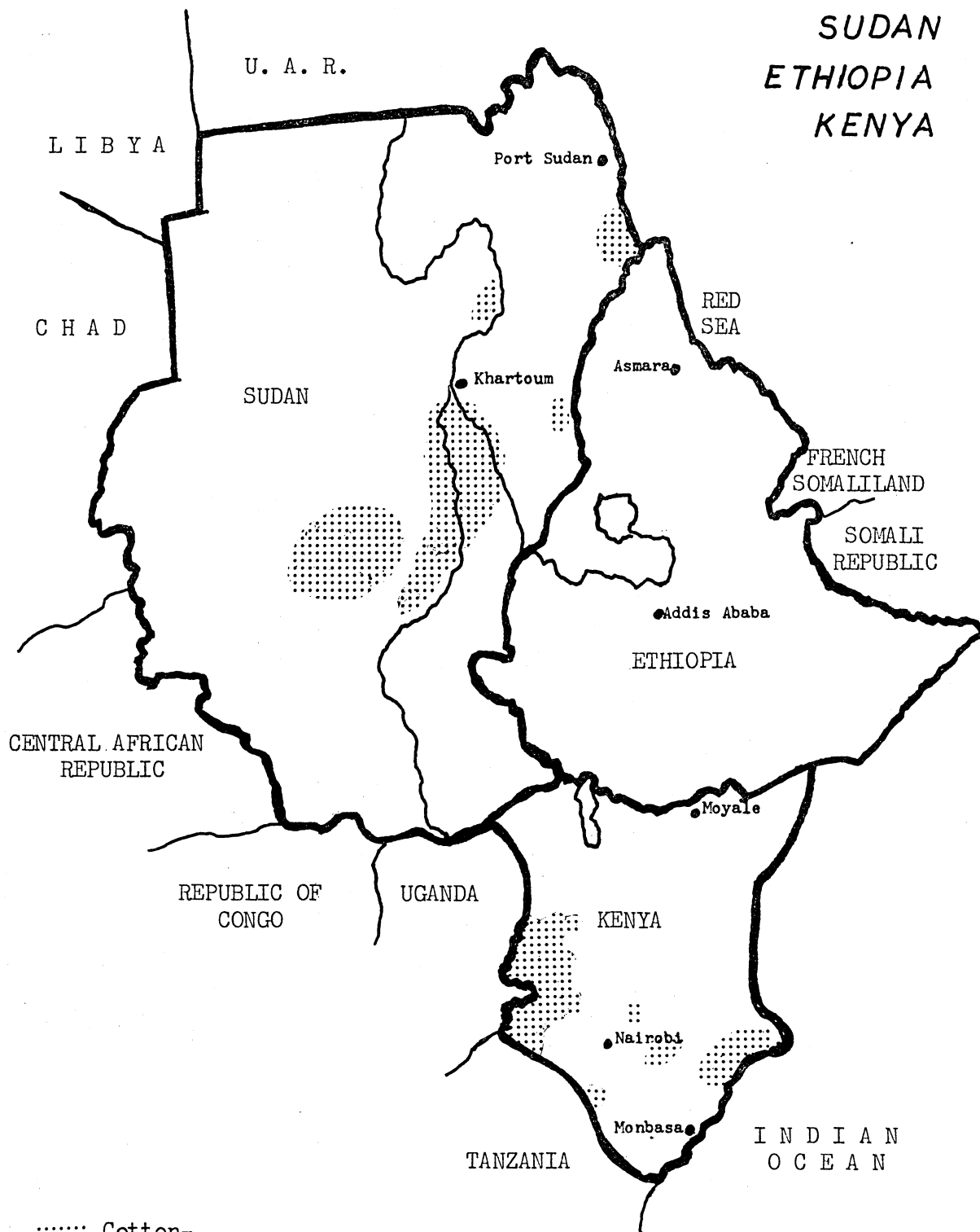
Variety	Equivalent		2.5% Span Length (Inches)	50/2.5 Uniform- ity Ratio (Percent)	Average Fiber Properties				
					Ten. Str. Thousands Psi Zero Gauge	Fineness (Micronaire Units)	Colorimeter		Shirley Non- lint Content (Percent)
	Grade	Staple					Readings		
							Rd	+b	
SATU	SIM	36.5	1.14	47	86.0	4.5	73.5	9.7	3.2
AR BP52	M	36.5	1.14	46	81.0	3.2	75.0	9.4	2.4
AR S47	SIM	36.5	1.14	47	88.7	3.8	73.8	9.5	2.7

Table 20. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN SUDAN, BY VARIETIES

Variety	Equivalent		2.5% Span Length (Inches)	50/2.5 Uniform- ity Ratio (Percent)	Average Fiber Properties				
					Ten. Str. Thousands Psi Zero Gauge	Fineness (Micronaire Units)	Colorimeter		Shirley Non- lint Content (Percent)
	Grade	Staple					Readings		
					Rd	+b			
G-6-S	(4)SLMTing	40.6	1.28	45	101.8	4.2	63.3	12.2	5.5
Girba Acala	SM Sp	32.0	1.02	44	87.9	3.5	71.0	12.9	5.1
Sakel	SLM Sp	43.0	1.37	48	98.1	3.8	68.0	11.0	3.0
Lambert	SLM Sp	42.0	1.31	46	102.9	3.8	65.5	11.8	3.5

(4) American-Egyptian grade 4.

COTTON MAP OF SUDAN ETHIOPIA KENYA




 Cotton-
Growing Areas

Figure 20.

better insect control, use of new varieties, use of more fertilizer, and the establishment of a program benefiting about 10 percent of the growers by financial assistance for land preparation and by loans.

The Government plans to produce primarily the three varieties of BPA, UKA59240, and UKA95250. If the plans are carried out, these varieties will be grown during the 1970-71 season in the following provinces: Western—BPA; Coast, Eastern, and Central—UKA59240; and Nyanza—UKA59250. Kenya had an average yield of 60 pounds per acre during the 1968-69 season. If the Government can increase the acreage and yield as planned, it is quite possible that Kenya will achieve its production goal.

Tanzania

Tanzania, located on the Indian Ocean and south of Kenya, produced an annual average of 45,000 bales during the 1934-1938 period. The growers of Tanzania then increased their production to 142,000 bales during the 1958-59 season. The 1966-67 season was the period of highest production with 365,000 bales. Production then declined to 250,000 bales for the 1968-69 season, which placed Tanzania in fourth place among the African nations growing cotton during the season. The cotton grown in Tanzania is all African upland, bred mainly in Tanzania's Research Stations. Cotton-producing areas of Tanzania are shown in figure 21.

Major African upland varieties produced in Tanzania during the 1968-69 season and their percentage of the total production are: UK 55, 39 percent; UK 61, 33 percent; UK 63, 22 percent; IL 58, 3 percent; UK 64, 2 percent; and all others, 1 percent. Average fiber property data for many of the varieties of Tanzania are given in table 21a. The average spinning data for some of the varieties of Tanzania are given in table 21b.

By 1975, cotton production in Tanzania could rise to 700,000 bales of 400 pounds (585,700 bales of 500 pounds gross weight). Reportedly, both ginning facilities and acreage would have to be increased. The emphasis is placed on the growth of new varieties which give a 10 percent to 15 percent increase in yield per acre. New strains, such as IL 66, will take about three years to produce sufficient seed for regional commercial production. Yield is also being increased through financing of full insecticide coverage, which will make possible yields of 1,000 pounds or more per acre. This insecticide coverage is being financed by the Lint and Seed Marketing Board of Tanzania.

Since the cotton is raingrown, climatic conditions will determine whether or not Tanzania reaches the established goal by the target date.

Malawi

Production in Malawi during the 1958-59 season was 13,000 bales. Over 30,000 bales were produced in Malawi during the 1964-65 season, for the record production. The 1968-69 season, production was 20,000 bales. The seed cotton is purchased by the Farmers Marketing Board from non-estate producers; and the

Table 21a. AVERAGE FIBER PROPERTIES OF COTTONS GROWN IN TANZANIA, BY VARIETIES

Variety	Average Fiber Properties							
	Equivalent		2.5% Span	50/2.5 Uniform-	Ten. Str.	Fineness	Colorimeter	
	Grade	Staple	Length (Inches)	ity Ratio (Percent)	Thousands Psi Zero Gauge	(Micronaire Units)	Readings Rd	+b
High Maturity	M+	35.0	1.10	47	81.1	4.4	75.5	10.2
UK 51/55	SM Sp	33.0	1.04	50	81.7	3.9	74.0	10.3
UK 55	SM LtSp	35.0	1.10	48	82.2	3.8	75.5	10.0
UK 58	M	35.0	1.09	47	83.6	3.7	75.5	9.0
UK 61	M+	36.0	1.12	48	76.8	3.7	75.2	9.8
UK 63	SM LtSp	36.0	1.13	48	82.5	4.0	75.0	10.2
UK 64	M+	34.0	1.08	47	85.2	3.9	76.0	9.7
IL 62	SLM+	39.0	1.18	47	82.0	3.1	75.0	8.8

Table 21b. AVERAGE SPINNING DATA OF COTTONS GROWN IN TANZANIA, BY VARIETIES

Variety	Average Spinning Test Data							
	Waste		Yarn Count	Yarn Strength (Pounds)	Break Factor	Yarn Appearance (Index)	Yarn Coefficient of Variation (Percent)	Neps Per Grain of Card Web
	Shirley Total	Picker & Card Total						
High Maturity	3.0	4.12	22's	93.8	2063	130	20.50	.17
	--	--	50's	26.9	1344	110	28.50	--
UK 55	2.0	4.12	22's	102.6	2258	130	21.37	.45
	--	--	50's	29.1	1456	130	29.13	--
UK 58	2.5	4.21	22's	98.8	2174	130	22.25	.70
	--	--	50's	29.7	1484	120	28.25	--
UK 61	2.5	4.18	22's	100.9	2221	110	20.75	.57
	--	--	50's	32.2	1608	110	25.50	--
UK 64	2.8	4.21	22's	91.5	2014	130	21.00	.16
IL 62	3.1	4.11	22's	103.4	2276	120	20.63	.78
	--	--	50's	33.5	1676	110	26.50	--

Board is charged with the marketing, packing, and handling of commercial sales. The Board is responsible for the operation of 32 cotton markets in Malawi. Future Malawian plans of expanding cotton production are not presently known.

