

THE CULTIVATION OF THE COTTON PLANT AND THE AGRICULTURAL FUTURE OF SENEGAMBIA AND OF THE SOUDAN

THE apprehension of a Cotton Trust in the United States, and the scarcity of cotton in every market, have caused considerable anxiety in England, Germany, and France, the three countries which chiefly suffer from the short supply of raw material.

German experiments in West African planting have been made in Togo-land, with the help of Negro experts brought over from America. Germans are also encouraging cultivation of cotton in the Russian possessions in Central Asia; where in 1900 seven million pouds of cotton were produced (1 poud is something over 35 lbs.): that is two million pouds more than the amount produced in 1899. In the same way the Germans are endeavouring to develop cultivation of cotton in Mesopotamia and Northern Syria.

France has opened enquiries as to what she may be able to do in her West African possessions, and the following paper describes the immense quantities of cotton which may be produced under proper management.

English experiments have not yet gone very far. Samples of cotton seed were lately sent to Lagos to be sowed in different places, and the plants must now be approaching maturity.

Governor Sir C. A. King-Harman, in some remarks he made to the chiefs and people at Bandajuma, February 12, 1901, said as follows:—

“Cotton is much wanted in the English market, and a large English merchant has written to me to say that he will give £50 to the first person

who will send to England from here a ton of cotton. That does not mean the price of the cotton, it means a present for the first ton which is sent away. I do not know the price, but I know that they are anxious to buy. Cotton is easy to grow, and if every town would plant a little it would bring much money into the country. I can get the best seed, and I am ready to give it to those people who will sow it."

The meeting held in Manchester on the 7th of May last, and the contributions promised by various merchants, show the interest which is now felt in the development of cotton plantations within British dominions. At the second meeting held in Manchester early in June last, a certain sum was provided for the opening of necessary researches and experiments, Sir A. L. Jones promised £100 a year for five years and offered to carry cotton home freight free for one year, Mr. John Thomson promised £250.0.0 to be spent during the next five years, Mr. John Holt of Liverpool, Mr. Hutton, Sir George Cotton and Mr. Swanzy promised to follow the lead given.

The following influential committee was at once formed :—

Manchester Chamber of Commerce—John Thomson, J. A. Hutton, Sir Geo. Cotton, M. S. Bles, John Walkden, G. B. Zochonis. Liverpool Chamber of Commerce—Sir A. L. Jones, John Holt, D. L. Wright, J. R. Callender, T. H. Barker. Oldham Chamber of Commerce—J. E. Newton, B. Crapper, C. Newton. Halifax Chamber of Commerce—A. W. Whitley, John Robertshaw. Bolton Chamber of Commerce—W. M. Musgrave, W. H. Hoyle, C. H. Woods. Bury Chamber of Commerce—F. Whowell. Blackburn Chamber of Commerce—H. Harrison, A. Birtwistle, F. Hodgkinson. Federation of Master Cotton Spinners—C. W. Macara, J. B. Tattersall, J. Ridyard, John Lees. Master Cotton Association, Limited—E. Stansfield, T. A. S. Hobson. United Cotton Manufacturers' Association—Tom Garnett. Oldham Master Cotton Spinners' Association—James Fletcher, F. Hardern. Operative Cotton Spinners' Association—T. Ashton, E. Mellor, Wm. Mullin. Fine Cotton Spinners' and Doublers' Association, Limited—two representatives. Burnley Chamber of Commerce—two representatives. Preston Cotton Spinners' Association—two representatives.

