THE GROWING OF LONG-STAPLE UPLAND COTTONS.

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INTRODUCTION.

The ordinary cotton grown in the United States has a short staple ranging in length from three-fourths of an inch to 1 1/2 inches. Cotton of this grade can be grown without difficulty in many parts of the tropical and semitropical regions of the world. The growing of sorts with longer staple, that is, above 1 1/2 inches, is attended with some drawbacks, and the regions where these cottons can be produced to advantage are much more limited in extent and number than in the case of short-staple cottons. In the present cotton shortage the demand is for any and all cotton, though this is true at all times to a limited extent. The quantity of long-staple cotton produced is so limited in comparison to that of short staple that a shortage in the long-staple crop does not materially influence the short-staple market. The increasing prosperity of the people is leading to a greater demand for the finer cotton fabrics manufactured from long-staple cotton, and the fear has been expressed that the supply will not long be sufficient to meet the demand.

The growing of long-staple cottons is practically confined to certain portions of Egypt and the United States. Small quantities of long-staple fiber are produced in other parts of the world, but the output is not yet sufficient to influence the market in any way. Considerable interest is being shown in the growing of such cottons in Cuba, Porto Rico, Haiti, and other of the West Indies, but the industry in these islands is still in an experimental stage. Some cotton of fairly long staple comes from Peru and Brazil, but as a whole the fiber is too coarse for fine spinning and is used largely in mixture with wool.

The cottons used for fine spinning are Sea Island, Egyptian, and the so-called long-staple Uplands, and the production of these types has thus far been limited to certain comparatively small areas. The supply of Sea Island cotton is produced in the Coastal Plain region of South Carolina, in central and eastern Georgia, and in northern Florida. The maximum production was reached in 1896–97, when the crop amounted to 103,516 bales. The amount has fallen considerably, and in 1900 only 97,279 bales were produced. Egyptian cotton is as yet grown exclusively in Egypt, the annual output from that country.
being now about 1½ million bales. The long-staple Upland cottons, the other group of cottons used for fine spinning and with which we are here principally concerned, are now grown mainly in the alluvial delta region of Mississippi and Louisiana, and to a limited extent in the rich valley lands of the Red River in Texas and Louisiana. Small quantities of long-staple Upland cotton are also produced here and there in all of the other cotton States.

In the statistical returns in this country no distinction is made between long-staple Upland cottons and the ordinary short staple, and it is thus impossible to give a very accurate estimate of the production. An estimate has been made by Mr. Henry G. Kittredge, based upon the production of fine yarn. He states:

An approximate idea may possibly be had of the amount of long-stapled Upland American cotton used in the United States for fine spinning, as represented by No. 41 and over, by taking the 1900 census figures, which give the consumption of Sea Island and Egyptian cottons at 74,287,566 pounds, and the total production of fine yarn at 77,195,871 pounds. Allowing a waste of 30 per cent on the assumption that these cottons were combed, we have a yarn production from them of 45,001,297 pounds, which, deducted from the total amount of yarn, leaves 32,194,574 pounds of yarn made from the Upland variety. As much of this Upland cotton for the lower numbers in the range from No. 40 and upward is not combed, and can not be so readily assumed as for the numbers for which the Sea Island and imported Egyptian cottons are used, the average waste in manufacture must be less than 30 per cent. I have, therefore, for purposes of calculation, called the percentage of waste on this cotton 20, which would make the 32,194,574 pounds of yarn represent 40,243,217 pounds of raw cotton, or 80,486 bales of 500 pounds each.\(^a\)

There is widespread interest in the growing of long-staple cottons of better quality than the ordinary Uplands, and it is probable that the quantity of long-staple Upland cotton has been considerably increased since 1900, when this estimate was made. It is likely that the production of 1903 has been nearly 105,000 bales, as the cotton crop for that year in the principal long-staple regions, notably in the delta region of Mississippi and Louisiana, was generally considered to be even better than the crop of 1902.

The increasing demand for long-staple cotton is well shown by the rapidly increasing consumption of Egyptian and Sea Island cotton. Quoting again from the article by Mr. Kittredge on “The supply of cotton for fine spinning”:

Great Britain increased her consumption of Egyptian cotton during the twelve years ending with the season of 1901–2 over 38 per cent, and of Sea Island cotton over 9 per cent. For the same period the Continent increased its consumption of

\(^a\) The so-called delta region of Mississippi and Louisiana, which is commonly known by this name in cotton circles, is not the true delta of the Mississippi River, but is an area bordering the river situated mainly between Memphis, Tenn., and Natchez, Miss. It is a strip of rich alluvial land, extending in some places from 25 to 70 miles back from the river on each side.

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Egyptian cotton nearly 112 per cent, and of Sea Island nearly 200 per cent. During the same time the United States increased its consumption of foreign cotton, chiefly Egyptian, over 680 per cent, and of Sea Island over 150 per cent.

Should this rate of increase continue (and there is every reason to believe that it will), the time will soon come when there will be a decided shortage of long-staple cottons. How this increased demand can be met is therefore a very pertinent question at present.