Mozambique

Mozambique, located south of Tanzania on the Indian Ocean, produced 29,000 bales annually during the 1934-1938 period. Production reached 200,000 bales during the 1958-59 season; and, one season later, the record high for Mozambique was reached with a production of 210,000 bales. The leading variety produced in Mozambique is A-637 (about 45 percent), followed by A-618 (about 37 percent), with other varieties making up the remainder. The cotton-producing areas of Mozambique, along with major varieties, are shown in figure 21. The three districts of Zambezia, Mozambique, and Cabo Delgado produce 76 percent of the total Mozambique annual production.

Nearly 100 percent of the cotton varieties produced in Mozambique are of American upland types. Mozambique has a production goal of 300,000 bales with a target date of 1973. Measures to achieve this amount were established in the III Development Plan, which calls for a gradually increasing cotton production for the 1968-1973 quinquennium. The plan indicates a total acreage of 394,000 hectares (974,000 acres), which will require 89,000 hectares (220,000 acres) of additional acreage. This additional acreage will consist of 72,000 hectares (178,000 acres) from growers who produce cotton on 62 hectares (153 acres) and who will be encouraged to increase their acreage to 80 hectares (198 acres); 9,500 hectares (23,475 acres) from special attention paid to cotton growing in certain areas with concentrated population; and 7,500 hectares (18,533 acres) from planned farming schemes laid out by the Institute.

Increased yield will be the responsibility of the Institute's Development Services, which will work with the cotton growers in an effort to improve yield from 339 to 375 kilograms per hectare (380 to 420 pounds per acre). This increase will be achieved through the use of more adequate technical practices and rational insecticide application.

Financial support will be granted by the Cotton-Growing Development Fund, mostly to provide the Technical Guide Brigades with adequate means to meet the land clearing requirements, pest control needs, and other technical assistance.

When the Mozambique program is implemented, it is quite likely that the established goal and target date will be met.

Rhodesia

Cotton production in Rhodesia was first recorded in 1961-62 as 3,000 bales. During the 1968-69 season, production is reported as being between 70,000 bales and 114,000 bales. This increase in production is extraordinary. Cotton varieties produced are believed to be of American upland types. Cotton growing areas of Rhodesia are not known, nor are future production plans.

Republic of South Africa

Cotton production in the Republic of South Africa averaged 2,000 bales during the 1934-1938 period. During the 1958-59 season, this production increased to 36,000 bales. The season of record production was in 1964-65, with 80,000 bales, while the 1968-69 season production was 75,000 bales. Cotton-producing areas in the Republic of South Africa are shown in figure 21. Approximately 60 percent of the cotton grown is of American upland type.

Major cotton varieties and amounts produced in the Republic of South Africa during the 1968-69 season are Cape Acala, 32 percent; Alban, 27 percent; Acala 4-42, 16 percent; and all others, 25 percent. Present major cotton-producing regions in the Republic are Vaalharts (Jan Kempdorp); Northern Transvaal (Louis Trichardt, Pietersburg, Elisras, Potgietersrus, and Marble Hall); Lower Orange River (Upington); Upper Natal (Magudu); Barberton and Swaziland; and East London and King Williams Town.

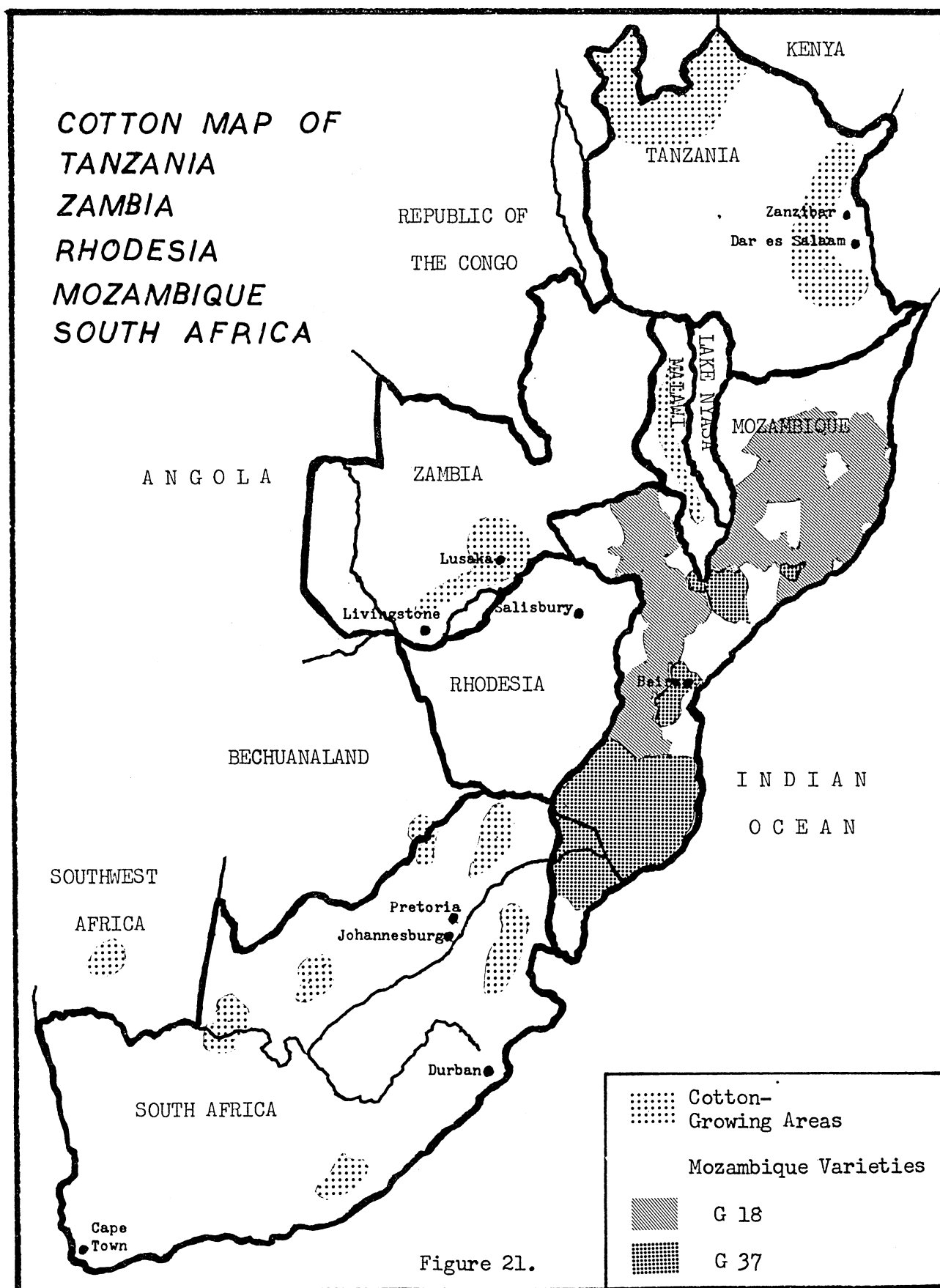
The Republic of South Africa has a production goal of 240,000 bales with no target date reported. To meet the goal, producing acreage will be increased; but the amount of the increase is not known at this time. Yield will be increased to assist in meeting the goal by use of improved varieties, by increased usage of fertilizers, and through a better insect and pest control program. A new irrigation project is being undertaken on the Orange River, and lands in this area will be set aside for cotton production. This land is expected to be under production in the next 15 to 20 years. Other acreage increases are expected in the Vaalharts and Northern Transvaal regions. Cotton varieties to be expanded under the increased production program will be Acala 4-42, Cape Acala, and Albar Static.

Cotton production in the Republic of South Africa has not been able to supply domestic consumption; and projections indicate that, even with the expanded production, cotton will still have to be imported to meet the domestic needs.

General

There are several other countries on the African Continent that produce cotton whose total production was approximately 45,000 bales during the 1968-69 season. One of these is Senegal, whose production in the 1963-64 season was about 200 bales and increased to 7,000 bales during the 1967-68 season. The Senegalese Government would like to increase production to about 21,000 bales during the 1972-73 season, which would be enough cotton to satisfy the domestic requirements anticipated. This expansion is being financed by (CFDT) The French Company for the Development of Textile Fibers and the Senegalese Government. A new gin costing \$365,000 and financed by the European Development Fund is being built at Tambacounda. A new textile complex costing \$4,900,000 is being built at Thies.

