

REPORT OF THE IMPERIAL COTTON SPECIAL-
IST FOR THE YEARS 1907-09.

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1. *Charge*.—Mr. Gammie joined the Imperial Department of Agriculture as Imperial Cotton Specialist on the 14th December, 1907, and has continued in charge of his office since. Until 10th October, 1908, when he was relieved by Mr. W. Burns, he held charge of the office of Economic Botanist, Bombay, in addition to his own duties, and from 6th August to 30th September, 1908, he held charge of the office of the Principal, College of Agriculture, Poona, owing to the illness of the Principal and the Professor of Agriculture.

2. *Tours*.—During the cold weather of 1907-08, the Imperial Cotton Specialist examined the cottons on all the farms of the Bombay Presidency and gave advice. In March 1908, he visited some farms in the Madras Presidency and discussed the experiments in progress with the Deputy Director of the northern division. During April and May an extensive enquiry was made regarding the varieties of cotton and the conditions under which the cotton crop is grown in Gujarat and Kathiawar. In Surat and Broach districts the quality of the cotton is best in the south and gradually gets worse as one proceeds northwards. Navasari has the finest and longest staple, then comes Surat and then Broach. This may be due to the heavier rainfall and greater atmospheric humidity at Navasari (owing to its proximity to the sea), for there is little apparent difference in the soil. Cultivators of the neighbouring districts have used Navasari seed, but, although the produce was ginned and despatched to Bombay separately, it failed to realise the same price as that obtained for cotton grown at Navasari. This may, however, have been due in part to the marks on the bales

showing that the cotton came from Broach and Surat. The two cotton varieties *Broach deshi* and *ghoghari* grown in the latter two districts are quite suitable to the tract, but it is absolutely necessary for the cultivators to maintain the purity of the seed. The growing practice of separating seed from the fibre in ginning factories, instead of as formerly by hand gins, has tended to injure the quality by mixing the seed. The average farmer gets his seed haphazard from the general supply at the ginning factory, good, bad, early, late, medium, tall, bushy and ordinary varieties all mixed. There can be no improvement, unless the seed is at least equal to the average of the previous crop. The improvement by selection of seed continued from year to year, is most important. If careful selection of seed is practised, and if the cultivator takes the trouble to handgin his seed at home, there is hope that the lint will be improved in quality and that the outturn per acre will also increase. In selecting the seed, cotton should be picked from the best sound bolls of large, healthy plants of branching habit of growth, each plant having a large number of bolls. Of the two varieties now growing in these districts the *Broach deshi* variety is the *standard*, and at present its price in the Bombay market rules that of all other cottons of India.

Kathiawar accounts for more than one-third of the total area under cotton in the Bombay Presidency (excluding Sind). Formerly *wagad* and *lathio*, two varieties of nearly the same quality as *Broach* (though picked less carefully, and, on that account, fetching a lower price), were the only ones found in Kathiawar, but on account of the succession of years of irregular rainfall, beginning with the famine year of 1900, they have been largely replaced by two inferior coarse varieties *mathio* and *navesari* (not Navasari) from Central India which give good yields, mature early and can be grown without much risk in years of scanty rainfall.

During the month of October, 1908, the Cotton Specialist visited the Punjab, Sind, Rajputana, Central

India and Gujarat. Throughout the four first named, the prevailing cottons are of *neglectum* type mixed with a plant resembling *bani*. If these two cross freely very close observation would be needed to establish the fact; that they remain, on the whole, true to type is easily demonstrated. The produce of these plants is probably the most inferior cotton in India which, however, fetches a price in advance of its intrinsic merits on account of its white colour and suitability for adulteration with wool. Throughout the area is found intermixed a superior style of cotton which has been already distinguished by the Cotton Specialist as *malvensis*. Officers of the provincial departments who are serving in coarse cotton tracts are already testing the feasibility of establishing this as a pure race, and Mr. Clouston of the Central Provinces is sanguine of ultimate success.