WHY THE CULTIVATION OF LONG-STAPLE UPLAND COTTONS SHOULD BE EXTENDED.

After a careful study of the cotton industry of the United States the writer has come to the conclusion that the demand for long-staple fine spinning cottons can best be met by increasing the growing of long-staple Upland varieties. This opinion is based on the characters of long-staple Upland varieties, which are probably better adapted to general cultivation in this country than any of the Sea Island or Egyptian kinds, and give with the different varieties now known all ranges of length of staple from 1½ to 1½ inches (Pls. I and II). The fiber of some of the varieties is fine and silky, and can well take the place of Egyptian and of the coarser grades of Sea Island. The fine grades of Sea Island, which are equaled by no other cottons in the world, have only a very limited use, and their production is costly, requiring such a high degree of selection and cultivation that their use will probably never be very greatly extended. Sea Island cotton, moreover, has small bolls, very difficult to pick, and generally gives a very light yield. The successful cultivation of this cotton, as stated above, is at present confined to a comparatively small area. It is probable that this variety could be improved and better adapted to the soil and climate in other parts of the cotton belt, but Upland cotton growers do not like the Sea Island plant, and it would be a difficult task to extend its culture very greatly.

Egyptian cotton (Pl. I, fig. 3) has the disadvantage of having small bolls and of being late in maturing. The bolls open better, however, than those of Sea Island, are more easily picked, and the yield is rather larger. Experiments which have been conducted under the writer's direction indicate that the Egyptian varieties can be successfully grown in various parts of the South, but American planters will always prefer larger bobbled sorts, and the introduction of these cottons into general cultivation will be slow. The writer believes, however, that if the demand for Egyptian cotton continues it may be grown extensively and with profit in this country. The greatest obstacle to its rapid introduction is the different form of bale used in shipping the Egyptian staple and the prejudice of manufacturers against taking the staple from a new region not in Egypt. If the American grown staple could be baled like the Egyptian and shipped from Alexandria instead of from
American points, there is little doubt that it would find a ready market. The present adverse conditions must be overcome, however, before the industry can be established in America, and this will probably require a number of years of experimentation.

The long-staple Upland cottons, however, already have an established market and place in the country, and in general suit the ideals of the growers (Pl. III). By proper attention to the methods of cultivation and manuring, together with intelligent selection of the soils on which to grow the crop, the writer believes that their production is capable of almost unlimited extension. With the proper study and encouragement in the growing of these cottons there is certainly no doubt that the normal increase in the demand for long-staple cotton can be met.

From the standpoint of the general improvement of the industry and of cotton fabrics, this increase is not sufficient. Long-staple cottons produce a better and stronger yarn or thread, and consequently a better wearing and superior quality of cloth. In the improvement of the industry, therefore, cottons with a staple at least 1½ inches long should gradually supplant the short-staple sorts. In connection with the use of long-staple cottons it is interesting to note that after careful tests the United States Railway Mail Service adopted a heavy duck cloth made from Sea Island cotton as the strongest, lightest, and most durable material for the manufacture of mail bags, and the old leather bags formerly used have been abandoned. If individual fibers are of equal strength, it is easily seen that the longer the fiber the stronger will be the thread that is manufactured from it. When a cotton thread is broken there are always some individual fibers, the ends of which lie near the breaking point, which simply slip apart without breaking. The longer the fiber the fewer there will be of such ends near any one breaking point, and therefore the greater the number of individual fibers that must be actually broken in breaking the thread. If other qualities are equal, therefore, the long-fibered cottons produce a better and stronger yarn and a better fabric.

INTRODUCTION OF LONG-STAPLE UPLAND COTTONS.

The introduction of long-staple Upland cottons has been comparatively recent, but the extension of their use has been so gradual that their history has not been carefully recorded, and even now it is practically impossible to obtain reliable information regarding their origin and spread. The variety Peeler seems to have been the first introduced of what may be termed the long-staple Upland cottons, though it is but slightly longer in staple than the ordinary Upland. According to Prof. S. M. Tracy, this race originated in Warren County, Miss., about 1864. It produces a staple about 1½ inches in length and has probably been the progenitor of a number of our long-staple Upland
SEEDS WITH LINT ATTACHED, ILLUSTRATING TYPES OF LONG STAPLE COTTON.

1, Ordinary Sea Island.  2, Allen Improved.  3, Imported Mit Affi (Egyptian).  4, Sunflower.
SEEDS WITH LINT ATTACHED, ILLUSTRATING TYPES OF LONG AND SHORT STAPLE COTTON.

1. Griffin. 2. Southern Hope. 3. Truitt. 4. Hybrid of Sea Island Upland.
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sorts. It is interesting to note that the Peeler cotton is still cultivated extensively, although the cotton now known under this name is probably quite different from the original variety. The name has become so well known that it is largely used in trade to refer to any class of cotton the staple of which will range about 1½ inches in length.