After discussion the following resolutions were passed unanimously :—

"(1) That in the opinion of this meeting the continued prosperity of the British cotton industry depends on an increased supply of cotton, and it is desirable that our sources of supply should be extended. (2) That in order to attain this end an association be formed, to be called the British Cotton Growing Association. (3) That its principal object be the extension

of the growth and cultivation of cotton in British colonies, dependencies, and protectorates. (4) That a guarantee fund of £50,000 be raised, to be spread over five years, no guarantor being required to contribute more than one-fifth of his total guarantee in any one year. (5) That this association shall have power to form a subsidiary company or companies and to dispose of any of its assets to any company thus formed, on condition that subscribers to this association have the first option of taking up shares in any such company in proportion to their subscriptions. (6) That a general committee should be appointed. (7) That this general committee should appoint from their number members to form the executive committee. (8) That the executive committee shall immediately collect all the available information on the subject and despatch expert expeditions to report on the best methods of procedure, and shall have power to—(a) Acquire land on which to make experiments and to establish plantations; (b) distribute seed among the natives and to encourage them by advice and assistance to grow cotton on their own land, and to engage experts for this purpose if necessary; (c) establish stations to buy and sell cotton, or any of its by-products, animals, implements, or any other articles or goods necessary for the expeditions; (d) to adopt any other means that may suggest themselves from time to time to attain the object in view. (9) That the general committee issue a report once each half year of the work which has been done."

Under these circumstances it has been thought that the following paper will prove of interest to those who are concerned in the growth of cotton in British West Africa. It is the translation of an article which appeared in August 1901 in the "Journal d'Agriculture Tropicale" published in Paris. The writer is a skilled botanist, who has been specially employed by the French Colonial Office in missions to French West Africa for the purpose of ascertaining its agricultural resources; and who has now started for a further mission to the Chari.—[ED.]

THE RESOURCES OF THE COUNTRY.

The rapid completion of the Railway from Senegambia to the Middle Niger, and the construction of that from Guinea to the Southern Soudan, will open up for colonisation a vast Empire long since pacified and explored in every direction. The Soudan, up to the present day, has only exported a little gold, some agricultural products such as rubber, gum bees-wax, and the gains of the chase, ivory and ornamental feathers. But this kind of exploitation cannot last indefinitely; it is already necessary to penetrate into the Interior of Senegambia over

2,000 kilometres¹ from the Coast, to find rubber vines that have not yet been farmed, and it is only very rarely that herds of elephants are encountered on the confines of the forest of the Ivory Coast or in the Baoule. The development of Agriculture would create permanent sources of wealth.

Two-thirds of the Soudan consist of land with which nothing can be done. It is only in the valleys and on the alluvial plains that agricultural enterprise should be attempted, and even here there must be no illusion as to the number and the returns of the possible cultures.

Neither the cacao-tree, the coffee-tree, vanilla, nor spices could be cultivated, as the climate is too dry and the arborescent vegetation too thin.

Cattle (sheep, bullocks, goats) and the native edible plants (manioc, sorgho, rice, bananas, yams) are almost the only resources now existing in the country the production of which could be rapidly developed ; but it is probable that for a long time to come they could not become articles of steady export from Africa.

The Ground-nut, Castor-Oil plant, and Sesame flourish well, but they are of low value and could not bear the cost of export.

As regards the cultivation of rubber and gutta percha, we are still in the experimental stage and it would be extremely imprudent to bind the future of a Colony to so doubtful a resource.

THE COTTON PLANT.

Like the Kola Plant, this plant seems to be the only one likely to prove remunerative to the European who can cultivate it in the Guinea Zone (Upper Ivory Coast and wooded regions of French Guinea). In fact the Cotton Plant is at present the only actual native culture which might be developed so as to furnish any considerable export trade from the Soudan proper (from 10 to 16 degrees Lat. N.).

The Cotton Plant was imported into Africa in very ancient times, but until a few years ago scarcely any efforts were made by Europeans to improve its cultivation, though the occupation of the Soudan began over three centuries ago.

¹ 2,000 kilometres = about 1243 miles.

During the American Civil War, under the impulse given by General Faidherbe and the botanist Legard, the annual export reached 50 tons for several years, but when the effects of the War ceased to be felt, the cotton of Senegambia was no longer able to compete with that of North America. Its cultivation was universally abandoned.

THE ECONOMIC MISSION OF THE SOUDAN.

In 1898 General de Trentinian, Lieutenant Governor of the French Soudan, revived the study of this question on a large scale. An Economic Mission of the Soudan was organised in which no fewer than four specialists were charged with researches concerning the cultivation and farming of the Soudan cotton.