In the Punjab alone there is an annual variety of *arboreum* which the Cotton Specialist has already named *sanguineum*. It occurs chiefly as a *mixture* in the fields, and from a trade point of view there is no particular reason why it should be isolated, as its cotton is in no way different from that of the more common varieties. At the Lyallpur farm the Economic Botanist was engaged in studying a set of Punjab cottons, so that he could draw out a scheme for future work in selection. The experiments with upland Georgian and Egyptian cottons were of prime importance. The former is not of the New Orleans type, naturalised in the southern parts of Bombay and Madras, and which is intolerant of cold, but the true Upland which requires a distinct autumn for its development. Sales of this cotton have proved that a good price can be readily obtained for it, and since the officers of the Punjab Department have found in this a product far in advance of anything they can hope to attain from the selection of their indigenous varieties, it was gratifying to see that they were attending specially to the establishment of first class varieties of upland Georgian. They ought in this connection to carefully study the methods

employed in the United States. Of the chance of success for Egyptian cotton in the Punjab there is more doubt. The Bombay merchants consider that the Egyptian cotton grown in Sind is distinctly inferior to that directly imported from Egypt, and that from the Punjab would probably be no better.

In Sind the Cotton Specialist discussed the subject of cotton cultivation with Mr. Henderson, Deputy Director of Agriculture. The latter is of opinion that the very sanguine estimates formed on the results of trial sowings of Egyptian cotton, must be considerably modified in the light of recent results. He states that no further extension of the area suitable for growing Egyptian cotton can be counted on outside the Jamrao canal district until a further system of perennial canals is constructed, and that on the Jamrao canal a maximum of not more than 10,000—20,000 acres could be sown under favourable circumstances. Further, owing to scarcity of labour, occasional scarcity of water and the often alkali condition of the soil, the Jamrao cultivators prefer a surer, if less profitable, return in the cultivation of millets and short stapled indigenous cotton to giving the requisite care to the cultivation of Egyptian cotton. Despite the unsatisfactory results hitherto obtained, Mr. Henderson believes that good results can be got with Egyptian cotton when Egyptian methods of cultivation are closely followed. He lays special stress on very careful cultivation and rotation of the cotton crop with *berseem* (*Trifolium alexandrium*).

The American cottons, Texas Big Boll and Boyd's Prolific and also the acclimatized Dharwar-American, have been tested during the last year in Sind and have given promising results. They have a shorter growing period than Egyptian cotton, enabling them to be sown on inundation canals.

At the sewage farm in Karachi Spence cotton, Egyptian cotton and Sea Island cotton were tried with disappointing results. This was to be expected, as cotton is in no way a suitable crop for a sewage farm.

The Central Indian cottons consist only of *bani*, *jari* and *varadi*, with the usual preponderance of inferior types, and the remarks made on the Central Provinces cottons below will also apply to these.

In November, 1908, the Cotton Specialist visited Bassein in the Konkan to study the results of Bourbon cotton cultivation there, and then proceeded to Pusa to discuss various subjects with the Inspector-General of Agriculture in India and other officers of the Imperial Department. Afterwards a visit was paid to Bhagalpur, and cotton matters were discussed there with Mr. Woodhouse, Bengal Economic Botanist. Cotton is not, of course, an important crop in this Presidency, but the attention of the officers of the department might be drawn to the fact that *Gossypium intermedium* (according to the classification of the Cotton Specialist) is perhaps common as a garden crop in some parts. At least three separate plots were seen between Muzafferpur and Pusa, adjoining the railway. Sir George Watt, in his recent great work, states that the famous Dacca muslins were manufactured from one of the coarsest cottons in India, and he reproduces Roxburgh's coloured figure to support his point. From internal evidence it may be gathered that Sir George Watt was ignorant of the existence of *Gossypium intermedium*, because the picture he gives shows clearly a distinct form of this race. Some varieties in favoured localities may produce fine staple which is far more likely to be used in the manufacture of a superfine cloth than one which closely approaches the coarse Bengal or Assam type. There is no record of *Gossypium intermedium* being found anywhere in Eastern Bengal, but local officers may not have suspected its existence as a garden crop grown in villages near houses and not in the fields. The real source of the Dacca muslin cotton is a matter sufficiently important for close investigation.