Guinea, on the west coast of Africa, would like to increase rice production for food and cotton production for a new textile mill just started, along with an increase in coffee for export revenue.



Tunisia, on the northern coast of Africa on the Mediterranean Sea, had its highest level of cotton production, 1,100 bales, in 1960; and production has since declined to an estimated 250 bales during 1966. More recent data indicate production in Tunisia may be increasing to about 500 bales. In 1968, it was reported that there were Russian cotton specialists in Tunisia to help develop the culture. Also, the presence of a Russian cotton picker at the Tunisian experiment station was reported. Rather than importing the needed cotton, the growing of upland cotton for the domestic textile industry apparently is being encouraged. Specific plans for any expansion are not known. Tunisian cotton-producing area is shown in figure 15.

Libya is reportedly doing some experimentation in the production of cotton; but there is no knowledge of any commercial cotton production or of plans to begin any such production.

COTTONS OF THE WORLD

Production

Cotton production in the world averaged 20,097,000 bales annually during the period 1914-1918. Production increased some 34 percent to reach an annual average of 26,956,000 bales during the 1924-1928 interval. The world cotton production averaged 30,645,000 bales during the 1934-1938 interval, which amounted to a 14 percent increase. By the 1958-59 season, world cotton production had increased 46 percent from the 1934-1938 average to reach 44,845,000 bales. The 1968-69 world cotton production reached almost 53,000,000 bales.

During the 1914-1918 interval, the production in the United States amounted to 62 percent of the world total. By the 1934-1938 interval, the percentage of cotton grown in the United States had decreased to slightly more than 40 percent of the world total production. During the 1958-59 season, the amount of the world total produced in the United States had decreased to 26 percent, while the 1968-69 season percentage of the world total grown in the United States was only slightly over 20 percent.

The percentages of world cotton production for the 1934-1938 period, the 1958-59 season, and the 1968-69 season grown in the six major areas of the world are shown in table 22. During the earliest period shown, the Socialist countries produced 20 percent of the world total. During the 1958-59 season, cotton produced in the Socialist countries increased to represent 35 percent of the world total. In the 1968-69 season, this amount decreased to 31 percent of the world total cotton production.

Table 23 shows the cotton production, acreage, and yield for the majority of the cotton-producing countries of the world. It includes the period of 1934-1938 and the seasons of 1958-59 and 1968-69. Also shown in table 23 are the cotton acreage and yield. Although, as indicated, the

Table 22. PERCENTAGE OF WORLD PRODUCTION FOR THREE SELECTED PERIODS AND BY THE SIX MAJOR AREAS OF THE WORLD

Area	1934-1938 Period	1958-59 Season	1968-69 Season
North America	41.8	32.0	27.3
South America	8.3	6.0	9.5
Europe	.5	1.4	1.6
U.S.S.R.	9.5	15.3	18.1
Asia & Oceania	30.8	36.0	34.6
Africa	9.1	9.3	8.9
World Total	100.0	100.0	100.0

Table 23. WORLD COTTON ACREAGE, PRODUCTION, AND YIELDS
BY COUNTRIES FOR SELECTED YEARS

Country	Year Beginning August 1								
	1934-1938			1958-59			1968-69P		
	Acreage 1,000 Acres	Produc-	Yield	Acreage 1,000 Acres	Produc-	Yield	Acreage 1,000 Acres	Produc-	Yield
		tion 1,000 Bales	Pounds Per Acre		tion 1,000 Bales	Pounds Per Acre		tion 1,000 Bales	Pounds Per Acre
<u>North America</u>									
Br. West In.	—	4	—	a	4	a	3	1	123
Costa Rica	—	—	—	a	6	a	17	20	562
El Salvador	7	4	250	132	180	653	130	200	737
Guatemala	3	1	223	69	75	520	235	365	742
Honduras	—	—	—	a	18	a	28	40	683
Mexico	679	302	216	2,552	2,345	442	1,795	2,300	613
Nicaragua	7	3	286	183	215	562	345	530	734
United States	28,400	12,389	212	11,849	11,504	466	10,175	10,915	516
(Texas)	11,222	3,361	141	5,395	4,308	383	4,125	3,473	404
Others	113	27	—	73	6	223	30	8	—
Total	29,209	12,730	214	14,858	14,353	462	12,758	14,379	535
<u>South America</u>									
Argentina	765	275	171	1,226	530	180	900	450	223
Brazil	5,181	1,793	165	4,000	1,400	184	6,500	3,350	246
Colombia	79	21	133	235	150	305	570	600	503
Ecuador	a	a	—	a	12	a	65	25	184
Paraguay	109	18	84	163	45	117	110	45	196
Peru	422	386	439	583	503	438	450	425	478
Venezuela	a	a	—	a	32	a	125	70	268
Others	94	22	—	142	6	151	14	11	—
Total	6,650	2,515	181	6,349	2,678	198	8,734	4,976	272

Table 23.—Continued

Country	Year Beginning August 1								
	1934-1938			1958-59			1968-69P		
	Acreage	Produc-	Yield	Acreage	Produc-	Yield	Acreage	Produc-	Yield
	1,000 Acres	1,000 Bales	Pounds Per Acre	1,000 Acres	1,000 Bales	Pounds Per Acre	1,000 Acres	1,000 Bales	Pounds Per Acre
<u>Europe</u>									
Albania	b	—	b	60	27	216	55	35	304
Bulgaria	b	34	b	169	65	184	125	100	382
Greece	162	75	224	402	290	342	356	395	531
Italy	38	14	202	89	38	187	20	10	240
Rumania	b	1	b	35	5	69	—	—	—
Spain	44	10	119	417	195	220	298	285	458
Yugoslavia	6	2	173	32	10	148	30	18	287
Total	354	136	183	1,204	630	221	884	843	420
<u>U.S.S.R.</u>	5,010	2,902	292	5,309	6,900	621	5,000	9,500	757
<u>Asia and Oceania</u>									
Aden	—	—	—	28	16	271	—	—	—
Afghanistan	30	16	255	160	55	134	300	100	159
Australia	a	12	a	17	7	212	88	165	901
Burma	489	95	93	300	65	104	475	90	91
Cambodia	a	—	a	a	a	a	—	5	—
China (Mainland)	7,334	3,127	207	14,142	8,700	294	12,300	6,700	260
India	24,692	5,320	88	19,926	4,220	101	20,300	5,000	118
Iran	402	161	215	640	330	245	890	690	349
Iraq	40	8	104	139	55	189	85	50	281
Israel	—	—	—	15	22	736	75	150	956

Table 23.—Continued

Country	Year Beginning August 1								
	1934-1938			1958-59			1968-69P		
	Acreage	Produc-	Yield	Acreage	Produc-	Yield	Acreage	Produc-	Yield
	1,000 Acres	tion 1,000 Bales	Pounds Per Acre	1,000 Acres	tion 1,000 Bales	Pounds Per Acre	1,000 Acres	tion 1,000 Bales	Pounds Per Acre
<u>Asia and Oceania—Continued</u>									
Korea, South	529	169	150	139	35	103	40	15	179
Pakistan	—	—	—	3,305	1,270	184	4,500	2,450	260
Syria	75	23	159	644	445	330	650	710	522
Thailand	a	7	a	a	48	a	250	160	306
Turkey	616	238	187	1,559	830	254	1,800	1,875	498
Yemen	—	—	—	a	5	a	30	18	239
Others	160	267	—	190	26	237	123	19	—
Total	34,367	9,443	128	41,204	16,129	187	41,906	18,197	207
<u>Africa</u>									
Algeria	—	—	—	a	1	a	—	5	—
Angola	52	8	84	126	38	144	100	40	191
Burundi	a	a	a	a	16	a	—	10	—
Cameroon	c	c	c	a	35	a	250	100	191
Gen. African Rep.	381c	33	45	432	75	83	330	80	116
Chad	c	c	c	589	110	89	780	200	123
Congo (Dem. Rep.)	814	155	93	864	284	138	180	50	133
Dahomey	a	a	a	a	4	a	d	30	—
Ethiopia	a	a	a	a	5	a	150	50	159
Ivory Coast	a	a	a	a	3	a	d	75	—
Kenya	64	14	89	113	15	62	200	25	60
Malawi	a	a	a	a	13	a	80	20	120
Mali	a	a	a	a	10	a	d	60	—

Table 23.—Continued

Country	Year Beginning August 1								
	1934-1938			1958-59			1968-69P		
	Acreage	Produc-	Yield	Acreage	Produc-	Yield	Acreage	Produc-	Yield
	1,000 Acres	tion 1,000 Bales	Pounds Per Acre	1,000 Acres	tion 1,000 Bales	Pounds Per Acre	1,000 Acres	tion 1,000 Bales	Pounds Per Acre
<u>Africa—Continued</u>									
Morocco	—	—	—	a	8	a	50	35	335
Mozambique	178	29	80	773	200	124	1,000	200	96
Niger	a	a	a	a	1	a	d	15	—
Nigeria	a	52	a	a	170	a	700	125	160
Rhodesia	a	a	a	a	a	a	—	70	—
South Africa	a	2	a	a	36	a	175	75	205
Sudan	427	253	275	887	585	310	1,160	875	361
Tanzania	232	45	89	400	142	170	670	250	178
Togo	a	a	a	a	8	a	d	12	—
U.A.R.	1,843	1,876	478	1,977	2,057	497	1,515	1,940	612
Uganda	1,460	278	89	2,014	336	80	2,000	285	60
Upper Volta	a	a	a	a	5	a	d	35	—
Others	740	53	—	1,125	7	—	880	23	—
Total	6,191	2,798	213	9,300	4,164	214	10,220	4,685	218
World Total	81,781	30,645	180	78,224	44,845	274	80,502	52,580	311
Socialist Countries	12,448	6,271	—	19,735	15,711	380	18,550	16,350	421
Elsewhere	69,333	24,374	—	58,489	29,134	238	61,952	36,230	278

P - Preliminary.

a Included in Others.

b Included in Total.

c Cameroon and Chad included in Central African Republic (formerly French Equatorial Africa).

d Included in Nigeria.

