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# The Quest of the Long Staple Cotton



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61972

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JULY 15 1922

THE UNIVERSITY PRESS,  
CAMBRIDGE, MASS.

24-20109

8, 2, 12, 57, 11, 23

## THE QUEST OF THE LONG STAPLE COTTON

THE "golden fleece" of the textile industry of today is long staple cotton. The search for it runs through all the world's cotton fields and markets. Problems seemingly impossible of immediate solution confront the cotton manufacturer, the cotton merchant, and the cotton grower at every angle. The persistent progress of insect pests, that destroy the cotton boll during its early growth, and shortage of labor, are two great problems of the cotton planter; the European war, the embargo on Egyptian cotton shipments and general transportation difficulties, are the problems of the cotton merchant. The unprecedented high prices of Egyptian and Sea Island cotton and all the individual difficulties of the planter, shipper, and merchant, are combined in one huge problem for the manufacturer.

The uses of Egyptian and Sea Island long staple cottons have expanded entirely out of proportion to the production, so that it is a generally recognized fact that either the acreage planted must be greatly increased, or substitutes must be used. Factors contributing to the increased uses of these staples are the manufacture of automobile tire and top fabrics, the changing styles in dress fabrics, the substitution of mercerized yarns for silk, and the constantly expanding market for threads

and yarns for insulating purposes made largely from the long staple Sea Island and Egyptian cottons.

The leading American cotton merchants have had experts investigating North and South American cotton-growing countries to determine, if possible, the sources of further supplies of high grade long staple cottons similar to the Sea Island and Egyptian. In another chapter will be found an analysis of the growth of Sea Island and Egyptian cottons in Brazil and Peru. In July, 1917, 100,000 pounds of Peruvian-Egyptian cotton was brought into this country to be placed among ten different yarn mills for experimental purposes. While results of these tests are not known as yet, it is generally conceded that Peruvian-Egyptian cotton will be found as satisfactory for tire fabric yarns as the genuine Egyptian of the Mitaffi and Nubari types.

A field of great promise, now being developed under the skilful guidance of our government, is Arizona. The Salt River Valley, which is not far from the famous Roosevelt Dam, is being scientifically planted under forced irrigation and a splendid crop is expected this year from the 45,000 acres under cultivation.

In the following chapters a brief résumé of long staple cotton growing is given. The facts have been secured from the most authoritative sources and, in many cases, are results of original investigations. It is hoped this article may be of general interest and promote further study of this most timely subject.

## EGYPTIAN COTTON

THE modern history of cotton in Egypt dates from 1820. Jumel, a French-Swiss engineer, discovered a cotton plant growing in the flower garden of Mako Bey in Cairo. Recognizing its commercial value he succeeded in interesting Mohammed Aly, the Sultan, and with his help soon showed that cultivation on a large scale was a commercial success. The results were so encouraging that further experiments were made with foreign seed, principally Sea Island and Brazilian. With this as a start the present annual type, known as Egyptian, was developed. This cotton has marked characteristics of length and strength of fibre, silky texture and brown color, which have given it a very high commercial use and value.

Egypt, being practically a rainless country, is dependent on the River Nile for its water supply. Egypt's total area is over 350,000 square miles, forming a square in the northeast corner of the map of Africa. Of this only one-thirtieth part, or 12,026 square miles, can be cultivated, the remainder being a desert. Cultivation is limited to the small region along the banks of the Nile to which water can be carried. The river annually overflows its banks, and deposits a rich layer of silt and mud over the cotton-growing lands, thus making them fertile.

In no part of Egypt is it possible to grow cotton

without irrigation, so the country is therefore dependent upon the Nile for the success of its crops. Within recent years a vast amount of money has been spent in perfecting an irrigation system through a series of dams and canals, by which a continuous supply of water is available the year round. Since the completion of the Assuan Dam, in 1902, the scarcity of water has ceased to exist with the exception of the abnormal year of 1913, when the flood conditions of the Nile fell far below all previous records; but fortunately the newly constructed dam partially filled the wants of the planters. Had this shortage occurred before 1902 such conditions would have meant starvation to perhaps half the country.

The general methods of cotton cultivation in Egypt, though primitive, are suitable and satisfactory, upon comparison of results, and cultivation is highly intensive. Most of the holdings are small and one or two acres will provide support for a man and his family.

The average yield per acre is over 450 pounds of lint-cotton, which is the largest amount produced per acre in the world. The quality is inferior to none except the Sea Island cotton and there is good reason to believe that the new types being grown in the reclaimed districts in the north will compare favorably with the long staple Sea Island.