The cultivation of *burhi* cotton in Chota Nagpur is probably capable of extension. Hand gins have been supplied by the Deputy Director of Agriculture, Bengal,

for the use of villagers. The cultivation of the cotton crop generally in Chota Nagpur is on the decline, owing to the restriction of the *daha* system of cultivation. This system consists in burning thick layers of jungle on the land selected for the cotton crop. The land is thus fertilised with the ashes, and weeds are killed. If there is not enough jungle on the selected site, jungle including often valuable trees, is cut down at some distance and carried there. The system is a wasteful one, and its restriction cannot, therefore, be deprecated. Tree cottons are grown in the district to a limited extent. The plants give a fair return for three or four years after which their yields diminish.

During the same month a visit was paid to the Central Provinces and Berar Exhibition, and full advantage taken of such a favourable opportunity of studying samples of cottons from all parts of the province. Side by side with the experiments which are being conducted for the improvement of the local *jari* and *varadi* by the selecting out of a superior race known as *malvensis*, work of great importance has been done in the introduction of *burhi* cotton. The staple has been favourably reported on, but something further is required in the way of strength, and it is hoped the provincial department will attain this quality by selection. In the course of a conversation with an enterprising gentleman who cultivates about 1,000 acres of land near Yeotmal, it was learnt that *burhi* cotton is thoroughly at home in low lying ground where *jari* was killed by excessive rain in the last season. There is thus a chance for the introduction of *burhi* into areas of heavier rainfall, and Mr. Clouston has arranged to work out this point. It should not be grown, however, on the higher and drier lands which are exactly suitable for *jari*. Mr. Hemingway, Director of Agriculture, stated that a good deal of cotton wilt had been reported from the Satpuras, but he himself thinks that it is not really wilt, but damage caused by the heavy rainfall. He also stated that *bani* requires a heavier rainfall than *jari*, that the

cultivation of the former has declined owing to a long succession of abnormally dry seasons, and that with more favourable climatic conditions, *bani* will probably again come into favour. He also says that the *ryots* are quite alive to the necessity of selecting good seed and hand gin what is required for their own use.

In the adjoining tracts of the Nizam's territory, a particularly fine cotton known as *karkeli* is grown from its centre of trade. A quantity of the best *karkeli* seed cotton was obtained, and after ginning, was submitted to Messrs. Tata for opinion. They valued it as equal to fine Broach and further stated that the chief characteristic of the *karkeli* variety of cotton is its tension which is greater than that of any other variety of Indian cotton, and that it is greatly valued by the mills on that account. The Cotton Specialist has supplied seed to all parts where the coarser cottons are grown, and when samples of the produce are received, he will, if the results are promising, be able to arrange for its introduction on a larger scale. This cotton consists of *jari* of a very superior type with an admixture of *bani* and *upland Georgian*. It is even in staple and general characteristics. However the fact that inferior cotton is brought down from Central India for mixing purposes, is to be deplored.

At Barsi also a good type of cotton, mostly *bani*, used to be brought in from the Nizam's territory, but now, owing to the substitution of inferior varieties, its reputation has sadly diminished. It may be mentioned here that there is little direct proof of deterioration of the cotton plant anywhere in India, and that falling off in quality is greatly due to substitution of inferior varieties, or to mixture of good and bad varieties at the ginning factories. During January, 1909, the Cotton Specialist toured in Gujarat to study the factors of environment which influence the characteristics of the distinct varieties of cotton which exist there. Such a study may make it possible to formulate general laws for the production of different varieties of cotton.