The most marked advance in the development of the long-staple Upland cottons was achieved by the introduction of the Allen Long-Staple, which was originated by Mr. J. B. Allen, of Port Gibson, Miss., about 1879. This variety is said by Mr. Allen to have come from a single fine stalk selected in a field of the so-called “Bohemian” cotton, a variety which he had obtained from Louisiana and the origin of which was unknown. The Bohemian cotton had a fiber about 1½ inches long and was probably similar to Peeler, if indeed it was not identical with that variety. The original Allen Long-Staple cotton was a compact plant with large white tufted seed and fiber 1½ inches long. It might be supposed from the length of the fiber that the original plant was a hybrid of some Upland cotton with Sea Island, but Mr. Allen believes it to have been simply an individual variation of a pure Upland plant.

In 1892 Mr. Allen originated his Allen Yellow Bloom, which came from a single plant growing in a field planted with Allen Long-Staple. It was the first plant with yellow flowers that he had ever seen in fields of Allen Long-Staple, which has cream-colored flowers, and it was preserved as the progenitor of a new race. The Allen Yellow Bloom had small seeds and rather smaller bolls than Allen Long-Staple, and was very productive. The lint ranged from 1½ to 1¾ inches in length and constituted from 28 to 29 per cent of the seed cotton. The appearance of a yellow-flowered plant among the Allen Long-Staple plants would indicate that hybridization with Sea Island cotton must have occurred somewhere in the remote ancestry of the race.

The Allen Long-Staple and Allen Yellow Bloom were both found to be rather susceptible to anthracnose, or boll-rot, and in 1894 the Allen Hybrid was introduced, which was not so susceptible to this disease, and was hardier. This variety was believed by the originator, Mr. Allen, to be a hybrid between King and Allen Long-Staple, the original plant having the habit of branching and form of boll of King, but a long staple like Allen Long-Staple.

In 1898 still another long-staple cotton was introduced and distributed by Mr. Allen. This was the Allen Improved (Pl. I, fig. 2), which was supposed to be a hybrid between his Yellow Bloom and Allen Hybrid. It was an improvement in having limbs of medium length and more puffy lint, which is more easily picked.

The above descriptions of the varieties of long-staple cotton originated by Mr. Allen will show how the varieties of long-staple Upland cotton have usually been secured and how imperfectly their origin is
known. So far as the writer can learn from cotton men and from the history of the origin of varieties, the long-staple Upland cottons first came to be generally known about 1880 or 1881. Previous to this time they had not been recognized as of any special value. It was not until Northern buyers began to go South and buy up the staple that the greater value of these cottons came to be known to the growers. In the alluvial delta region of Mississippi and Louisiana, where long-staple cottons first came into prominence, the soil is very rich and does not require artificial fertilization to give good yields. One peculiarity of the fiber grown on such soils is its greater length and fineness as compared with that of the same variety grown on the poorer soils of the hill regions. This feature is one commonly observed by growers. The better and richer the soil the longer and finer the fiber. Soils artificially manured also show the same effect in the quality of the fiber. The staple from the long-staple delta region previous to about 1880 was largely shipped to New Orleans and sold through commission merchants, and did not bring much more to the planter than ordinary cotton. As a matter of fact, the staple was only about \(1\frac{3}{4}\) to \(1\frac{3}{8}\) inches in length, a slight increase over ordinary Upland cotton, which was probably due mainly to the fertility of the soil rather than to the character of any particular variety or race. The so-called "Benders" cotton, which is well known in the market under this name, is simply any cotton grown in the bends of the Mississippi River, which from its better quality and length of fiber has come to be known to buyers and manufacturers as of special grade. Much of it is doubtless Peeler cotton, but in the majority of cases the planters do not know what variety they are growing.

**VARIED ES OF LONG-STAPLE UPLAND COTTON.**

The cottons grown in the United States belong to four different groups: (1) Sea Island; (2) Egyptian; (3) Upland, or short staple; and, (4) long-staple Upland. The group of long-staple Uplands, or staple cottons as they are frequently called by growers, includes now a large number of races, some of them quite distinct in their characters. The following list of varieties and strains is not intended to be complete, the object being simply to call the planters' attention to some of the principal races that are now being grown:

**Allen Improved.**—The origin of the Allen long-staple cottons, namely, Allen Long-Staple, Allen Hybrid, Allen Yellow Bloom, and Allen Improved, has already been described. The Allen Improved, the latest variety (Pl. I, fig. 2, and Pl. IV, figs. 1 and 2), was distributed first in 1900, and was included in the seed distribution of the Department of Agriculture in 1902. The variety is recommended because of its productiveness and its long staple. The bolls when ripe open up
FIG. 1.—FIELD OF ALLEN IMPROVED COTTON AT PORT GIBSON, MISS., SHOWING METHOD OF RIDGE CULTURE.

FIG. 2.—FIELD OF WELL-OPEN LONG STAPLE UPLAND COTTON AT YAZOO CITY, MISS.
MATURE OPEN AND UNOPEN BOILLS OF LONG STAPLE UPLAND COTTON.