There are seven well-known types of Egyptian cotton, which are as follows:

- 1, Ashmune, or Upper Egyptian, is probably the original brown Egyptian cotton and is the poorest in quality, — weaker, more irregular, and dirtier than the



other varieties. The length of the staple varies between  $1\frac{1}{8}$  to  $1\frac{1}{4}$  inches and is sometimes less. It is grown almost entirely in northern Egypt, where no other variety has proved successful, and is used mostly for the cheaper grades of yarn. The market for this grade is England, India, Japan, and the United States.

2. Affi, or Mitaffi, is another recent variety and still forms the bulk of the Egyptian crop. The fibre is very strong and regular, about  $1\frac{1}{4}$  full to  $1\frac{3}{8}$  inches in length. The price of a good cotton of this type is the basic price of the Egyptian market in Liverpool. It is now cultivated in Lower Egypt and the Nile Delta and is sold to all the textile markets of the world.

3. Assili, or Assil-Affi, was introduced about 1910, and is an attempt to recover an old variety that is fast disappearing. The fibre is strong with a staple of  $1\frac{7}{16}$  inches, but up to the present time it has not been grown in large quantities.

4. Nubari is another recent variety, selected about 1905, and is similar in character to the Affi. The staple is weaker, a somewhat darker brown, but of good commercial value to spinners of that grade and with a staple of  $1\frac{3}{8}$  to  $1\frac{7}{16}$  inches.

5. Abbassi is the whitest of all the grades of Egyptian and has been grown since the year 1893. It is very fine and of good length, with a staple of  $1\frac{1}{2}$  inches.

6. Jannovitch, one of the best grades of Egyptian cotton, was originally a chance selection from Affi, first grown in 1899. The fibre is long and strong, about  $1\frac{1}{2}$  inches in length, and not as brown as the Affi. It is

used for the production of fine twist yarns, such as sewing cottons, where strength is essential.

7. Sakellarides, or Sakel, is a new variety similar to the Jannovitch, and superior in some respects, but lighter brown in color. It is a competitor of the Georgia and Florida cotton, with about the same staple, and possesses many of the characteristics of Sea Island. Its cultivation has increased very rapidly since its introduction in 1907, due to the fact that it grows well anywhere in Egypt and has a heavier yield than the other types. In 1915 one-half of the cotton acreage was planted with this variety. Tire fabric yarns are manufactured very largely from this type of cotton because of its strength and generally excellent qualities.

Cotton growing by irrigation is done almost entirely by hand labor, the farm implements being a primitive plow and hoe. Each tract is plowed three or four times, each plowing being at right angles to the previous one. Planting takes place in the north during March or April, since one advantage of early planting is that the earlier maturing cotton has a better chance of escaping damage by the boll worm. The use of artificial fertilizers is not general and manure is scarce, but the silt and mud from the Nile are rich in fertilizer and have much to do with maintaining the fertility of the soil.

The picking starts about the end of August in Upper Egypt and early in September in the Delta. The work is done mainly by boys, girls, and old people, and wages are from 10 cents to 25 cents per day. The picking is very clean and the average child picks from 30 to 50

pounds of seed cotton per day. The cotton is then collected into long bags containing about 400 pounds, two of which are carried by camels to the gin. The first picking is followed by two others, the last being as late as December. After December the cotton stalks must be pulled up in order not to provide winter quarters for the boll worm.

The methods of ginning and baling cotton in Egypt are primitive and out of date when compared with American methods, the main reason being that labor-saving appliances are not used on account of the cheap labor. The cotton is carried from the fields to the ginneries by camels, by train, or by river. The old roller gins, fed by hand, are used. The cotton is baled by hydraulic pressure, each bail weighing from 700 to 800 pounds. Before baling, the cotton is watered by syringes and shaken. This process is also used in certain parts of India, where a hose is turned on the bales as they stand in the yards. Bales are then shipped to Alexandria, sampled, and sold for export. Subsequently they are reopened, examined, and watered again, and repressed to a density of about 35 pounds. New hoops and canvas are added, making an addition of 20 pounds. The final result is a bale which is a model to the entire world.

The cotton worm, boll worm, and, since 1912, the pink boll worm, are the most important cotton pests. In 1883 a government commission was appointed which, by educational efforts, tried to show the growers the best means of overcoming the pests. These efforts, however, had little effect, and in 1904 the loss on account of

ravages of the cotton worm was estimated at over \$10,000,000. The Government, since 1905, has inaugurated a campaign against the cotton worm and been successful in decreasing the ravages of this pest. The authorities, however, have not found it possible to deal as effectually with the boll worm, and have reached the same decision as the United States Department of Agriculture, — that it is necessary to keep house with the pest. The only effective remedy is to pick off the whole of the bolls attacked, but this is difficult not only from a labor standpoint, but because of the impossibility of distinguishing the infested bolls with any certainty.