Mons. Jacquy, an Agriculturist already installed at the "Garden" at Kati, sowed several varieties of cotton seeds of Egypt and the United States, and himself supervised their cultivation.

Mons. E. Fossat, a Cotton-broker of large experience, delegated by the Chamber of Commerce of Havre, was charged with the commercial side of the question, and succeeded in collecting in the Middle Niger 70 tons of picked cotton still containing the seed, of which only a small quantity could be shipped to France. The Cotton Society of Saint Etienne du Vauvray spun 2,500 kilos¹ of cotton collected by Mons. Fossat which arrived at Havre in 1899; in their report they mentioned the fibre of the Soudanese cotton as having made the best impression on their Society, and asked for further supplies for their use.

Mons. Baillaud specially examined the native process of spinning, and recognised the possibility of setting up a small weaving industry in the Djenne region. He also brought back with him a very complete collection of goods woven in the Country, which was exhibited in 1900 at the Colonial Office.

In this Mission, I was entrusted with the study of Biological Questions relating to Cotton Plants, such as the botanical determination of various species, their geographical distribution, and their natural selection, etc.

By these researches, set on foot by General de Trentinian,

¹ 2 tons 9 cwt. 23½ lbs.

it is now well established that the valley of the Middle Niger is admirably adapted to the cultivation of cotton on a large scale. Its climate, irrigation, and the fine development of the most widespread native species, prove this beyond doubt.

SPECIES AND VARIETIES.

Four species of *Gossypium* are at present cultivated in Senegambia and French Soudan, but none of them are indigenous.

These species are—

1. The *Gossypium Herbaceum* L. probably the most ancient species known to the Natives who call it "the female Cotton Plant" ("N' dar Guine" in Wolof, "Coroni Moussa" in Bambara).

2. The *Gossypium Barbadense* L. (Var. Sea Island, *G. Maritimum* Tod. Var. Jumel or Mako, *G. Maritimum* Var. Jumelianum Tod, etc.) is of quite recent introduction into the Soudan, for the first seeds were distributed in 1896 and 1897. The Natives call it the "White-man's Cotton Plant" (Coroni Toubab in Bambara). This long-fibred species which gives such fine results in Louisiana and Egypt, has generally failed in West Africa. Perhaps it may be acclimatized in time in Senegambia, on the plains of Baol and Cayor near the sea where the dew is abundant. It also appears to thrive in the South of the Soudan where the rainy season lasts 6 to 7 months. In the North on the contrary and especially in the Middle Niger, it does not thrive and gives but little blossom. In short the climate is manifestly too dry and checks the development of this species, generally an annual, and of too rapid growth. Moreover at Sansanding most of the plants were destroyed by an invasion of caterpillars. The Natives also, to whom General de Trentinian had distributed seeds of the various varieties of Egypt, very quickly gave up its cultivation.

3. Sometimes in Senegambia near the Coast a very robust Cotton Plant is found. Its leaves are deeply cut, its petals are pale yellow showing a clear red spot on the white part of the leaf adherent to the cup. This plant is without doubt the *Gossypium Religiosum* L. It is an intermediate species between the *Gossypium Barbadense* L. and the *Gossypium Hirsutum* L.

It appears to be a fixed hybrid, that is to say, reproducing itself by seed with the same characteristics. This Plant resembles very much the "hybrid Cotton Plant of the Niger," which we will deal with later on. The *Gossypium Religiosum* is a very rare species in Senegambia and is wholly absent in the Soudan. It would be perhaps interesting to endeavour to classify it. Our short stay in Senegambia did not allow of our studying it completely.

4. The *Gossypium Punctatum* Perr. The best known Cotton Plant all over Senegambia and the Soudan is the *Gossypium Punctatum* Perr (exclus. descript. and var. *Acerifolia*). It is a very vigorous African species of the *Gossypium Hirsutum* L. Sometimes it is fairly villous, sometimes completely glabrous. It is often found completely naturalised in the bush.