[Fig. 1 and 2, Allen Improved; fig. 3, Griffin.]
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wide, like ordinary Upland, letting the cotton hang out and making it easy to pick. It is said to pick easier than the Allen Hybrid and to have a stronger fiber. Mr. Allen states that it has stood the weather better for the past three years than any other variety of long staple he has ever planted, not rotting in wet weather, as the Yellow Bloom does. It gives an average yield per acre of about 1,500 pounds of seed cotton and from 300 to 500 pounds of lint. The crop of 1900, Mr. Allen states, sold for 17 cents per pound net; that of 1901 for 15 cents, and that of 1902 for from $1.6 to 17 cents. The staple of Allen cotton, according to the statements of spinners, can be handled successfully in warps from 50s to 70s, and in filling, up to 120s or 125s.

Plant 3 to 6 feet high, compact, with two or three long basal limbs and one main central stem. Bolls of Upland type, medium size, slightly pointed, 4 to 5 locked, opening wide. Seeds medium large size, weighing 0.14 to 0.15 gram, gray tufted, 7 to 9 per lock. Lint white, fine, and silky, 1/4 to 1/2 inches long, fairly strong. Per cent of lint, 27. Time of ripening, midseason.

The Allen long-staple cottons are probably now more widely known and grown than any other of the long-staple Upland sorts.

GRIFFIN.—This variety is a long-staple, big-boll Upland cotton (Pl. II, fig. 1, Pl. IV, fig. 3, and Pl. V, fig. 2) produced by John Griffin at Refuge plantation, near Greenville, Washington County, Miss. The first selection was made in the fall of 1867 and the seed planted in the spring of 1868. The variety resulted from a cross of the old "Green Seed" cotton with Sea Island, the cross being made to give a tendency to the Green Seed to produce a longer and finer fiber. The hybrid was from 12 to 16 feet high and very unproductive. It was recrossed five years in succession with pollen of the constantly improved Green Seed. This resulted in reducing the stalk to within a few inches of the length of that of Green Seed, giving it a larger boll, and making it nearly as prolific. Every successive crossing was made on stalks which least resembled the Sea Island in form and most nearly approximated the Sea Island in character of lint. After about ten years of selection some seed were distributed among friends in the vicinity of Greenville, and a few bushels were sold. The variety, however, was never very generally distributed until it was included in the seed distribution of the Department of Agriculture in 1902.

Griffin cotton is without question one of the best long-staple Upland sorts that have ever been produced. Unfortunately, the lint is not very uniform in length, and is inclined to be low in strength. In size of boll, ease of picking, and productiveness, the variety is very good. A peculiar feature of Griffin cotton is its tendency to produce a few very long fibers. Frequently a group of several dozen fibers will reach a length of 2½ or 3 inches, while the average length is only about 1½ to 1½ inches.

*Standard sizes of yarn, similar to the familiar sizes of sewing thread.*
The average yield per acre at Mr. Griffin's plantation, on Mississippi bottom land not having been cultivated more than twenty years, is about 400 pounds of lint cotton. On fresh land of this sort it yields about 500 pounds of lint cotton per acre. The proportion of lint to seed cotton, Mr. Griffin states, is about 28 per cent. Professor Tracy, at the Mississippi experiment station, gave the percentage as 28 to 29. Professor Duggar, at the Alabama experiment station, obtained 29.2 per cent from the crop grown at Auburn, Ala. The crop produced at Columbia, S. C., the past season gave about 29 per cent.

As an indication of the market value of this cotton, Mr. Griffin gives results of sales as follows: When short-staple was selling at 5 cents per pound Griffin sold at 8½ cents. In 1900, when short-staple cotton was quoted at between 8 and 9 cents, Griffin sold for 15 cents. In 1901 it sold for 12 cents, against 8 cents for short-staple of the same grade.

Plant 3 to 6 feet high, vigorous and prolific, with main central stem and several large spreading limbs below; foliage pale green. Bolls medium large, ovate, blunt-pointed, 4 to 5 locked, opening well. Seeds of medium size, weighing about 0.12 to 0.13 gram, gray tufted, 7 to 10 per lock. Lint white, fine, and silky, rather variable in length, ranging from 1½ to 1¾ inches; per cent of lint, about 28 to 29. Season medium.

COOK.—Originated by W. A. Cook, of Newman, Miss., from a single select stalk found in a field of ordinary cotton in 1884. The plant is prolific and a vigorous grower. The bolls, which open well and are easy to pick, are large and long; season of maturing, medium late; lint 27 to 28 per cent, with length of about 1¾ inches; strength, medium. Cook is recognized as one of the best of the long-staple Upland varieties and is cultivated extensively in the delta region. In trials in South Carolina the results were indifferent, but tests should be repeated before condemning the variety for that section. A strain of this variety grown near Yazoo City, Miss., examined by the writer in the summer of 1903, gave uniformly the strongest fiber of any long-staple cotton tested in that region.

COMMANDER.—This variety was originated by R. C. Commander, of Florence, S. C., from seed obtained in Virginia. The plant is similar to Peterkin in shape. The bolls are ovate, medium to small in size, but open well; lint, 1¾ to 1½ inches in length. The Commander cotton has come to be well known in the vicinity of Florence, and is said to be thoroughly adapted to growth in that section.