The pink boll worm was first reported in Egypt in 1910, but since 1912 has increased rapidly. This pest, after eating out the contents of the boll, remains inside the seed and even passes unharmed through the ginning process, so that it is carried over to the next year in the seeds reserved for that sowing, in that way causing increasing damage to succeeding crops. It is also difficult to handle for the same reasons as the boll worm.

The future of Egyptian cotton rests upon the successful suppression of the insect pests, the extension of the proposed irrigation systems, the possibility of reclaiming 1,000,000 acres, and the improvement of the average yield as a result of better drainage, all of which will tend to increase the production. The supply of Egyptian cotton has never equalled the demand, and increased acreage will greatly contribute to the world's needs.

## SEA ISLAND COTTON

SEA ISLAND COTTON has been successfully cultivated in two areas, the southern portion of the Atlantic States (South Carolina, Georgia, and Florida) and the West Indies. Columbus discovered cotton growing in Barbados on his first landing and from there it was undoubtedly carried by the Europeans to the American colonies. Practically all of the cotton used in England during the eighteenth century came from the West Indies. In the nineteenth century production died out entirely and it was not revived until the early years of the twentieth century. The first of this cotton which was shipped to Europe was packed in boxes similar to our orange boxes of today, but soon afterwards was shipped in bags or bales.

The Sea Island cotton is a long stapled, black seed cotton and seems to be affected by sea air. While it has been known to grow a hundred miles inland it does not thrive to any great extent except near the coast. The staple from Georgia and Florida averages about  $1\frac{5}{8}$  to  $1\frac{3}{4}$  inches. The total crop is relatively small and is seldom over 100,000 bales of about 400 pounds each. The production fluctuates greatly. A record crop in 1911 of 122,866 bales was followed by a crop of 68,163 bales in 1912.

The extraordinarily speculative character of the

market and the extreme fluctuations in price have caused general dissatisfaction among the growers. Unless very high prices are obtained, Sea Island cotton does not pay on account of the time, labor, and special care required and its peculiar susceptibility to damage by unfavorable weather. The crop failure of 1912 was due to the severe hurricane which devastated the Sea Island district and cut down the crop to almost one-half of normal. The appearance of a new competitor has still further complicated the situation. The superior varieties of Egyptian cotton, namely Abbassi, Jannovitch, and Sakellarides, are being used by the spinners of Lancashire, England and America in place of the Sea Island with satisfactory results.

There is a great danger for the future of the Sea Island cotton because of the approach of the boll weevil. On account of the late maturing of this cotton, cultivation under boll weevil conditions appears hazardous. It is not possible to have an early maturing crop because of the long time required for the staple to grow, and unless new means can be found to combat the advance of the pest, serious crop curtailment may be expected.

Changes in style and the enforced economy of production are other features that in the past have affected the Sea Island market. Manufacturers have reported the change of style of women's dress goods from soft, lustrous cloths, composed of fine yarns and of high counts per inch of both warp and filling, to coarser, rougher goods which means fewer threads per inch in

the woven fabric. Such changes are, of course, reflected in the kind of cotton purchased, and, as might be expected, the cheapest quality that will answer the purpose is generally bought. The final result is a gradual grading down in the staple length, the shorter grades being used in the fine goods trade. Thus, the Sea Island cotton has often been sold at a sacrifice when compared with former prices. It must be remembered, however, that these conditions do not exist during the present war period, but are stated merely to bring forth the previous tendencies and to indicate what may be expected when the world is at peace.

The crop requires a sandy, or a sandy loam, soil with a clay or a compact sand soil about a foot below the surface. A well regulated water supply is necessary for successful cultivation, and drainage is essential. In the interior it is possible to grow cotton only where the drainage is suitable, but on the other hand, a regular supply of water is needed if the firmer and longer staple is desired.

At the present time there is a great scarcity of cheap labor which will restrict the acreage planted. The planters are trying to overcome the labor shortage by using labor saving devices, but there will be difficulty in getting the cotton picked.