Source: Quarterly bulletin of the International Cotton Advisory Committee, Cotton—World Statistics, April 1969, and production reports from cotton-producing nations of the world.

cotton production in the world has consistently increased; the total acreage planted to cotton has not. In fact, the acreage planted during the 1958-59 and 1968-69 seasons was actually less than was planted on an annual average during the 1934-1938 period when the total amounted to 81,781,000 acres. Thus as acreage has decreased slightly and production has increased for these periods, the yield per acre has increased from 180 pounds in 1934-1938 to 274 pounds in the 1958-59 season, and to 312 pounds during the 1968-69 season. With the passage of each season, the yield per acre will increase even more due to an increase in the amount of cotton being grown under irrigation and the application of more fertilizers and utilization of modern cultural practices throughout the world.

Shown below are the production shares of the largest cotton-producing nations of the world for the 1934-1938 period and the 1958-59 and 1968-69 seasons, stated in percentage and in millions of bales:

<u>Largest Cotton- Producing Nations</u>	<u>1934-1938 Period</u>	<u>Nations</u>	<u>1958-59 Season</u>	<u>Nations</u>	<u>1968-69 Season</u>
1. United States	40.4%	U.S.A.	25.7%	U.S.A.	20.8%
2. India	17.4%	China (M)	19.4%	U.S.S.R.	18.1%
3. China (Mainland)	10.2%	U.S.S.R.	15.4%	China (M)	12.7%
4. U.S.S.R.	9.4%	India	9.4%	India	9.5%
Total	77.4%	Total	69.9%	Total	61.1%
Combined Production in Millions of Bales	23.7		31.3		32.1

The combined production of these four nations has increased 8.4 million bales from the 1934-1938 period to the 1968-69 season, and yet their combined percentage of the world total production has declined. Thus the production in other parts of the world has increased at a faster rate. The United States production, when compared with the annual average for the 1934-1938 period, actually has decreased about 1.5 million bales in the 1968-69 season.

The world and United States acreage and production for selected periods is shown in table 24. Also included are United States acreage and production world-percentage figures. The final United States average yield for the 1968-69 season was 516 pounds per harvested acre. Production during the 1968-69 season equaled current world consumption. Production increases occurred in the medium and long staple cottons of the world during the season.

Demand

Demand for cotton is determined by price (which will be discussed later) and consumption. Every cotton grower hopes that his cotton will be consumed. Cotton consumption in the United States has been over 8 million bales annually since 1939. United States annual consumption during the period of 1951 through 1968 averaged between 8.5 and 9.5 million bales. The 1950 consumption was 10.5 million bales, and the highest consumption of cotton in the

Table 24. UNITED STATES SHARE IN WORLD COTTON ACREAGE AND PRODUCTION
FOR 1934-1938 PERIOD AND 1953-54, 1958-59, AND 1968-69 SEASONS

Acreage			
Year	World (Thousands of Acres)	United States (Thousands of Acres)	U.S. as a Percentage of World Total
1934-1938	81,781	28,400	34.7
1953-54	79,819	24,341	30.5
1958-59	78,224	11,858	15.1
1968-69	80,502	10,160	12.6

Production			
Year	World (Thousands of Bales)	United States (Thousands of Bales)	U.S. as a Percentage of World Total
1934-1938	30,644	12,586	41.1
1953-54	41,588	16,402	39.4
1958-59	44,845	11,504	25.7
1968-69	52,586	10,948	20.8

Source: Data adapted from International Cotton Advisory Committee
"Monthly Cotton Review," April 1969 and others.

United States was during the years of 1941 and 1943 when consumption exceeded 11 million bales. The continuing increase in cotton consumption that is taking place in the world is not occurring in the United States. The population in the United States is increasing annually; and even the per capita consumption of all fibers in the nation is increasing, reportedly at 50.9 pounds per person for 1968. But cotton is not increasing as a part of total consumption in the United States, nor on a per capita basis. In fact, the per capita figure for 1968 is 22.0 pounds of cotton per person; this represents 43.2 percent of the per capita consumption of all fibers for the year.

World cotton consumption is still increasing almost annually and reached 52.6 million bales during the 1967-68 season. The United States consumption for the same year represented only a little over 17 percent of the world total. This information for selected years is shown in table 25, along with the percentage that United States cotton is of total foreign consumption and the percentage that the consumption of all United States cotton represents of the world total. Below the table are shown what United States domestic consumption and United States cotton consumption (domestic and foreign) would currently be if the United States cotton consumed still maintained its percentage of total world consumption of previous years.

Table 26 lists the world mill consumption of cotton, wool, rayon, and other man-made fibers in thousands of metric tons for the years 1952 through 1967. World consumption, and thus demand for all fibers, has increased 561,000 metric tons annually for the period 1952-1967. Of this total average annual increase, cotton represented 247,000 tons; wool, about 20,000 tons; rayon (filament 34,000 and staple 79,000), 113 tons; and other man-made fibers, 181,000 tons. The greatest demand for cotton (or cotton consumption) is in those countries that are involved in the transition from agricultural nations to industrial nations; for, as the people acquire more money that can be spent on the necessities and the luxuries of life, the demand for cotton increases.

Consumption, or the demand, of cotton depends on the ability of a nation to convert raw cotton into fabric. World cotton spindles in 1939 were reported at a total of 147,648,000. By 1958, this number had decreased to 134,371,000 cotton spindles. The 1966 world figure for cotton spindles was reported as 132,830,000 spindles. At first glance, one notices the decrease in the number of cotton spindles over the intervening years and imagines that cotton consumption has gone down also. Such is not the case, as the modern-day cotton spindles are much more efficient and have a much greater production capacity per hour than those of previous years. Thus fewer modern-day spindles are required today to process larger amounts of cotton. The percentage of cotton spindles in various areas of the world for the years 1939, 1958, and 1966 is shown in figure 22. As the agricultural nations of the world industrialize, the areas in which spindles are located receive a larger portion of the world total.

World cotton consumption for the years of 1939, 1958, and 1967 amounted to 30,116,000 bales, 45,664,000 bales, and 52,600,000 bales, respectively. The percentage that cotton consumption in the various areas of the world represented in relation to total world consumption for the three years is shown in figure 23. World demand for cotton should continue to increase for the next ten years, but the rate of increase will probably decline from the year 1975 on.

Table 25. CONSUMPTION OF UNITED STATES COTTON IN THE WORLD

Year	U.S. Consumption as Percent of World Consumption	U.S. Cotton Consumed in Foreign Countries as Percent of Their Consumption	All U.S. Cotton Consumed as Percent of World Consumption
1920	27.3	46.9	59.3
1925	25.0	45.4	56.2
1930	21.8	39.7	50.0
1935	21.8	26.6	42.6
1940	32.5	5.5	36.2
1945	36.5	23.4	50.9
1950	29.8	15.9	41.5
1951	26.1	21.4	41.7
1952	25.5	10.7	33.7
1953	21.9	12.4	31.5
1954	22.1	11.1	30.7
1955	22.2	6.9	27.6
1956	19.9	22.0	37.4
1957	17.9	16.3	30.6
1958	19.0	25.1	25.0
1959	18.6	18.7	33.5
1960	17.6	17.1	31.7
1961	19.5	13.3	30.2
1962	18.6	9.1	26.1
1963	18.1	14.5	29.9
1964	18.3	9.9	26.4
1965	18.6	7.1	24.4
1966	18.1	10.9	27.1
1967	17.0	9.6	25.0
1968E	15.6	6.0	20.3

E - Estimated.

U.S. domestic consumption, if current consumption equaled:

25% of world consumption as it did in the 1920's, 1950, 1951, and 1952, would be 13.0 million bales.

22% of world consumption as it did in the mid-1950's and other periods, would be 11.6 million bales.

U.S. consumption (domestic and exports), if current consumption equaled:

50% of world consumption as it did in the 1920's, would be 26.4 million bales.

40% of world consumption as it did in the early 1950's, would be 21.1 million bales.

30% of world consumption as it did in the mid-1950's, would be 15.9 million bales.