MOON.—Originated by J. Moon, of Peytonville, Ark., about 1875, being a selection from a single plant producing a specially fine staple. Bolls, large, oval, medium in time of ripening; lint, 31 to 33 per cent; staple, 1¾ to 1½ inches; medium in time of maturity. The lint of this variety is said to be very strong, but the writer has had no opportunity to confirm this statement. The variety is still grown in parts of Arkansas and Louisiana.
PLATE V.

FIG. 1.—PLANT OF SUNFLOWER COTTON, GROWN AT COLUMBIA, S. C.

FIG. 2.—PLANT OF GRIFFIN COTTON, GROWN AT COLUMBIA, S. C.
Peeler.—This was probably the first of the long-staple Upland varieties to be introduced, and was originated in Warren County, Miss., about 1864. Bolls large, opening well and easy to pick; lint, 30 to 32 per cent; staple, 1\(\frac{1}{2}\) inches long; season of maturing, late. This is probably the most widely grown of the long-staple Upland cottons, being in general cultivation throughout the delta region of Mississippi and Louisiana. It is so well known that any cotton of this length is not uncommonly referred to in the market as Peeler cotton. It is stated by manufacturers that Peeler cotton can be spun in warps from 40s to 50s, and in filling from 50s to 70s.

Southern Hope.—According to Prof. S. M. Tracy, this variety was originated many years ago by Col. F. Robieu, of Louisiana, from seed said to have come from Peru. It produces a staple averaging about 1\(\frac{1}{2}\) inches in length and yields from 30 to 32 per cent of lint. It matures late, but is ordinarily early enough to give good results in the delta region, where it is widely grown. It is considered one of the best varieties for general culture in that section.

Sunflower.—This variety (Pl. I, fig. 4, and Pl. V, fig. 1) is of unknown parentage, being the offspring of seeds shipped to an oil mill in Yazoo City, Miss., in 1900, which were purchased for planting by Marx Schaefer. Selections of seed from the best-shaped and most prolific plants were made that season, and the same method of selection has been followed for each succeeding crop, with the result of making the plants more uniform in shape and more prolific. The yield has been from 300 to 500 pounds of lint per acre, fully equal to the yields of short-staple varieties grown during the same season on the same plantation. The crops sold in Yazoo City during the last three years have brought 14\(\frac{1}{2}\) to 15\(\frac{1}{2}\) cents per pound, and no other cottons sold in the same market have brought a higher price.

Plant vigorous and productive. Bolls medium size, ovate, blunt-pointed, opening well, but not dropping the seed cotton. Lint fine, 1\(\frac{1}{2}\) to 1\(\frac{3}{4}\) inches in length; 30 to 31 per cent of the seed cotton. Season early.

The writer grew a small plat of Sunflower cotton during the season of 1903 at Columbia, S. C., in comparison with all of the well-known varieties of long-staple Uplands. It is certainly a distinct variety from any known to him, being about ten days earlier than any long-staple Upland variety tested in comparison with it. Its earliness and productiveness indicate that it will be found a good variety for general culture.

Miscellaneous.—Aside from the varieties or races above described there are a number of other less known sorts which may prove valuable in certain sections. Among these may be mentioned the following: Bailey, Brag Long-Staple, Cobweb, Cochran, Colthorp Pride, Ethridge,
Considering the short period that has elapsed since the introduction of the first of the long-staple Upland cottons, great advance has been made in the general improvement of the varieties. Much still remains to be done, however, to adapt them better to general culture. The chief objection to these cottons, as a class, is their light yield. None of them gives more than 28 to 32 per cent of lint, and as an average the longer-stapled forms seldom give more than 27 or 28 per cent of lint. Thus, while the yield of seed cotton is frequently as great as in the case of short-staple sorts, the lint yield is ordinarily considerably lower. A yield of a bale per acre is sometimes made of varieties like Allen and Sunflower, but the same fields under the same conditions would probably have given a somewhat larger yield of some of the short-staple sorts. There would seem to be no inherent reason why these long-staple Uplands can not be made as productive as the ordinary short staple. Some of them have the same form of plant, leaf, and boll as ordinary Upland cottons, and the production of long fiber, so far as we can judge, requires no more actual plant food per pound of fiber than the production of a short staple. The low percentage of lint and consequent low yield must be improved until as much lint per acre of 1\(\frac{2}{3}\) or 1\(\frac{1}{2}\) inch fiber can be grown as of the short staple. For several years the writer has been conducting experiments in the production of long-stapled, big-bolled Uplands by hybridizing varieties of the ordinary short-staple sorts with Sea Island. The necessity for securing sorts giving a larger percentage of lint per weight of seed cotton has been constantly kept in mind, and very many individual plants have been found having much better covered seeds and yielding a larger percentage of lint than any of the long-stapled Uplands now grown. Two seeds from one of these hybrids are shown in Pl. II, fig. 4. None of these hybrids has as yet been bred into a fixed race, but it is believed that this can be accomplished, and careful experiments are being conducted with this end in view.