The markets for Sea Island cotton are at Charleston, South Carolina, Savannah, Blackshear, and Valdosta, Georgia, Alachua and Madison, Florida. The South Carolina cotton is put up in bags  $7\frac{1}{2}$  feet long and about  $2\frac{1}{2}$  feet in diameter, each bag containing 300 to

400 pounds. The bags are filled by hand and the cotton is pressed in by a light handscrew press. Interior cotton is packed by a steam press into bales which average about 400 pounds each, the shape and size being similar to an Upland cotton bale of 54 by 27 inches. The bale is covered by a heavy burlap and instead of the steel bands is sewed together with strong cord.

The buyers classify the cotton according to staple and each grade is sub-divided into classes such as, fancy, extra choice, choice, extra fine, fine, and "dogs." This classification applies only to the cotton from the coast. The staple coming from the islands called "Fine Islands" is generally given the grower's private brand, where he, by careful selection of seeds and methods of growing, has produced a fibre of unusual length and cleanliness. This brand is a sufficient guarantee of its quality and staple.

At first Sea Island cotton was used to spin yarns for fine laces, but with the invention of the sewing machine a new field was opened, and at the present time a large per cent of cotton threads manufactured in this country are made from Sea Island cotton. It is also used in the manufacture of fishing lines, boot laces, the finest mercerized fabrics, electrical tape, government mail bags, aeroplane fabrics, sails for racing yachts, and cloth for bicycle and automobile tires. At first it was spun only in England and France, but now it is being spun all over New England, and even the Southern States are taking a share of the crop.

The future of Sea Island cotton, after the war, de-



pend upon the success growers have in combating the ravages of the boll weevil and in meeting the competition of the new Egyptian varieties grown in the Eastern and Western countries.

## ARIZONA-EGYPTIAN COTTON

THE failure of the Egyptian and Sea Island crop to meet the demand for the long staple cotton required in the spinning of fine yarns has led to the development of new fields. After extensive experiments and careful cultivation, the United States Department of Agriculture discovered that by forced irrigation Egyptian cotton could be raised in Arizona. At the close of the season of 1911 these experiments had reached a stage which seemed to justify the trial of this crop on a small scale by the farmers of Salt River Valley. The seed which was distributed by the Department of Agriculture in the spring of 1912 was a careful selection of Egyptian, entirely free from all contamination or vegetable disease. The results of the first crop, harvested in 1912, were not satisfactory, due to various causes. The farmers, in some cases, were not familiar with the requirements of the crop; the fields were given very little attention after the planting; there was a lack of irrigation water for some of the farms, soil in others was too salty, and in one section high ground water, resulting from a flood of the Colorado River, caused the

crop failure. The crops of the later years met with much better success.

The boll of the Egyptian cotton is three lock and somewhat smaller than the average boll of the short staple cotton grown in the Southern States. Its small size, with the sharp-pointed burr, causes greater difficulty in clean picking than is the case with ordinary Upland cotton. Since these fibres are used in the manufacture of combed and mercerized yarns, in making goods that resemble silk, it is necessary to have the fibre picked free from hulls and leaf. Furthermore, the type of roller gin used does not clean the foreign matter from the seed cotton as the saw gins do, hence clean hand picking is necessary, at a labor cost as high as two cents per pound for picking. With but a few exceptions the cotton is now picked carefully and the seed cotton taken to the gins is clean and free from trash, thus making it possible to turn out a high grade lint.

The cotton is sampled at the gin by a workman who is required to take a handful of the lint cotton; another, when the seed cotton is about half ginned; and a third, when the ginning is nearly complete. Samples by this method are secured from different parts of the bale. The cotton taken for samples weighs about one pound and provides a sufficient number of types on which sales can be made, thus eliminating the practice of cutting the bagging at sampling. The cutting of the bagging not only wastes as much cotton as is taken out at the gins for samples, but opens the way for further loss and damage, and also causes greater liability to fire. All

bales are pressed to the density of 12 pounds to the cubic foot and the bale is known to the cotton trade as the flat or uncompressed.

The following system of marking, branding, and weighing is used in order to secure accuracy and safety in handling.

*Tagging.* As the bale comes out of the press box a heavy tag is attached by means of a double copper wire. On this tag is printed the name of the gin, location, and serial number. The tag carries one or more coupons bearing the corresponding serial number and a coupon is placed in the sample of the cotton.

*Marking.* The bales are marked by a stencil, with four inch letters. The size of the letters used varies according to the quality of the bagging.

*Branding.* The mark of the planter and the gin number are placed on the head of each bale and are also branded on the sample hole side.

*Weighing.* The Arizona-Egyptian cotton is sold on net weight or the total gross weight less the tare. This tare is supposed to cover the weight of the bagging and ties.