Table 26. WORLD MILL CONSUMPTION OF FIBERS, 1,000 OF METRIC TONS

Year	Cotton	Wool	Rayon		Other Man-Made Fibers	Total
			Filament Yarn	Staple		
1952	7,670	1,088	831	773	151	10,513
1953	8,221	1,220	947	930	184	11,502
1954	8,534	1,182	926	1,111	225	11,978
1955	8,728	1,226	1,047	1,237	302	12,540
1956	9,100	1,322	1,021	1,361	308	13,112
1957	9,310	1,360	1,052	1,419	409	13,550
1958	9,550	1,276	959	1,315	419	13,519
1959	10,150	1,446	1,093	1,419	576	14,684
1960	10,360	1,495	1,131	1,469	702	15,157
1961	10,090	1,505	1,135	1,547	830	15,107
1962	9,880	1,501	1,201	1,655	1,080	15,317
1963	10,000	1,475	1,231	1,819	1,331	15,856
1964	10,540	1,460	1,329	1,950	1,687	16,966
1965	10,940	1,473	1,368	1,956	2,046	17,783
1966	11,160	1,539	1,373	1,965	2,479	18,516
1967	11,370	1,463	1,340	1,965	2,865	19,003

Source: Quarterly bulletin of the International Cotton Advisory Committee, Cotton—World Statistics, April 1969.

PERCENTAGE OF COTTON SPINNING SPINDLES BY AREAS
FOR 1939, 1958, AND 1966

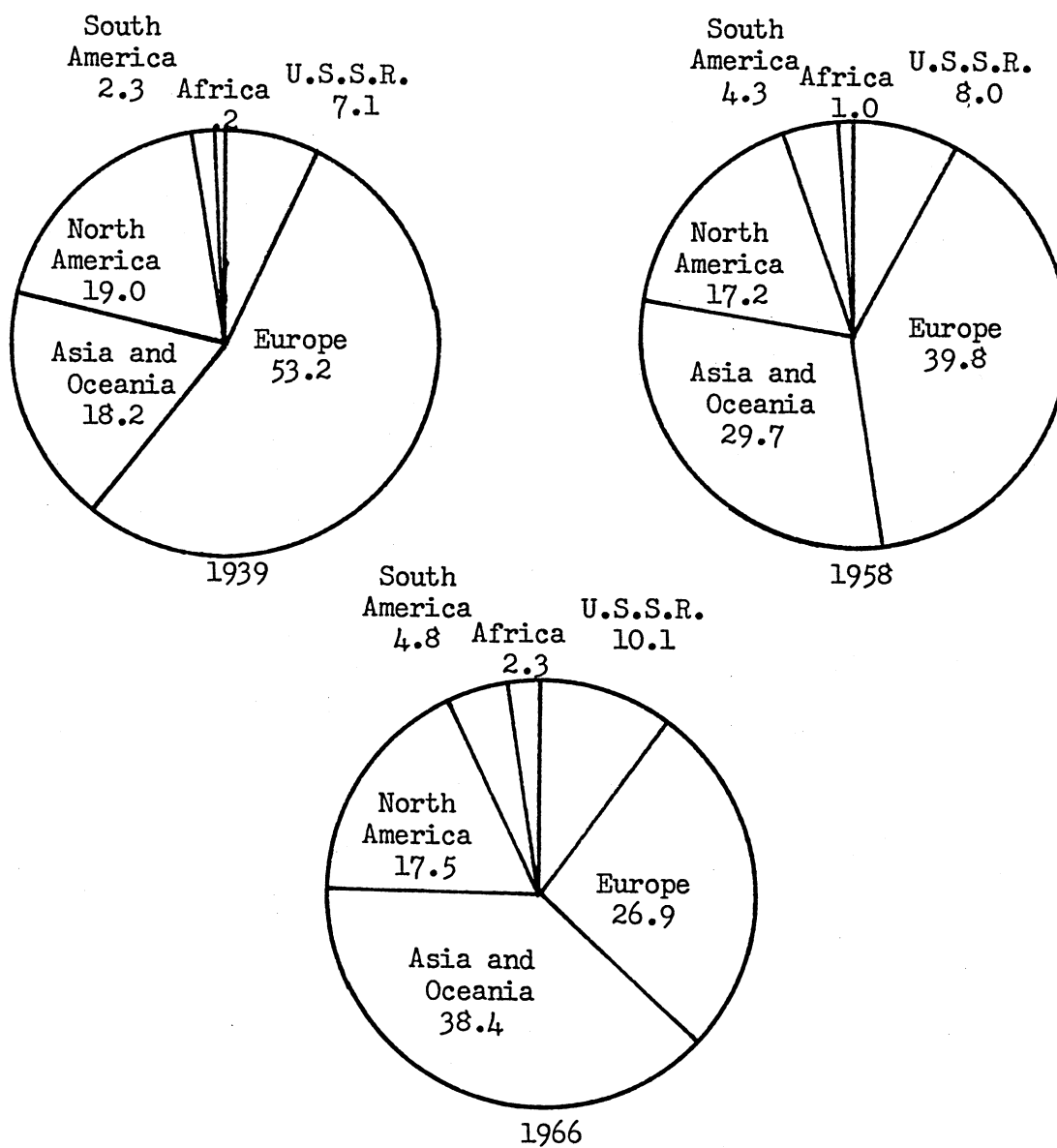


Figure 22.

PERCENT OF COTTON CONSUMPTION BY AREAS FOR 1939, 1958, AND 1967

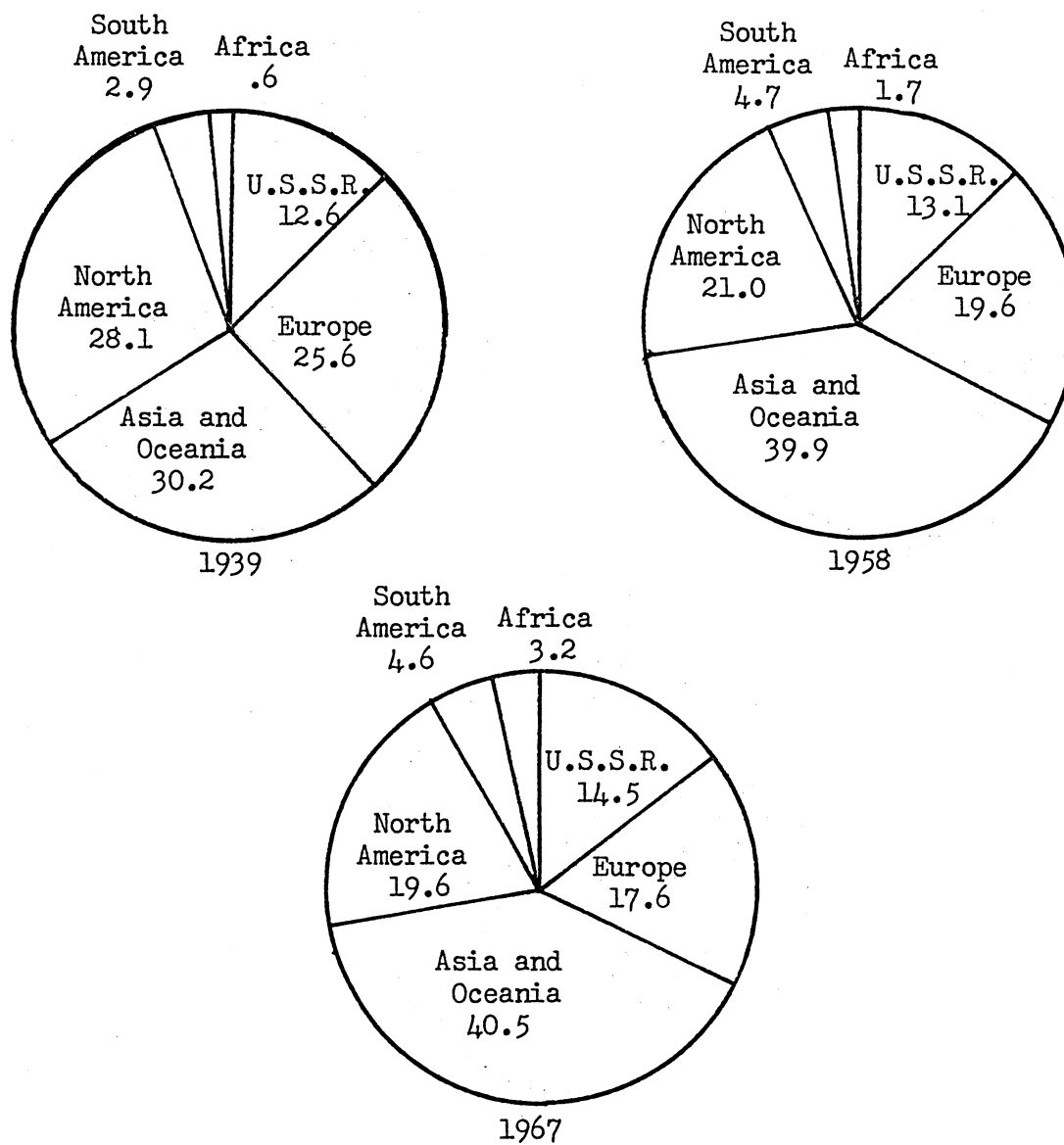


Figure 23.

Because of the competition from synthetic fibers, the demand for cotton is much more specialized now than it was ten years ago. The mills now need cottons with a particular length, fineness, grade, and tensile strength. This is particularly true with the cottons that are blended with the synthetic fibers. More cottons with longer lengths and fineness in the range of 3.5 through 4.9 micronaire units and tensile strength or 80,000 psi or better are being produced all over the world to meet this demand. Future demand for both general and specific cottons beyond the year 1980 will depend, to a great extent, on the research that is being carried on today.