As this Plant is said to have come originally from America, it may probably have been carried to the Coast by the first Portuguese ships that crossed backwards and forwards between the New and the Old World, at the same time as manioc, ground nuts, tobacco, etc.

The seeds are of the size of a pea, they are of a green colour before maturing, becoming later yellow. The fibre is very adherent, generally white but sometimes reddish, and the wool is short, thick, ash coloured, and persistent.

The best plants produce annually from 30 to 50 pods which ripen in November and December, that is to say in the middle of the dry season ; a few other pods develop more slowly.

In the most favorable soil around San, Djenne, and Sumpi the fibre attains a length of 25 to 28 mm.¹ and is fairly regular. This is evidently caused by the more favorable climate and especially by the more perfected cultivation.

QUALITIES AND DEFECTS OF THE SOUDAN COTTON PLANT.

The Soudan Cotton Plant has real qualities which could be developed by a constant selection and by more perfect cultivation, as for instance the use of manures and irrigation of the plantations during the dry season. Its most appreciable advantages are the following :—

1. It is admirably adapted to the climate of the Country : in

¹ 1 inch to $1\frac{1}{8}$ inch.

spite of the seven or eight months of drought which it has to suffer, and the small quantity of water it receives (from 15 inches to 31 inches per annum, perhaps more along the Middle Niger), it thrives vigorously in all the valleys and on plains irrigated in the winter season.

2. Robust bushes are in full bearing during two and three years and more.

3. The fibre attains in the most favorable places (for example, on the alluvial soil around Lake Sumpi) from 25 to 28 mm.¹ It is therefore an "average fibre" of current commercial dimensions.

4. The fibre is sufficiently resisting, at the same time neither too coarse nor too fine.

5. It is very white. Occasionally some Plants produce a reddish fibre valued by the Natives for making thread which is employed without being dyed to border or to mark their garments.

It appears that the Soudan Cotton is particularly suitable to become a substitute for Indian Cotton.

The two principal defects of the Soudan Cotton are :—

1. The want of uniformity in the length and quality of the fibre.

2. The very strong adherence of the wool to the tegument which makes the ginning laborious and causes the rupture of some of the fibres in this operation.

The first defect would disappear by careful cultivation, while the good qualities mentioned above would be strengthened. As regards the non-adherence of the wool fibres, this could be obtained by crossing the *Gossypium Punctatum* of the Soudan with a class of *Gossypium Barbadense* having non-adherent fibres.

HYBRIDATION AND ARTIFICIAL SELECTION—THE HYBRID COTTON PLANT OF THE NIGER.

Such crossings have already taken place naturally in the Experimental Gardens of the Soudan, where the native Cotton Plant and the American Cotton Plant (Sea Island) have been cultivated side by side. We noticed many of these hybrid

¹ 1 inch to $1\frac{1}{16}$ inch.

forms in the Experimental Fields of Sansanding which were created by Fama Mademba. Most of these hybrids were already in their second generation. The most general form, which we will name the "Hybrid Cotton Plant of the Niger," shows an almost equal blending of the qualities of the parent plants.

The bushes of the Hybrid Cotton Plant of the Niger are semi-arborescent, showing almost the vigour of the *Gossypium Punctatum*. They have withstood the drought and the invasion of caterpillars which almost destroyed the *Gossypium Barbadense* in the Experimental Fields in 1899.

One only of the specimens under observation had long and fine fibres non-adherent to the tegument. All the others on the contrary showed by their flowers and by their pods most of the characteristics of the *Gossypium Punctatum*, especially the adherence of the fibres, and they only differed by the leaves and a red spot on the white part of the leaf adherent to the cup.

According to the laws brought to light by Mons. Hugo de Vries, the non-adherence of the fibre will in this case constitute the "recessive characteristic," which will gradually disappear in succeeding generations. It is easy to foresee that in the second generation, in every hundred descendants of the first hybrid there will only be 25 which will retain the characteristic non-adherent fibre of the *Gossypium Barbadense*. Therefore in order to improve the cotton of the Soudan it will be necessary to select from the 25 those which have preserved most of the good qualities of the Native Cotton Plant.