Arizona cotton being a new variety, for which no standards for grades or staples existed, the Department of Agriculture established the following grades:

*Fancy.* Clear and clean and of creamy color, allowing about as much leaf as Strict Good Middling and equivalent to Extra Fine Egyptian Sakellarides.

*Extra.* Clear, creamy or of slight color, leaf allowed

equal to Good Middling, U. S. Official Standard, and equivalent to Fine Sakellarides Egyptian.

*Choice.* Allows color after frost and is equivalent to Good Sakellarides Egyptian.

*Medium.* Leaf equal to Strict Low Middling; U. S. Official Standard and equivalent to Strictly Good Fair Sakellarides Egyptian.

The three staple lengths are grouped as follows: The longest and best staple is named Sacaton, the second, River, and the third, Valley. The Sacaton staple is equivalent in length to that of the best Sakellarides imported into this country, the River equals the best Jannovitch, and the Valley is similar in length to the best Mitaffi.

By this system of classification and standardization the cotton buyer of a mill can request his broker or agent to purchase the exact grade and staple required to manufacture his products.

In 1913 the members of the Southwestern Cotton Committee of the U. S. Department of Agriculture met with the members of the Arkwright Club of Boston and by presenting samples of the various types called the attention of cotton dealers to the new long staple crop of Arizona. From then on the demands for Arizona-Egyptian cotton increased, and to meet the needs of the manufacturers, irrigation plans were rushed and the acreage available for planting was developed.

The following table will give the results of the Egyptian plantings to date in the Salt River Valley:

<i>Year</i>	<i>Production in Bales</i>
1912 . . . . .	220
1913 . . . . .	1500
1914 . . . . .	6300
1915 . . . . .	1000
1916 . . . . .	4000
1917 . . . . .	Estimated 9000

The future of the Southwest is bright and it has already won an enviable reputation in the cotton world. The rich soil, abundant sunshine, plentiful water supply, and a long growing season, offer unlimited opportunities for the production of long staple cotton.

### CALIFORNIA COTTON FIELDS

COTTON growing in California was started in 1909 and has already become of great commercial importance. The first crop of cotton, grown in 1909, was preceded by numerous plant testings. In 1902 the Department of Agriculture at Calexico, California, planted several selections of Egyptian cotton seeds with remarkable results. The cotton grew luxuriantly and even reproduced itself from the old stumps for a number of years. The industry was definitely launched in 1909, and careful selections of seeds were distributed among the growers, who planted 450 acres. The crop averaged a little more than three-fourths of a bale per acre, the total amount being 350 bales.

This new country is in every respect a second Nile

Valley in the extreme southwest corner of the United States, where the great Colorado River passes between Arizona and California and flows down into the Gulf of California.

The soil of the Imperial Valley is composed of an alluvial silt which was deposited there when the valley was the delta of the Colorado River and the head of the Gulf of California. The fertility of the soil enables the planter to grow cotton without rotation or change. Each year the river, carrying a rich fertilizing silt, deposits about nine tons on every acre during the season's irrigating.

The supply of water for irrigation is taken from the Colorado River and is carried by means of canals through the valleys and irrigated districts.

The summers are long, thus giving a long growing season which is desirable for Egyptian and long staple cotton.

The labor consists of a large percentage of the superior kind of white labor, the wages ranging from \$35 to \$40 per month and board. A large number of Mexicans and Japanese come into the valley at harvest time and with this supply there has never been a shortage of cotton pickers.

The land is plowed and thrown into ridges on beds about four feet apart and the seed is drilled into the top of these beds. The water is then turned on and allowed to run down the rows between the ridges. Irrigation by this method is sufficient to cause the seed to germinate and appear above the ground in about ten days.

As the fruiting period develops, the deep-rooted plant is watered every two weeks throughout the fruiting period, which continues until the last of November. Owing to the richness of the soil and the abundance of moisture, the cotton plants are very much larger and more vigorous than those in the Southern States, making it necessary to grow them farther apart in the row. The plants are therefore chopped or thinned out to a distance of 18 to 22 inches.

The cost of growing cotton averages \$12 per 500 pound bale on the basis of a bale per acre. To this must be added \$15 for picking and \$5 for baling, making a total of \$32 per bale ready for shipment; this showing is unequalled by any country in the world.

In the early days of the cotton industry in the Imperial valley, there was no compressor, all the cotton being shipped out by gin weight only. In the later years compresses have been installed, and as it is customary in the cotton trade to accept the weights as given by them (there is usually a certified or public weigher to oversee this matter), cotton producers have come to accept compress weights as correct.