Price

Price of cotton in the world market depends mainly on supply and demand. When the supply of any given cotton is short and the demand is high, the price will rise. In a sense, this is what happened during the 1968-69 season in the United States. Mill and merchant interests called for longer staple growths in the fineness range of 3.5 through 4.9 micronaire units with more strength and better quality during the 1967-68 season. The United States producers obliged in 1968-69 and produced one of the longest staple length crops in the history of the country. In addition, production of medium and long staple cottons in Brazil, Colombia, Iran, Mexico, and Syria also increased to create a plentiful supply of these cottons both in the United States domestic market and in the world market. As a result, a downward trend in prices for better quality cottons occurred in all world markets from December 1968 through February 1969. However, some strengthening of prices for some growths in this group occurred in mid-February. Also, prices for some growths produced in Central America and Iranian high grades began to increase after February.

Since world production during the 1968-69 season appears to have leveled off at an amount equal to world consumption, the price of cotton should become stable on the world market and perhaps advance slightly. Not much advance is foreseen, however, as most spinners throughout the world have at least a three month's supply of cotton on hand, except for small lots needed to fill unexpected orders, which will take them to the end of the current season. Prices of the longer growths declined more than did the prices of the medium staple growths. This was because of the increased production and supply of the longer staple growths during the season and the decline in the production and supply of medium staples, particularly in the United States.

The average United States loan price in cents per pound for Middling one inch growths for the seasons 1951-52 through 1968-69 (preliminary) is in column one of table 27. Also included in the table are C.I.F. seasonal average price quotations in cents per pound, where data were available, for many of the major cotton growths of the world for the corresponding seasons.

Studies by the USDA have indicated that a one-million-bale change in world stocks of cotton creates an opposite change in the price of cotton amounting to 1.1 cents per pound. Thus if stocks increase, prices decrease as they did during the 1968-69 season until February when prices firmed up. Foreign production change of one million bales causes an opposite price change amounting to 1.2 cents per pound. Price of cotton is important and often should be compared with the price of man-made fibers. Direct per-pound price

Table 27. AVERAGE C.I.F. QUOTATIONS AT LIVERPOOL, ENGLAND IN UNITED STATES CENTS PER POUND
FOR 1951-52 SEASON TO DATE BY SELECTED GROWTHS

Season	U.S. Loan* M 1"	U.S. Orleans/Tex. M 1"	Pakistan 289F	Punjab S.G. Brazil	Sao Paulo Type 5 1-1/32"	U.S. Memphis Terr. SM 1-1/16"	Mexico SM 1-1/16"	Syria SM 1-1/16"	Iran SM 1-1/16"	Nicaragua SM 1-1/16"	Greece SM 1-1/16"	U.S.S.R. SM 1-1/16"	U.S. California SM 1-3/32"	Uganda B.P. 52	Peru Tanguis Type 3
1951-52	32.36	43.46	58.21	55.75	46.16	43.67	46.69	—	—	—	—	—	46.04	56.40	48.55
1952-53	32.41	38.36	39.08	50.47a	41.14	39.66	37.96a	—	—	—	—	—	41.20	42.10	39.54
1953-54	33.50	36.99	39.63	34.31	39.62	38.01	38.54	—	—	—	—	—	39.75	43.64a	40.75
1954-55	34.03	37.59	40.08	37.31	40.68	39.10	38.24	—	—	—	—	—	41.19	44.19	41.28
1955-56	34.55	32.95	34.95	32.53	39.75	35.03	34.76	34.79a	—	—	—	34.69a	40.28	42.96	37.89
1956-57	32.74	28.38	34.23	30.14a	33.35	32.63	32.43	33.08a	—	—	—	32.75	34.91	43.65	42.44a
1957-58	32.31	28.86	33.89	28.66a	35.79	33.81	33.65	33.44	32.28	—	—	34.60a	36.70	37.92	37.98a
1958-59	35.08	28.18	30.64	—	32.70	—	28.84	29.18	27.63	—	—	28.88a	32.95	32.87	31.89
1959-60	34.10	26.45	30.55	30.55	29.75	29.30	29.42	29.56a	28.43	29.91a	29.16	30.75	36.72	37.10a	—
1960-61	34.42	28.15	32.02	27.80a	31.08	30.35	30.82	30.58	29.81	31.09a	30.82	32.80	36.95	32.95	—
1961-62	33.04	28.95	32.73	27.53a	31.22	30.08	30.61	30.53	29.93	30.16	30.77	32.74	—	32.81	—
1962-63	32.47	27.92	29.70	26.35	30.55	29.11	29.47	29.63	28.89	29.40	—	32.07	33.98	34.04	—
1963-64	32.47	26.84	28.29	26.27	29.52	29.52	29.37	29.76	28.59	29.69	29.86	33.08a	36.06	36.71	—
1964-65	30.00	27.13	29.10	26.17a	29.88	29.19	29.30	29.32	27.65	29.83	29.71	35.83	36.05	35.79	—
1965-66	29.00	26.13	27.95	24.95a	29.27	28.27	—	28.07a	27.10	29.09	29.03	33.41a	31.91	34.02	—
1966-67	21.20	25.11	26.01	24.77	28.72	29.34a	28.18	28.95	27.60	28.91	30.02	33.47a	32.02	39.01	—
1967-68	20.55	27.49	26.33	27.84a	33.76	31.92	32.17	32.03a	30.42	31.35	33.25	39.75a	36.72	37.89	—
1968-69P	20.60	27.22	26.20	25.10	31.15	29.17	30.93	30.50b	27.40	31.84	31.08	34.84	36.98	33.15	—
Approximate Staple in 32nd Inch	32	32	32	33	34	34	34	34	34	34	34	35	36	38	—

* This is U.S. Government loan price, not C.I.F. Liverpool, and includes micronaire premiums where applicable.
a - Average less than 12 months.
b - Average less than 8 months.
P - Partial, August-March.

Source: Quarterly bulletin of the International Cotton Advisory Committee, Cotton—World Statistics, April 1969, and USDA Cotton Price Statistics.

comparison between man-made fibers and cotton can be useless unless one realizes that one pound of cotton contains more waste than does a pound of man-made fibers. Thus to make correct price comparisons, prices should be on the basis of cotton equivalent. Below are comparisons with regular per-pound prices and prices on the cotton equivalent basis. Prices are April 1969 United States averages.

<u>Fiber</u>	<u>Regular Price Per Pound</u>	<u>Cotton Equiva- lent Basis*</u>
Cotton, Strict		
Middling 1-1/16"	\$0.31	\$0.35
Rayon	.28	.29
Rayon, modified	.38	.40
Polyester	.61	.51
Acrylic	.68	.57

* Cotton equivalent--regular price converted to cotton equivalents as follows: cotton + 0.88, rayon + 0.96, and non-cellulosic + 1.19.

Source: USDA, ERS, Cotton Situation, CS-241, May 1969.

It should be noted that the price differential between cotton and polyester on a cotton equivalent basis was just 16 cents a pound in 1969, while two years ago this differential for the same month was 29 cents a pound. Here is concrete proof of one reason for the increased usage of polyester with or in place of cotton in many of the products that were once manufactured solely from cotton. Price is all important in the sale of cotton, or any fiber for that matter, in the manufacture of textiles.

Price of cotton is influenced by supply and demand; but it must not be forgotten that for cotton to maintain its position in the world market, it must be cheaper than man-made fibers. As the production of man-made fibers increases, the cost of these fibers decreases. For increased production means a lesser cost per pound of the fiber produced, for the synthetic fiber industry operates on a cost-volume basis. If they can increase production with the same amount of equipment, the cost of production pound-wise decreases.

Price of cotton is also influenced by Government legislation in many countries of the world that produce cotton. Governments may protect their cotton producers by preventing importation of foreign growths, or they may offer a bounty to cotton producers, in an effort to assure their textile industries a domestic supply of raw material. A government may support the price of cotton to assist the producer in making a living producing cotton. Or they may finance the exportation of cotton to achieve the same end.

The United States Government, during the past two seasons and during the 1968-69 season, has supported the price of cotton produced and has reduced the amount of cotton produced by diversionary payments to the producer in an effort to reduce the large carryover of 16,574,000 bales at the beginning of the 1966-67 season. This was accomplished during

these three years so that the 1969-70 government program will not include a diversionary payment. As a result, production in the United States is expected to increase above the 1968-69 level to over 12.0 million bales, if weather is favorable. Price support loan level for cotton of the 1969-70 season in the United States is at 20.25 cents a pound at average locations, which is the same as it was for the 1967-68 and 1968-69 seasons. The price support payment for the 1969-70 season is 14.73 cents per pound, up 2.49 cents a pound from the 1968-69 season level.

The exportation of United States cotton is financed under Public Law 480, commonly called PL 480, and Export-Import Bank credits. The exportation of United States cotton during the 1968-69 season was down due to many reasons, among which are prices and a shipping strike. Unused funds through mid-March for the exporting of cotton from the United States for the 1968-69 season could cover the exporting of 1.5 million bales. The PL 480 export authorizations are down from a year ago, while Export-Import Bank credits issued were higher.