It will be necessary to take great care in their selection so as to prevent the return of the adherent fibre. It would also be necessary to try to obtain a maximum number of pods ripening together so as to facilitate gathering them.

THE FUTURE.

The future success of Senegambia and of the Soudan, and the prosperity of the Cotton Industry of France, depend on the efforts made in this direction. We must not shut our eyes to the fact that in its present state the Soudan Cotton cannot be

exported commercially to Europe, even if there was a railway to carry it to the Coast; for it must not be forgotten that this Cotton is rarely quoted on our markets, and although Legard was able to obtain 1,000 Kilos¹ of unginned cotton per hectare² in 1863 at Richard Toll, in irrigated lands, the results are very small under actual native cultivation.

The best sorted out Soudan staple was quoted in Havre 40 frs. the 50 Kilos³ in 1899. If the plants are 1m. 50⁴ apart a hectare would comprise 4356 plants, able to produce under the best existing conditions 20–30 pods per plant at the most, which would give 137–260 kilos of ginned cotton per hectare,⁵ calculating 500 pods to 1 kilo⁶ of fibre. We are far behind the results obtained in Egypt, where it appears they obtain 1000 pounds of ginned cotton per hectare.

Again, we must not forget that the carriage of a ton of ginned cotton from the Niger to Havre would cost, even with a railway to the Coast, 110–120 francs per ton.⁷

It should also be remembered that the improved varieties (in America and in Turkestan) give 33 per cent. of cotton in proportion to the total weight of their seed; now the pods of the native Cotton Plant at present only give in the Soudan 25 per cent. of cotton. Great efforts are still needed to make French West Africa a cotton exporting country. Nevertheless we believe that it is precisely the cultivation of cotton, along with the raising of cattle, that would insure agricultural prosperity through the whole extent of the Soudan.

The regions where the Cotton Plant could acquire a great development are particularly in Senegambia: Baol and Maritime Cayor, in the proximity of water; and in the Soudan, that region of the Niger that Mons. Camille Guy has so happily named the Mesopotamia of the Niger, which by its system of inundations, its fertility, and its climate, is in every way comparable to the Lower Nile.

In this latter Country, it would be possible at the present time to cultivate 250,000 hectares⁸ with Cotton without any special system of irrigation. Estimating the return at only

¹ 2,204 lbs. ² 1 hectare = 2 acres 1 r. 35 p. ³ £1 11s. 8d. the 110 lbs.

⁴ 59 inches apart. ⁵ 301 lbs. to 572 lbs. per 2 acres 1 r. 35 p.

⁶ 1 kilo = 2½ lbs. ⁷ £4 7s. 3d. to £4 15s. 2d. per ton. ⁸ 965¼ sq. miles.

200 francs per hectare,¹ which figure is far below the reality, it would mean an annual revenue of 50,000,000 francs,² and it could be made to yield this in very little time. This area could be trebled by constructing reservoirs along the course of the river at a normal height, where the water could accumulate during the winter season to be distributed afterwards over the plantations.

A few years of peace and assistance have sufficed for Senegambia to become and to continue the richest source of ground-nuts in the world ; in like manner the Soudan with a few years of persevering effort would become the richest Cotton producing country of the world, capable of supplying the greater part of the French Markets.

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APPENDIX.

A SUMMARY OF THE HISTORICAL ATTEMPTS TO CULTIVATE COTTON IN WEST AFRICA.

It is more than a century and a half since Europe made her first endeavours to procure West African Cotton for her mills. The R.F. Labat advised the "Compagnie des Indes" to send French colonists to Senegambia for the purpose of cultivating cotton and tobacco. This project, developed in 1728 in the "Relation du Voyage de Brue," was not followed up. However 60 years later it was again introduced by the Swede Waldstrom, whose first attempt at Agricultural Cultivation at Cape Verde failed on account of the death of most of the emigrants who had accompanied him there.

On his return to Europe Waldstrom did not long remain idle. He laid before the House of Commons his scheme for the emancipation of the slaves and the social betterment of the natives by teaching them to cultivate the soil. His Lectures led to the foundation of the Colony of Sierra Leone, which in its origin was simply an experiment in agricultural colonisation.