California cotton varies in length of staple from  $1\frac{1}{16}$  to  $1\frac{5}{16}$  inches. The fibre has considerable spirality, is exceptionally strong, even in length, and is quite free from waste when grown in rich soil which is sufficiently irrigated, and when carefully picked. Some of the longer staple cotton from this section is being used by worsted manufacturers as a substitute for moderate rough Peruvian cotton.

There were no established types or standards that could be used other than the Official Cotton Standards of the United States and this classification was adopted after some consideration.

The Imperial Valley Cotton Growers' Exchange, organized early in 1912, attempts to market the crop on the coöperative plan. The functions of this organization are to store and to market the cotton of its members. It also engages in all lines of activity touching upon the cotton industry, including ginning and the manufacture of oil. The expense of operating the exchange is provided for by a fixed charge on each bale handled. Sales are made either through cotton brokers by consignment, or direct to manufacturers. In direct sales samples are submitted to users, the cotton they purchase being paid for by sight draft attached to the bill of lading. The price paid is generally based upon quotations for similar cotton in the ports of New Orleans and Galveston, less the broker's commission, freight to the ports, compressing and other charges, plus the commission or profit to the original buyer.

The future of California offers a bright field for the production of high quality cotton. The extension of the industry depends upon future seed selection and the application of the best cultural methods.



## COTTON FIELDS IN BRAZIL

COTTON has been cultivated in Brazil from very early times, and probably was found growing there by the Portuguese when they first landed in that country in 1500. In 1872 over 346,000 bales were exported, but during the last twenty years local cotton factories have been constructed and home consumption is taking a large part of the crop that was formerly exported. In 1911 there were 190 mills with a spindleage of over 1,000,000. The Government has also taken steps to increase the manufacturing of cotton goods by imposing a high export and a low import cotton tax. The cotton that is now exported is mostly of the long staple varieties.

Cotton growing is widely spread over many different provinces, each area offering different conditions. In one state alone, Sao Paulo, there are three kinds of cotton grown — Upland in the southern and western districts, several varieties of Egyptian in the northern and Sea Island in the maritime zone.

Planting begins as early as the middle of December in some districts and goes on to the end of May in others, and, in the same manner, the picking season extends from July to February. There are only a few large plantations, most of the growers being small farmers, as the labor supply is not always sufficient. As a general rule wages are very low, and the highest rate known

to have been paid for picking is 6s. 4d. per 100 kilos of lint, equal to about 25 cents per 100 pounds of seed cotton. The day wage is about 1s. 6d., yet the cost of living is high.

Two different varieties of cotton seem to be chiefly grown. The first is a tree cotton known as Creovlo, or Maranhao, which yields for two or three years and bears open bolls the year round. The fibre of this tree cotton is of very good quality, although the yield is less than that of the herbaceous variety, which is cultivated more extensively. The tree cotton is more drought resisting. Its bolls are large, but have a close growing habit so that the cotton when ripe does not protrude, thus giving rise to an increased cost of picking. Insect pests do not disturb the bolls of the tree variety.

The second variety is the ordinary herbaceous cotton which is grown chiefly in the coast districts, where the rainfall is more reliable. The grade varies greatly in quality, the staple being sometimes as short as  $\frac{3}{4}$  of an inch, while some growths give as much as  $1\frac{1}{2}$ -inch staple, but the average is about 1 to  $1\frac{1}{4}$  inch. The general character of the staple is good. It possesses a peculiarly harsh or wiry character which makes it especially suitable for mixing with wool. It is generally badly handled in picking and ginning, and only saw gins are used. The usual weight of a bale is only about 250 pounds, though those exported are often more.

With the exception of Southern Brazil, very few plantations are worked with modern agricultural implements. By far the greater quantity of the best Brazilian cotton

is grown on land that has never been plowed. The system in common practice is the same today in the interior that it was in 1580, when discovered by De Soufa. The brush is cut down and allowed to dry during the hot season. Before the rain starts a fire is run over the ground, and with the commencement of the rains seeds are planted here and there over the field, no attention being paid to row or alignment. Not only is cotton planted, but also corn and beans, and frequently still other crops, all mixed together in the same field. During the season two or three hand hoeings are given, and, as the crops mature, the beans, corn, and cotton are harvested.

Brazil, however, is potentially the greatest cotton-producing country on earth and has enormous areas with soil and climate that are ideal for the crop. Labor is plentiful in most parts and may be employed at about one-third the cost of farm labor in the United States. The quality of the cotton produced in the coast country equals that of the American Upland and under special treatment and care would equal the best Egyptian. Insects of the more serious character are not known to exist in Brazil. Furthermore, ocean transportation is available from Brazilian ports to the world markets.