Future

Production of cottons in the world has been continually shifting to the production of 1-1/16" lengths from the 1" lengths of the past; and without much doubt, this trend will continue. At the same time, the varieties being grown throughout the world have been shifting to the upland types, particularly the American upland types of 1-1/16" length. To indicate the changes that have taken place in relation to the cottons being grown according to basic types, table 28 was constructed. In this table are shown the estimated share of the world in bales and percent for American, Asiatic, Egyptian, Peruvian, Sea Island, and perennial types of cotton for the 1934-1938 period and the 1953-54 and 1968-69 seasons. Also shown are the major production areas where these types are grown.

Since cotton is one of the most important agricultural products to many nations as a source of foreign exchange and as a moderate-to-high income producer for the grower, its production will continue for several decades on a fairly world-wide basis. Countries which can grow cotton economically will try to increase their production wherein possible. This is particularly true for those countries which are trying to increase their standard of living and make the transition from an agricultural nation to an industrial nation.

To indicate on a world-wide basis the planned expansion of cotton production of such nations and their possible dates of accomplishing such an undertaking, table 29 has been constructed. The present and past production figures for each country are given, along with the estimated production goal for the country and target date of expected accomplishment. Methods of accomplishing the expected production goals are given as well as remarks pertaining to their ability to accomplish the goal and target date and other information.

Table 28. ESTIMATED SHARE OF THE MARKET TYPES OF COTTON IN WORLD PRODUCTION

Market Type of Cotton	1934-38		1953-54		1968-69		Major Areas of Production
	Produc- tion, 1,000 Bales	Percent of World Total	Produc- tion, 1,000 Bales	Percent of World Total	Produc- tion, 1,000 Bales	Percent of World Total	
American	21,450	69.99	32,286	77.52	42,077	80.01	United States, Mexico, Brazil, China (Mainland), Argentina, India, Pakistan, Turkey, Syria, Uganda, U.S.S.R.
Asiatic ^a	5,461	17.82	5,139	12.34	6,115	11.63	India, Pakistan, China (Mainland), Burma, Thailand, Iran, Turkey, Korea
Egyptian	2,464	8.04	2,969	7.13	3,087	5.87	Egypt, Sudan, U.S., Peru
Peruvian	396	1.29	569	1.37	497	.95	Peru
Sea Island	4	.02	7	.02	2	*	British West Indies, Puerto Rico
Perennial Tree Cottons ^b	870	2.84	679	1.62	808	1.54	Northern Brazil, Colombia, Ecuador, Haiti
Total	30,645	100.00	41,649	100.00	52,586	100.00	World

a - Includes some cottons which are crosses between American and Asiatic types, but are still included as Asiatic types on the basis of their fiber characters.

b - The perennial cottons included in this category are those which cannot be properly included in any of the five market types.

* Less than .005 percent.

Source: Total production figures have been taken from International Cotton Advisory Committee Cotton—World Statistics, April 1969. A number of different sources have been used to split the production by market types.

Table 29. COTTON PRODUCTION PROSPECTS IN SELECTED COUNTRIES

Country	1,000 Bales		Expected Date of Achievement	Proposed Measures for Achieving the Target Production	Remarks
	Production	Target Level of Production			
North America					
<u>Mexico</u>	1953-54 - 1,210 1958-59 - 2,345 1968-69 - 2,300	None	--	None, stable acreage 2.0 to 2.4 million.	Farmer plants or not as he sees fit.
<u>El Salvador</u>	1953-54 - 59 1958-59 - 180 1968-69 - 200	225	1969	Increased acreage and insect control.	People desire to stabilize acreage at 173,000 to 216,250 acres.
<u>Guatemala</u>	1953-54 - 28 1958-59 - 75 1968-69 - 365	None	--	New land, increased yield.	No specific goal set. But increased yield hoped for through improved practices.
South America					
<u>Brazil</u>	1953-54 - 1,425 1958-59 - 1,400 1968-69 - 3,350	None	--		South Brazil changing to IAC-13 variety. Forecast indicates Brazilian production will increase.
<u>Peru</u>	1953-54 - 430 1958-59 - 503 1968-69 - 425	None	--		Production associated with world demand and price.
<u>Argentina</u>	1953-54 - 651 1958-59 - 530 1968-69 - 450	669	1974	Increased acreage and yield.	Attempting to return to production figures of 1957-58.
<u>Ecuador</u>	1953-54 - 12 1958-59 - 12 1968-69 - 25	45	1973	Increased acreage and yield	Goal is quite possible. Approach is to use new acreage for medium and longer staple cottons.

Table 29.—Continued

Country	1,000 Bales		Target Level of Production	Expected Date of Achievement	Proposed Measures for Achieving the Target Production	Remarks
	Production					
<u>South America--Continued</u>						
<u>Venezuela</u>	1953-54 -	13	None	--	Increased acreage and yield.	Govt. hopes it can become self sufficient as to needs of cotton by 1975.
<u>Europe</u>						
<u>Spain</u>	1953-54 -	80	450	1972	Increased acreage and yield.	Shifting to newer varieties and irrigation.
	1958-59 -	195				
	1968-69 -	285				
<u>U.S.S.R.</u>	1953-54 -	6,100	10,000	1970	Reclaim land and increase irrigation.	Should be accomplished without too much difficulty.
	1958-59 -	6,900				
	1968-69 -	9,500				
<u>Asia and Oceania</u>						
<u>Australia</u>	1953-54 -	3	None	--	Bounty payments to increase production.	Per-pound payments decreasing annually as production increases.
	1958-59 -	7				
	1968-69 -	165				
<u>Pakistan</u>	1953-54 -	1,175	3,500	1970	Higher yields, insect control, better varieties.	No change in acreage planned, improved cultural practices.
	1958-59 -	1,270				
	1968-69 -	2,450				
<u>India</u>	1953-54 -	3,770	6,650	1974	Higher yields.	By use of increased irrigation, fertilization, insect control and better varieties.
	1958-59 -	4,220				
	1968-69 -	5,000				
<u>Turkey</u>	1953-54 -	600	5,300	2000	Higher yields and acreage	Better varieties, more fertilizer, modern equipment, insect control.
	1958-59 -	830				
	1968-69 -	1,875				

Table 29.—Continued

Country	1,000 Bales		Expected Date of Achievement	Proposed Measures for Achieving the Target Production	Remarks	
	Production	Target Level of Production				
Asia and Oceania--Continued						
<u>Iraq</u>	1953-54 -	11	159	1971	Higher yield and acreage.	Better seed, more fertil- izer, insect control and weed control.
	1958-59 -	55				
	1968-69 -	50				
<u>Thailand</u>	1953-54 -	35	None	--		Govt. is helping to in- crease production through research, breeding, credit to meet consumption.
	1958-59 -	48				
	1968-69 -	160				
<u>Iran</u>	1953-54 -	230	800	1972	New land and higher yields.	To be accomplished by use of better seed, more fer- tilizer and pest control.
	1958-59 -	330				
	1968-69 -	690				
Africa						
<u>Uganda</u>	1953-54 -	320	575	1971	Increased yield.	Better insect control, more fertilizer and variety changes.
	1958-59 -	336				
	1968-69 -	285				
<u>Sudan</u>	1953-54 -	410	None	--	Land reclamation and irrigation.	Ten-year plan calls for 60% increase in long staple cotton.
	1958-59 -	585				
	1968-69 -	875				
<u>Kenya</u>	1953-54 -		45	1974	New land, increased yield.	Better insect control, new varieties, more fertilizer, loans.
	1958-59 -	15				
	1968-69 -	25				
<u>Congo</u>	1953-54 -	225	82	1969	Reclaimed land.	In 1960, at time of Congo's independence and rebellion, large amounts of land left abandoned. Govt. attempting to return people to land to return production.
	1958-59 -	284				
	1968-69 -	50				

Table 29.--Continued

Country	1,000 Bales		Expected Date of Achievement	Proposed Measures for Achieving the Target Production	Remarks	
	Production	Target Level of Production				
<u>Africa--Continued</u>						
<u>Morocco</u>	1953-54 -		55	1972	Increased acreage and yield.	Better producing varieties.
	1958-59 -	8				
	1968-69 -	35				
<u>Ivory Coast</u>	1953-54 -		150	1971	New varieties and acreage.	Govt. promoting cotton to remove dependance on coffee and cocoa.
	1958-59 -	3				
	1968-69 -	75				
<u>Nigeria</u>	1953-54 -	130	539	1980	Return producers to growing cotton on land which used to be used for that purpose.	Current crop down due unfavorable price, weather and civil war.
	1958-59 -	170				
	1968-69 -	125				
<u>Mozambique</u>	1953-54 -	151	300	1973	Increased acreage and yield.	Clear land, technical assistance and pest control.
	1958-59 -	200				
	1968-69 -	200				
<u>Republic of South Africa</u>	1953-54 -	20	240	--	Better varieties, more acreage and higher yield.	Increase use of fertilizer, better pest and insect control, irrigated land.
	1958-59 -	36				
	1968-69 -	75				
<u>Tanzania</u>	1953-54 -	42	586	1975	Increased acreage, new strains.	Depends on weather conditions.
	1958-59 -	142				
	1968-69 -	250				
<u>Dahomey</u>	1953-54 -		75	1970	Increased use of Allen strains and improved cultural practices.	Handicapped by decreased world price.
	1958-59 -	4				
	1968-69 -	30				

Note: 1968-69 preliminary figures.