Many of the Kathiawar States this year have gladly undertaken to carry out experiments with superior cotton, and there is hope that the former good varieties will again find a footing there.

The experiments with *Bourbon* cotton at Nadiad farm are very promising. Years ago partial success was obtained in its cultivation in the Kaira district, and the ultimate failure was perhaps due to the ignorance of the requirements of a perennial cotton which needs careful pruning among other details. Some of the samples of cotton were valued very highly. Mr. Spence might have obtained success further north at Deesa if he had tackled the problem in the right way. Some samples of Bourbon cotton from the Coimbatore district have been favourably reported on by a Bombay merchant.

Bourbon is probably the only foreign tree cotton worth experimenting with in India, and an attempt is at present being made to obtain sufficient information to enable definite schemes to be formulated for its cultivation on a larger scale. Its chief virtue at present seems to be that it is not suitable for ordinary cotton soil tracts where it would immediately suffer by admixture, but it would thrive on red and sandy soils where cotton is not a usual crop. In the Madras Presidency it is almost the sole memorial of the long defunct cotton department, and it has there suffered from long and unmerited neglect.

In February, 1909, the Cotton Specialist attended the Board of Agriculture meeting at Nagpur, and there discussed cotton matters with the officers interested. In March he toured through the southern Mahratta country, Madras Presidency and Bangalore where he advised the recently appointed Economic Botanist as to the experiments he should undertake.

In the previous year three Bombay cottons were reported as having given satisfactory results at Bellary. Broach, however, shows a steady decline. The peculiar yellow coloured cotton of the Madras Presidency is objected to

in the Bombay market where a white colour is one of the chief desiderata. A constant introduction of fresh seed would only partially remove the difficulty, as even in the case of cotton at Dharwar from imported seed, it was pointed out to Mr. Gammie that it was darker in colour. In the southern part of the Madras Presidency it has been proved that the *karangani* is superior to *uppam*, and steps are being taken to distribute quantities of the former. The introduction of the seed drill is considered the most important part of the work done.

From Burma intimation was received that the department had resolved to begin experiments; so, as a preliminary, sets of seeds of standard varieties were supplied in order that their behaviour might assist in arriving at some idea on what lines the trials should ultimately run.

3. *Collection of Varieties.*—A large collection of annual and perennial cottons, both indigenous and American, has been kept under observation at Kirkee and Ganeshkhind. The only tree cottons which gave any promise of success, were Bourbon and Spence cotton which is ordinarily indistinguishable from Bourbon.

4. *Distribution of Seed.*—Considerable quantities of cotton seed have been supplied, in all, to 47 persons in various parts of India.

5. *Identification and Valuation.*—A good many samples have been sent in for identification and valuation. All samples received for valuation were submitted to Bombay merchants, and the verdicts transmitted to the senders. An assistant recently appointed with a previous knowledge of cotton valuation, has studied the subject in Bombay and ought to prove of great help in the future in this line.

It is hoped to keep in close touch with cotton merchants. The Cotton Specialist has met and talked with a good many, and he feels that the trader and not the farmer is the chief obstacle in the way of improvement.

6. *Programme for 1909-10.*—It is proposed to tour in Eastern Bengal and Chittagong Hill Tracts in the autumn to advise on the possibilities of improvement of cultivation and introduction of suitable superior varieties. A visit may be paid to Burma later on. A scheme will be formulated for extended trials of Bourbon cotton, at least in the Madras and Bombay Presidencies. A tour will again be made in Gujarat to continue the investigation into the conditions which affect the production of cotton. This enquiry is also carried on wherever touring is done. The introduction of superior cotton into Kathiawar and of *karkeli* cotton into *jari* districts, will depend on the results achieved. Finally the Cotton Specialist is at the disposal of any one who may require his advice or assistance.