Against these great natural advantages there stand the general ignorance and the widespread indifference of the average farmer to modern agricultural methods. When this is overcome Brazil should become the foremost cotton-producing nation in the world.

## PERU

THE conditions in Peru are markedly different in almost every respect from those in Brazil. Here cotton has been cultivated since the times of the Incas. This is testified to by the remnants of cotton cloth, in exquisite colors, which were wrapped around the mummies. It was not, however, until 1899 that cotton was produced to any great extent and by systematic cultivation. The following table shows the production for the ten years:

<i>Year</i>	<i>Production in 500-pound Bale</i>
1905 . . . . .	42,000
1906 . . . . .	46,000
1907 . . . . .	54,000
1908 . . . . .	70,000
1909 . . . . .	95,000
1910 . . . . .	62,000
1911 . . . . .	69,000
1912 . . . . .	84,000
1913 . . . . .	data unavailable
1914 . . . . .	100,000
1915 . . . . .	90,000

Peruvian cotton is grown entirely under irrigation, as the climate is practically rainless except in the North, where torrential rains sometimes fall in summer; and only the lack of funds to carry out further irrigation work prevents the development of cotton growing on a more extensive scale than at present.

Peru owes its advantages for cotton growing to the exceptional physical and climatic characteristics of the country. Its coast line extends about 1200 miles from 3° south of the Equator to 22°. It consists chiefly of arid sand hills, but these are intersected by numerous valleys varying in length from 25 to 100 miles, running from the Andes to the sea, and each is the bed of a river which has filled it with a deep, alluvial soil. During the hottest summer months, which comprise the cotton-growing season, the volume of these rivers is augmented by the melting of the snow in the mountains, and as the slope of the valley is, as a rule, fairly steep, irrigation is a comparatively simple matter, and every part of the valley can be conveniently watered.

The following kinds of cotton are cultivated in Peru:

*Egipto*, introduced into Peru from North America, where it is known as Upland cotton. It is generally of a more reduced size than other varieties, showing a certain ligneous development, and attains, under favorable conditions, the height of two metres. Its stem is more pliant and soft in the early stages of its growth. As a rule the life of the plant is two years, but when cultivated under favorable conditions may extend to four or five. The seed, after being separated from the fibre, is relatively large.

*Gossypium peruvianum* Cav. is found in the warmest regions of the coast. The plant will live more than twenty years and the fibre is very rough and long, which permits it to be employed in imitation of woollen cloth.

The seed, which is small, is separated perfectly by the ginning machine and is smooth and black.

*Gossypium barbadense* L., as found on Peruvian plantations, is also ligneous, and the fibres are very long, fine, and silky. The seed is also smooth and black. From this variety are derived the sub-varieties of "Sea Island," "Mitafifi," and "Jannovitch." Sea Island cotton is also cultivated in very insignificant quantities in the valleys of Supe, Huarmey, and Huache, in the departments of Lima and Anachs.

Nearly all the known varieties of cotton may be cultivated on the Peruvian coast. The absence of rain and hail insures the safety of the crops and gives the planter a liberty of action unknown to those who must contend with more inclement climates. The temperature varies very little during the twenty-four hours, or from one season to another. Plagues attacking Peruvian cotton are very few and are mild in form. The most dangerous insect is the arrebiatado. In recent years the boll weevil has been found in Peru, but steps have been taken to study means to combat and destroy this plague. The fertilizer most used by cotton planters is the guano, easily obtained from the islands off the coast.

The next crop, corresponding to the year 1916-17, should show a notable increase in the production of "Mitafifi" cotton, for, owing to the high price at which this cotton is selling, many planters are devoting their attention entirely to it.

Planting time is from the middle of October to Decem-

ber. In March the plants begin to flower and the crops are gathered from May to July, harvesting continuing often in many valleys until September.

The increasing value of the coast lands of Peru is due in a large measure to the cultivation of cotton, and this is an important factor in favor of this crop. If the demand for long staple cotton of the best grades continues and the competition of the Egyptian is not keen, cotton will become an important feature of the agricultural life of Peru.

## CONCLUSION

THIS brochure would be incomplete without referring to the valuable results accomplished by the many cotton manufacturers in New England and elsewhere who, coöperating with cotton growers and merchants, have made scientific tests during the various processes of the manufacture of these newer types of long staple cotton. Particularly should credit be given to the spinners of combed tire yarns and builders of machinery for the manufacture of tire fabric and cord, for in this newer department of the textile industry there has been more real scientific research and evolution than in any other field of textile experiment.