Data on some major cotton-producing nations are also included in table 29 even though they may not have a planned expansion but might be planning a change in the varieties planted or other changes which might affect cotton production in their nation, and thus affect total world production. Based on the production goals in table 29 and the target dates, the table below was developed:

World Planned Production Increase by Target Years in Bales

<u>Target Date</u> <u>Year</u>	<u>Amount to be</u> <u>Increased by Year</u>	<u>Accumulated Planned</u> <u>Increase to Year</u>
1969	57,000	57,000
1970	1,595,000	1,652,000
1971	474,000	2,126,000
1972	295,000	2,421,000
1973	120,000	2,541,000
1974	1,889,000	4,430,000
1975	338,000	4,768,000
2000	2,165,000	6,933,000

Production annually has increased about 810,000 bales, on an average, for the last ten-year period. Thus the planned production increase starting with the 1968 crop as noted above is entirely within the amount of increase experienced over the last ten years. While foreign nations are planning this expansion in cotton production, the United States and foreign producers of man-made fibers are also planning the expansion of their production, which may, depending on price, tend to offset the planned increased cotton production in the world.

SUMMARY

World cotton production and consumption is in near-perfect balance this crop year of 1968-69, the magic figure being 52,600,000 bales of cotton. This is not the world's largest production, but it is the world's largest consumption. The world's highest production was 53.9 million bales in 1965-66.

The growers of cotton-producing nations are nearly all shifting to modern upland varieties with better fiber properties and higher yield, factors which, for the most part, the spinners of the world have indicated that they want. The specialty cottons such as Peruvian, Egyptian, and others are all being produced; but the demand for them is not growing at the same rate as for the standard "bread and butter" cottons. Formerly the bread and butter cottons were those of medium staple lengths of about one inch. Modern-day bread and butter cottons are those with a staple length of approximately 1-1/16". The modern textile machinery requires longer cottons with better fiber properties in order to spin yarn at the modern-day high speeds of production. The increased utilization of man-made fibers in blends with cotton also necessitates the utilization of longer cottons.

In other words, growers are producing the cottons that the spinners of the world want. Thus, for the most part, cottons from the various nations compete for the same markets. In fact, the same varieties are grown in many different cotton-producing nations. Fifteen of the cotton-producing nations from whom cotton samples were obtained were selected to show the varieties of cotton produced and the fiber property data for these varieties. This information has been assembled in table 30.

Growers the world over are increasing their yield per acre by use of more fertilizers, irrigation, insecticides, herbicides, better seed, newer varieties with better qualities, and other modern cultural practices. This has one purpose, to produce as much cotton as possible as cheaply as possible in order to obtain as much financial return as possible to the grower and the nation. Thus, as noted in table 29, many nations are planning to increase their production.

This interplay of cottons for world markets was noted in the United States during the 1968-69 season. Prices of foreign growths, particularly from Nigeria, Chad, Ivory Coast, Cameroon, Colombia, and Sao Paulo, Brazil, plus others in the staple lengths around 1-1/16" and with grades GM through SLM, have been under the prices of American 1-1/16" lengths and equivalent grades landed in European markets. This was particularly true for California growths. This resulted in a decreased sale and export of American cottons. The European spinners have been using these foreign growths because of the cheaper price, known origin, known variety, handpicked cottons, and single variety per lot, to name but a few of the reasons. The cheaper price is, of course, the primary reason; but American growers and merchandisers should closely examine some of the other reasons, such as known origin, known variety, and single variety shipments, which could be employed to increase their cotton sales.

Table 30. WORLD VARIETIES AND FIBER PROPERTIES

Country	Variety	Average Fiber Properties				
		Equivalent Grade	Staple*	2.5% Span Length (Inches)	Ten. Str. Thousands Psi Zero Gauge	Fineness (Micronaire Units)
<u>U.S.A.</u>	Lankart 57	LM+	30.0	.93	78.0	4.9
	Paymaster 111	SLMLtSp	32.5	1.03	82.0	3.5
	Stoneville 213	SLMLtSp	34.9	1.10	84.0	4.5
	Coker 413	SLM	34.7	1.12	90.0	4.0
	DPL 16	M LtSp	34.9	1.11	83.0	4.6
	Acala SJ-1	M Sp	35.9	1.13	95.0	4.4
	Acala 4-42	M LtSp	35.5	1.09	91.0	4.1
<u>Mexico</u>	Deltapine	M+	34.7	1.08	85.3	5.0
	Acala	GM	38.3	1.20	89.0	3.7
<u>Peru</u>	Tanguis	SM	39.0	1.23	86.8	5.4
<u>Brazil</u>	Sertao	M Sp	37.5	1.18	86.4	3.5
	IAC 12	SLMLtSp	34.2	1.09	73.4	3.6
<u>Paraguay</u>	Empire	M Sp	32.2	1.01	79.6	3.4
<u>India</u>	Bengal Deshi	SLM Sp	24.0	.74	77.1	7.4
	Gaorani G6	SLMLtSp	32.0	.99	93.4	5.6
	Digvijay (C02-170)	SLM Sp	36.0	1.13	84.5	4.2
<u>Israel</u>	Deltapine	SLM	34.0	1.05	83.5	4.4
	Acala 4-42	SLM+	34.0	1.07	91.4	4.5
	Acala S.J.1	M	37.0	1.14	96.9	4.7
<u>Iran</u>	Coker	M	35.0	1.11	86.2	4.1
<u>Pakistan</u>	Amer. AC 134	SLMLtSp	31.0	.97	93.2	5.3
<u>Syria</u>	Saw Ginned	M	35.0	1.10	79.7	4.4
<u>Turkey</u>	Adana	SLM	35.0	1.09	78.6	4.4
<u>Egypt</u>	Giza 67	M Sp	39.0	1.26	98.0	4.8
<u>Uganda</u>	**AR BP52	M	36.5	1.14	81.0	3.2
<u>Sudan</u>	**G-6-S	SLMTing	40.6	1.28	101.8	4.2
<u>Tanzania</u>	UK 55	SM LtSp	35.0	1.10	82.2	3.8

* 32.0 = 1", 34.0 = 1-1/16", 36.0 = 1-1/8".

** American-Egyptian grades.

World production of cotton is expected to be higher in the 1969-70 season than in the 1968-69 season due to increased production in the United States, Sudan, Tanzania, Nigeria, India, Pakistan, Iran, and Communist countries. India and the Communist countries should recover some of the lost production encountered during the 1968-69 season. Pakistan is planning increased acreage as a means of increasing production, and the other countries are increasing their yields by the various methods described earlier. Production in the United States will be increased through increased acreage planted since no acreage diversion was required for the 1969-70 season.

For the period beyond the 1969-70 season, many foreign countries are planning increased production for a variety of reasons, among which are increased foreign exchange through the exportation of cotton and increased production in an attempt to supply the local, or domestic, textile industry, both new and old, in order to reduce the need and expense of importing cotton.

The outlook for cotton production in the United States is not as certain as elsewhere because Congress is considering the application of a limitation on the amount of government payments that a producer may receive during a given year. This limitation could apply to all programs and crops on which government payments are made, or it could relate to specific crops such as cotton, feed grains, etc. Depending on the amount and kind of limitation imposed, all cotton producers might be affected, or it might affect only the large volume producers. Thus United States production could be greatly affected or changed very little.

It can be predicted that the world's level of production will stay about the same, or it will increase for the next few years, depending, for the most part, on the United States legislative processes; and, of course, depending on the old problem of weather, which can deal cotton production a helping hand or an adverse blow.

Table 31. COTTON SAMPLES CONTRIBUTED BY:

Anderson, Clayton & Co., S.A.	Mexico
Cia. Sanbra, S.A.	Brazil
Coats & Clark, Inc.	U.S.A.
Coker's Pedigreed Seed Co.	U.S.A.
The Cotton Production & Marketing Board, Ltd.	Israel
East India Cotton Association, Ltd.	India
La Fabril Paraguaya, S.A.	Paraguay
W. D. Felder	U.S.A.
Lint Marketing Board	Kenya
McNair Seed Co.	U.S.A.
Paul Reinhart, A.G.	Switzerland
Tanzania Lint & Seed Marketing Board	Tanzania
USDA, ARS, U.S. Cotton Research Station	U.S.A.
University of Arkansas Cotton Branch Experiment Station	U.S.A.
Von Roeder Seed Farms	U.S.A.

Table 32. GRADE INDEX CONVERSION

Grade index, as reported in the summary tables is designed to reflect differences in market value and provides a method for averaging the grade for a number of individual lots. Middling grade is used as the basis of 100, and higher or lower index numbers reflect higher or lower average market values, respectively. Index values for white, spotted, tinged, and gray grades of upland cotton are shown below:

Grade Name	Grade Index For					
	White	Light Spotted	Spotted	Tinged	Light Gray	Gray
Good Middling	105	103	101	94	99	93
Strict Middling	104	102	99	91	98	91
Middling plus	102					
Middling	100	97	93	82	92	84
Strict Low Middling plus	97					
Strict Low Middling	94	89	82	75	85	75
Low Middling plus	90					
Low Middling	85	80	75	68		
Strict Good Ordinary plus	81					
Strict Good Ordinary	76					
Good Ordinary plus	73					
Good Ordinary	70					
Below Grade	60					

100