Some of the shorter stapled races of long-staple Uplands now give a fair percentage of lint per seed, and nearly equal ordinary short-staple sorts in productiveness. Peeler, which has fiber from 1\(\frac{2}{3}\) to 1\(\frac{1}{2}\) inches long, gives from 30 to 32 per cent of lint, and Southern Hope, which has fiber averaging about 1\(\frac{1}{2}\) inches in length, usually gives from 30 to 32 per cent. Even the longest stapled of these sorts are but little below ordinary short-staple cotton in productiveness, and with the greater

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*a For descriptions of most of these varieties, see Prof. S. M. Tracy's "Cultivated varieties of cottons," in The Cotton Plant, Bulletin 33, Office of Experiment Stations, U. S. Department of Agriculture."
value of the lint their growth is probably rather more remunerative under ordinary conditions where they can be grown to advantage.

The fiber of the long-staple Upland races is also rather low in strength, and this is another feature that must be improved before they will be perfectly satisfactory. Different individual plants vary greatly in strength of lint, and there can be no doubt that stronger fibered varieties can be produced. Some varieties under certain conditions will produce strong fiber and under other conditions weak fiber. It is probable that the nature or composition of the soil and of the fertilizer used has much to do with this character, but the knowledge now possessed is not sufficient to allow of definite statements. It is a general belief that staple produced by plants grown on light, sterile soils is weaker than that produced by plants grown on rich soils. The correctness of this statement is doubtful, however, as the writer has found sterile fields producing strong fiber, while the rich delta lands of Mississippi, planted with the same variety, give a fiber generally low in strength. The writer is aware that strength in cotton fiber is relative. What is strong for a long-staple Upland would be weak indeed for a Sea Island or Egyptian. Many times, in discussions with cotton buyers regarding the strength of long-staple Upland cottons, he has found that their knowledge is based on a comparison of locally grown sorts only. There can be no question that as a group the long-staple Uplands are weak in fiber, and that varieties with uniformly stronger fiber are much to be desired.

Other features to be desired in improved varieties are uniformity in length of staple, larger bolls, and earlier maturity. In almost all of the long-staple Upland sorts the lint is rather shorter on the pointed than on the rounded end of the seed, and when the staple reaches 1½ inches in length it is important that it be uniform in length. In some sorts, such as Griffin, some of the fibers are very long, reaching 2½ and 3 inches, while the majority are only 1½ inches (Pl. II, fig. 1). This would cause waste in manufacturing, and is thus an undesirable character. All of the varieties of these cottons now known, except Griffin, have comparatively small bolls, and large-bulled varieties are greatly in demand among American growers because of the ease in picking, etc. Most of the varieties are late, and early maturity in all cotton is of great importance. The Sunflower is nearly ten days earlier than any other long-staple cotton known to the writer, but still earlier varieties are much to be desired. The improvements considered desirable are discussed here to call the attention of growers to them, with the hope that varieties showing some of these characters may shortly be secured.

THE SELECTION OF SEED.

It is a well-known fact that races of cotton become mixed and impure unless special care is taken to prevent crossing with other sorts. If, therefore, fields of long-staple Upland cotton are growing in the
vicinity of fields of ordinary short-staple Upland cotton, the seed for planting should be taken at some distance from any short-staple plants. It is desirable to locate the seed field off by itself, half a mile or more from any other cotton. Besides precautions to keep the seed pure, it is also very desirable that some careful method of seed selection be regularly followed. It is desirable to keep the variety up to its full productiveness and better adapt it to local conditions, and this may be accomplished by simple and inexpensive methods of seed selection. The following is a simple method, and one which is easy of application:

Choose one or more careful pickers that remain on the plantation continuously from year to year and train them to recognize the best plants, that is, those most productive, earliest in maturing, and having the largest, best-formed, and most numerous bolls. It is also advisable, where time permits, to have these special pickers learn to pull the lint from the seed cotton and test it as to length, to see that this quality is maintained up to the maximum. Each year, before the first and second general pickings, have these skilled pickers go over the field and pick the cotton from the best plants only. These pickers should of course be paid by the day, and not according to the quantity picked. Sufficient seed cotton should be thus carefully picked to furnish, when ginned, the amount of seed necessary for planting the next year. To avoid mixing, preserve such seed separately, and gin it on a carefully cleaned gin.

There is some difference of opinion as to the best cotton to pick for seed. Most planters claim that it is not best to take the cotton either from the first bolls that open, as these are liable to be small and imperfectly formed, or from those that open late in the season. Probably the first and second pickings furnish the most desirable seed, if care is used not to pick from any of the small or poorly formed bolls. Owing to the danger of picking the cotton from small and imperfectly formed bolls, it is frequently recommended that the seed be saved from the second and third pickings, where four pickings are made. More exact data, showing more definitely the effect of selecting seed from different pickings, are very much desired.

Where growers are in a position to do so, they should adopt a more careful method of selection than that described above. More complete methods will be found fully described in an article by the writer on “The improvement of cotton by seed selection” in the Yearbook of the Department for 1902.