The enormous consumption of long staple cottons for automobile tire fabric and cord and mechanical cloths undoubtedly accounts for the shortage of these grades, and it appears quite safe to venture the opinion that there must be either a substantial increase in the acreage of long staple cotton during the next few years or substitutes such as peeler cotton will have to be used by the textile industry.

Many of the smaller automobile tire manufacturing companies have used combed peeler cotton this season with satisfactory results, — particularly in unguaranteed tires, — but the larger companies have adhered strictly to the use of combed Sea Island and Egyptian cotton of the longer staple, with the result that today



the guarantee of the leading brands of tires is of little or no value as the service mileage almost invariably exceeds the guarantee by a liberal margin.

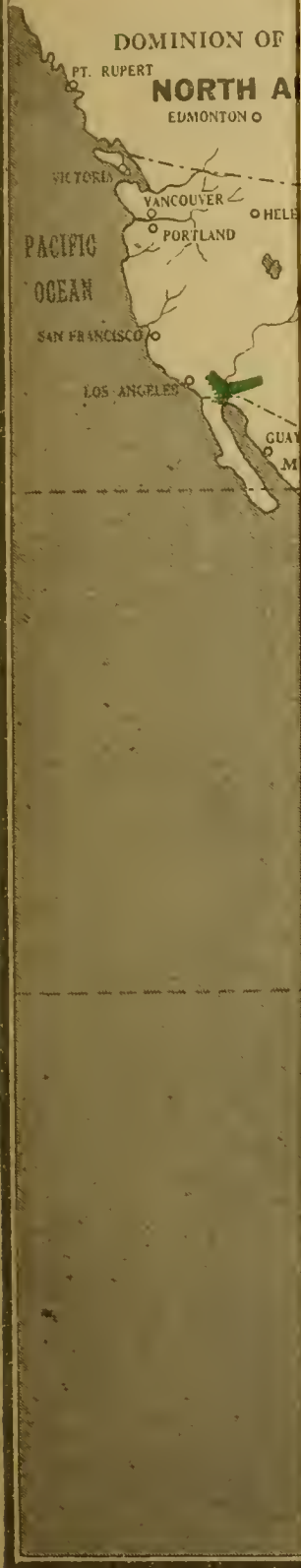
One of the leading rubber companies recently organized a subsidiary for the purpose of reclaiming and planting more than 10,000 acres of the arid lands of the Salt River Valley in Arizona with long staple Egyptian cotton seed. Of the 9000 bales of long staple Egyptian-Arizona cotton to be picked this fall, a large part of this crop will be from cotton plantations reclaimed this spring and irrigated from the Roosevelt Dam.

An economic reward is sure to follow the efforts of cotton growers and merchants to extend the acreage of long staple cotton, and of cotton manufacturers and textile machinery builders to change the processes of textile manufacture so that cotton of shorter staple than the better grades of Egyptian and Sea Island can be spun into yarn and woven into fabric that will be as strong in the breaking and wearing tests as contemporary fabrics made from the long staple cottons.





LONG STAPLE  
COTTON FIELDS



DOMINION OF

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**NORTH AMERICA**

EDMONTON

VICTORIA

VANCOUVER

HELENBURG

PORTLAND

PACIFIC  
OCEAN

SAN FRANCISCO

LOS ANGELES

GUAYMAS

MEXICO





# Fold-out Placeholder

This fold-out is being digitized, and will be inserted at a future date.







# The Textile Department

of THE MERCHANTS NATIONAL BANK OF BOSTON has been established to furnish to the textile and allied industries reliable statistics and reports of important developments; to investigate new fields; to initiate original research work, and to collate and make available pertinent data regarding the textile industry.

Special expert attention is given to each of the three divisions, — materials, machinery, and markets; to the cotton crop, to mill equipment, and to the finished goods trade. Conditions, prices, costs, supplies, demand, deliveries, and prospects general and local will be surveyed.

This is a service of co-operation for our clients, covering the needs of every branch of textile activity. Domestic and foreign trade opportunities are investigated and presented in the form of detailed reports covering the ocean freight rates, insurance, methods of packing and shipping, customs duties, export and import taxes, methods of financing, and in addition, reliable credit information.

Data on idle mill sites, water powers and factory buildings, labor conditions in different localities, and schedules of wages of operatives in the various textile centers will be available.

**The Merchants National Bank  
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28 State Street, Boston, Mass.