Waldstrom relied especially on cotton to develop the agriculture of the Black Continent. He studied in a manufactory in Manchester the most simple means of spinning, with the intention of going out to Senegambia to make use of the cotton on the spot in the manufacture of native stuffs.

The troubled state of Europe during the French Revolution prevented his finding the means of carrying out his plan, and he died without return-

¹ Fr. 200 = £8.

² £2,000,000.

ing to Africa. Until the XIX Century the attempts by Europeans to cultivate cotton appear never to have gone farther than making plans. Since then serious efforts have been made on three occasions.

From 1817 to 1830 very important attempts were made. Colonel Schmaltz and Baron Roger, Governors of Senegambia during this period, greatly favored private enterprise. Bounties were in the beginning accorded to the cultivation of cotton, but after a first disappointment these bounties were withdrawn and were transferred to its export. In spite of this, the total export from Senegambia between 1820 and 1830 did not surpass 100 tons of ginned cotton.

There was great enthusiasm at the outset, when a Philanthropic Society started a Plantation at Cape Verde in 1820, and when the Government established Experimental Fields at Walo ; but there was an equally general abandonment of all efforts when Governor Brou officially proclaimed that cultivation of any sort was impossible in Senegambia. Perrottet explained this first failure by the scarcity of rain, the evil effects of the east wind, the want of fertility of the soil, and the high price of labour. He also concluded that it was impossible ever to cultivate Senegambia. We at present know how very much mistaken he was, at least as far as the ground-nut is concerned.

Documents of that period gathered from different Archives show that the cause of failure was far more serious. Most of the plantations were merely dishonest speculations, and the Government itself was guilty of gross carelessness. When in the Census Report of 1825 the Government stated that the Colony possessed 3,500,000 Cotton Plants, they carefully omitted to note that the Europeans cultivated these plants with no more care than did the Natives. These Colonists were not contented merely to leave their cotton plants uncultivated, but when the census was taken it was discovered that they broke off branches and stuck them in the soil to gain larger bounties, amounting to 10,000 francs per 200,000 plants, and 6,000 francs per 100,000 Plants. It was no longer the products of cultivation that enriched the Colonist, but the bounties and frauds. When the bounties were suppressed cultivation ceased.

From 1863 to 1868, during the American Civil War, Governor Faidherbe made a vigorous effort to develop again the cultivation of cotton in Senegambia. About 50 tons of cotton were exported during a few years, but again on this occasion the effort was too weak and with the close of the war the export ceased. Certain plantations of that time, for example that of the Missionaries of Saint Esprit, appear to have been conducted in a serious manner, but most of the plantations seem to have suffered from the "great dryness," "east winds," and the "ravages of the caterpillars."

Besides they only seem to have cultivated the native cotton plant with the foreign cotton plants : Louisiana, Sea Island, Jumel. Thos. Legard, who operated at Richard Toll, obtained by irrigation encouraging results. In regions where there was more rain, as in South Senegambia, similar results could have been obtained without irrigation. But it is always on the banks.

AGRICULTURAL FUTURE OF SENEGAMBIA AND SOUDAN 443

of the Senegal, close to the Sahara, that agricultural efforts have persistently been made in Senegambia.

In 1899, whilst General de Trentinian in the Soudan was superintending the interesting experiments we have already related, Mons. Perruchot was making experiments in the several Gardens of the Colony. In his Report published in the Exhibition Volume of 1900 he concluded that it was possible to acclimatize Egyptian Cotton Plants in Senegambia. "They have thrived fairly well in all soils, but silico-argilious soil is the most favorable. They resist the East Wind relatively well."

Unfortunately the epidemic of Fever in 1900 interrupted all these studies.

In conclusion, none of the attempts to cultivate cotton undertaken up to the present day in Africa have been made under conditions that would permit of arriving at a definite decision regarding its cultivation. It is a question to be taken up again experimentally from the very beginning.

PARIS, 1st *May*, 1902.

(Signed) A. CHEVALIER.