METHODS OF CULTIVATION.

The methods of cultivation used with long-staple Upland cottons are the same as those used in cultivating ordinary cottons, and need not be described in detail. These methods should vary according to the locality and soil conditions. In the delta region of Mississippi and Louisiana,
where the long-staple Upland cottons are extensively grown, a certain method of culture is quite generally used, but under other conditions this method would probably not prove satisfactory. In regions where they have not been grown to any extent, the best direction for their cultivation and manuring that can be given is simply to follow the practice that has been found to give the most satisfactory results with ordinary cotton. In the delta region, where the soil is very rich, the rows are placed from 4 $\frac{1}{2}$ to 6 feet apart and the plants from 15 to 20 inches apart in the rows. In many cases the rows are placed much nearer together, some fields being planted at about 3 $\frac{1}{2}$ and 4 feet. In this region the rows are planted on rather high beds, this being necessitated by the lowness of the soil, to secure drainage. (See Pl. III, fig. 1.) In South Carolina and Georgia the writer has seen excellent results with comparatively level culture. In the delta region the land for cotton, when following corn and cowpeas, is usually plowed before Christmas, no fertilizer being used. The plow is usually run about 3 inches deep. Shallow plowing is the general practice in this region. "The more shallow the cultivation, the better the crop," is a statement which several of the best growers emphasized in talking with the writer. It is not probable, however, that this practice would prove at all satisfactory in other regions. After the first plowing the land lies idle until about the middle of March, when it is rebedded ready for planting. The average date when planting begins in the delta section is about April 10.

If the land intended for cotton was planted in cotton the preceding year nothing is done toward the preparation of the soil until the last of January or in February, when the land is rebedded, the soil being turned into the old water furrow, and the beds made alternate with those of the preceding year. If the stalks of the preceding crop are difficult to turn under, they are knocked down and broken up by running a cornstalk cutter over the field. In the delta region described, cotton is ordinarily planted by some single-row planter. Corn planters are sometimes used with cottons that have smooth black seeds, but their use is seldom possible, as none of the varieties has uniformly smooth seeds, and ordinarily a force-feed planter is necessary. Frequent and shallow cultivation has in general been found to give the best results in this section. A cultivation is given about every ten days, the aim being to keep the surface throughout stirred up and loose, so as to form a sort of mulch for the moister soils below and to keep the weeds down. The cultivation should be continued till the cotton becomes too large to admit of passing between the rows. The principal tools used for cultivation in the delta region are the sweep and some cultivator with narrow 2$\frac{1}{4}$-inch-wide shovels. If the fields get too grassy and weedy, as sometimes occurs, it may be necessary to turn the weeds under with a plow. The general practice is to hoe about four times during the season.
Planlers ordinarily do not hoe as many times as they cultivate. The crop is generally laid by, all cultivation ceasing, about the 10th to the 15th of July. Sometimes the cultivation is continued until August if this is found necessary.

PICKING, GINNING, AND BALING.

In the ginning and baling of long-staple Upland cotton it is necessary to bear in mind at every point that a fine product is being handled, and that great care is necessary if the greatest profit is to be realized. This is particularly the case in connection with picking, preserving, ginning, and baling. Greater care should be exercised in the picking to avoid getting the fiber mixed with fragments of leaves, bolls, etc. Fiber from immature and weather-stained bolls should also be discarded. Pickers familiar with ordinary cotton methods are likely to be too careless in their endeavor to gather large quantities and thereby increase their wages. In fine grades of long-staple Upland cotton it will probably also be found desirable to spread the seed cotton on a platform to dry in the sun for a few hours before storing it. This practice is regularly followed by Sea Island cotton growers, but so far as the writer is informed, has not been adopted by growers of the long-staple Upland, and it must be conceded that fair results are obtained where no drying is practiced. It is of course necessary after heavy dews and rains that the seed cotton be thoroughly dried before storing it in the seed house.

The difficulty of properly ginning long-staple Upland cottons has been considered an impediment to their general cultivation. It is generally recognized that long-staple Sea Island sorts require to be ginned on a roller gin, as the saw gins tear and break the fiber to such an extent as greatly to reduce its value. It is also very commonly supposed that the long-staple Upland cottons require to be ginned on a roller gin, and this understanding has prevented many from attempting to grow these cottons, as roller gins are ordinarily accessible only to growers in regions where Sea Island cotton is cultivated. Experience has shown, however, that long-staple Upland cottons can be ginned on ordinary saw gins if care is used in the process. Before ginning these cottons the gin saws should be sharpened square across the teeth and then dulled somewhat by use in ginning ordinary short staples. It is also important to run the gin at a lower rate of speed than in ginning short-staple cottons. All through the delta region, where the long-staple Upland cottons are grown, they are uniformly ginned on saw gins, the saws being run usually at a speed of about 300 revolutions per minute. The finest stand of roller gins which the writer has ever seen was installed by a company at Vicksburg, Miss., especially to gin cottons of this sort. There can be no doubt that the cotton ginned on roller gins is much superior to the saw-ginned product,
yet this fine stand of roller gins remains idle and unused. Roller ginning is so much slower and more costly that growers prefer to use saw gins. Much of the long-staple cotton, however, is very poorly ginned, being torn and cut up and full of "naps," so that its value is greatly reduced. It is a question whether it would not be better to use roller gins in preparing the longest fibered sorts, but they are not now used. The fact that no roller gin is accessible on which to gin the product need not deter anyone from cultivating these cottons. When the precautions above given are carefully observed the long-staple Upland cottons may be satisfactorily ginned on any ordinary saw gin if the seed cotton is well matured and preserved thoroughly dry and in good condition.

Long-staple Upland cotton is baled exactly the same as short-staple cotton, that is, in the ordinary square gin bales or in round bales. By far the larger part of the crop is put up in square bales, rather more care than usual being taken to cover the entire surface of the bale with closely woven burlap. The cotton being more valuable than ordinary cotton, more care should be exercised to protect it from becoming stained and damaged in shipment. The round bale is particularly well adapted for long-staple cottons, and the writer would urge the use of this form of bale wherever possible. The process of recompressing the square bale is known to break and seriously injure long-fibered cottons by the sudden thrust under great pressure, and is never used with the fine long-staple Sea Island cottons. By the use of the round bale this source of injury is avoided and the fiber is put up in a neat package, specially adapted for shipment by rail or steamer.

MARKETING.

It is also important that growers of long-staple Upland cottons give special attention to the marketing of the product. The writer in the season of 1902 saw several bales of long-staple Upland cotton sold to a buyer at a small interior town in South Carolina for 10 cents per pound which were certainly equal to bales of similar cotton which he saw sold in the New Orleans market the week following at 15 cents per pound, when ordinary cotton was selling at $1. Many of the failures with long-staple Upland cotton have been due to lack of experience on the part of the grower in the matter of marketing. Many buyers take advantage of the growers' ignorance and purchase cotton for 10 cents per pound that is worth 15 cents and realize the difference themselves. In many localities where long-staple cotton is not generally grown, the buyers are not informed as to the value of the different grades and necessarily protect themselves by giving the minimum price. In 1¼-inch staple, for instance, scant quarter, quarter, and full quarter give variations in value which are important to the grower.
Every eighth or sixteenth of an inch added to the length of the fiber increases the value.

The following prices, obtained for long-staple cottons marketed at Yazoo City, Miss., the past autumn, indicate something of the range of value of different lengths of staple:

<table>
<thead>
<tr>
<th>Name of cotton</th>
<th>Grade length, full.</th>
<th>Date sold.</th>
<th>Price per pound.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunflower</td>
<td>1(\frac{1}{4}) to 1(\frac{3}{4})</td>
<td>October 1</td>
<td>15(\frac{1}{2})</td>
</tr>
<tr>
<td>Do</td>
<td>1(\frac{1}{4}) to 1(\frac{3}{4})</td>
<td>October 8</td>
<td>15</td>
</tr>
<tr>
<td>Allen</td>
<td>1(\frac{1}{4}) to 1(\frac{3}{4})</td>
<td>October 8</td>
<td>15</td>
</tr>
<tr>
<td>Southern Hope</td>
<td>1(\frac{1}{4})</td>
<td>September 30</td>
<td>12(\frac{1}{2})</td>
</tr>
<tr>
<td>Chitister</td>
<td>1(\frac{1}{4})</td>
<td>September 30</td>
<td>12(\frac{1}{2})</td>
</tr>
<tr>
<td>Do</td>
<td>1(\frac{1}{4})</td>
<td>September 30</td>
<td>13(\frac{1}{2})</td>
</tr>
</tbody>
</table>

Ordinary cotton in the same market sold October 8 at about 9 cents, and this was about the average price from September 30 to October 8.

Until buyers inform themselves on the value of long-staple cotton and pay reasonable prices it will have to be consigned to general long-staple markets, such as New Orleans, Vicksburg, Savannah, or Charleston, or to some of the large New England markets, such as Providence or Boston. An increasing number of Southern mills, particularly in Georgia and South Carolina, are coming to use long-staple cotton purchased mainly in Mississippi and Louisiana. In the immediate vicinity of such mills a ready home market should be obtained for the long-staple product. The length of staple desired by such mills should be ascertained and varieties selected for cultivation which ordinarily produce staple of this length.

Long-staple Upland cottons have been successfully grown in many sections in South Carolina, Georgia, Alabama, and Texas not now recognized as in the regions producing these cottons. There seems to be no reason why these cottons can not be grown on any good, rich cotton land properly manured and cultivated. In any good cotton region where mills are located which use long staple, the growing of this cotton in the immediate vicinity should be thoroughly tested and encouraged. By a proper selection of varieties the writer believes that staple of almost any length desired, up to 1\(\frac{3}{4}\) inches, can be produced on good soils in any good cotton region, and the cooperation of mill owners and planters in the production of the staple desired should result in benefit to both.