

# COTTON

## COTTON GROWING IN MADRAS.

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The Madras Presidency, covering over 90 million acres, extends, as far as cotton is concerned, from 8° to 16° north latitude, and is thus well within the tropics. Its boundaries are, however, irregular through the inclusion of the large native states of Mysore, Cochin, and Travancore; and in configuration it is broken up by two ranges of mountains passing generally north and south. On the west, close to the coast, is the continuous rampart of the Western Ghats from 4,000 to close on 9,000 feet high; and on the east the Eastern Ghats, close to the coast in the north, gradually recede from it till they are lost in isolated masses about halfway down. This configuration makes the Presidency one of the most delightful parts of India from the scenic point of view.

The indigenous cotton varieties are entirely rain-fed, and the annual fall in the cotton tracts roughly varies from 20 to 40 inches, this, considering the great heat of the tropical sun, is distinctly on the low side. As in all regions of periodic rains, the year is divided into "wet" and "dry" periods. The bulk of the rain falls between May and November, and it is not infrequent for the remainder of the year, December to April, to suffer from a spell of continuous drought for five consecutive months. The growing period for cotton is therefore somewhat strictly limited, and there are other factors which prevent the full rainy period from being completely utilized for this crop. In these conditions it is only possible to mature the crop because of the presence of a peculiar type of soil, specially fitted in all respects for the growth of the indigenous types. This is termed locally the "black cotton soil," and a brief description of it will be necessary in order to understand the Madras conditions.

This soil covers large areas between the mountain ranges, either in great plains or on slightly undulating land, and is intensely black in colour. It is not met with in Northern India, but covers immense areas slightly on the western side of the main axis of the peninsula. Its origin is rather mysterious, but the northern portion (Bombay, etc.) appears to have been derived from the trap formation, and the southern (Madras) from the prevailing gneiss. It is very uniform in texture, so as to show little difference between soil and subsoil, and remarkably retentive of moisture. It cracks deeply during the dry part of the year, but readily breaks down to a fine powdery mulch, especially under repeated shallow cultivation. The Madras black cotton soil is said to be rather poorer than that derived from the trap, is often slightly saline, and generally underlain by a layer of limestone concretions known as "kankar," which provides an excellent road material. The indigenous Indian cottons are distinctly deep rooting, and so possess a

considerable degree of drought resistance; they can thus, on this soil, go on growing and mature their bolls long after the last rains of the year have fallen. Lastly, the black cotton soil is markedly free from weeds of cultivation, and only a few kinds of trees are met with on it; so that the larger cotton areas present, during the off season, the appearance of boundless black desert plains, without the clumps of trees and scattered villages so characteristic of Southern India. Weeding costs are greatly reduced, a surface mulch is rendered easy, and we have here a fine example of dry farming, evolved by the cultivators in their ancient indigenous agricultural system.

Another factor of extreme importance which must be further discussed before we can form an opinion as to the Madras cotton conditions is the length of the growing period. In North India cotton is grown as a summer crop because of the winter cold; in the south of Madras it is a winter crop; and in the northern part of Madras a transition between these two extremes is met with. In the Madras Presidency cold is no longer a factor of importance; the incidence and duration of the rains dominate the position. The rainfall in the northern part, commencing in May, makes it possible to plant the crop during July and August, whereas in the extreme south it is necessary to wait till October. In both cases, because of the absence of rain after December, picking begins in February, and this leaves very little time in the south for cotton to grow. India is noted throughout the world for its short growing period for cotton, and this is shorter in the south of Madras than elsewhere in India with the exception of the extreme north-west. Nothing but the retentive nature of the black cotton soil, the drought-resistant character of the Indian species, and the intelligent labour of the ryot could enable the crop to survive.

On the average there are in Madras over 2,300,000 acres grown under cotton each year. There are five main tracts distinguishable, primarily dependent on the distribution of the black cotton soil, but also separated by the trade into time-honoured grades of lint. In the northern section, adjoining similar areas in Bombay and Hyderabad, a broad band extends from east to west and is divided into three tracts, termed Westerns, Northerns, and Coconadas respectively, diminishing in acreage, the first two together covering over 1,000,000 acres and the last under 250,000. The species of cotton grown are, in the Western tract, almost pure *Gossypium herbaceum*, with a rather short, harsh lint of a pure white colour; in the Northerns *G. herbaceum* with a considerable admixture of *G. indicum*, with a lint as a rule less white in colour but of distinctly superior length and softness; and in the Coconadas tract, which is less clearly defined in area, but has its focus near to the Northerns and extends in a north-eastern direction, an entirely new species is grown, named *G. obtusifolium*, with soft lint, often of a distinct khaki colour, irregular in length, and inferior in staple to Northerns. In the southern part of the Presidency there are two main tracts, known as Salems and Tinnevellies. The former is again less clearly defined, having its focus in the extreme west (Coimbatore) and extending in a south-easterly direction, while the latter forms a compact area in the extreme south of the Presidency. These two areas comprise 360,000 and 660,000 acres respectively; the predominating species is *G. herbaceum*, but towards

the South *G. indicum* comes in till, in the extreme south, it is the species almost exclusively grown. The lint varies with the species as in the northern region, but is, on the whole, of a better class. Included in the acreage of the southern tract, there is a newly introduced American species (*G. hirsutum*) grown under special conditions which will be referred to later.

Coupled with and dependent on the geographical distribution of these cotton in Madras, there are marked differences in elevation and climate. In the northern half we have the highest and driest cultivated land in the Presidency. In the heart of the Westerns tract, which has an elevation of from 2,000 to 3,000 feet above sea-level, less than 20 inches of rainfall on the average during the year, which means that in alternate years the total is less or more than this. Extreme dry heat is experienced during the early summer (April to June) while during the rest of the year the air is pleasantly cool. Much of the Coconadas tract lies little above sea-level, and the rainfall averages 40 inches; the weather, although often hot and steamy, has none of the great heat further west. The Northern area, although broken up by ranges of hills, lies between the two in these respects, with a rainfall a little over 30 inches. Similar differences are met with in the southern region. The elevation is about 1,200 feet in the west of the Salems tract and sinks in a south-easterly direction to near sea-level, the rainfall increasing from about 22 to 30 inches or more. Most of the Tinnevellies tract is little above sea-level, and the rainfall is about 28 inches. The weather in the south is more insular in character, and, while there is a short cool season at Coimbatore, the rest of the tract is uniformly hot, but the heat of summer is less intense than further north.

Cotton cultivation in Madras is of a high order, but, as the cotton tracts are occupied by three different races, there are variations, sometimes of a substantial character. In all alike, as elsewhere in India, the "plough" is merely a heavy cultivator, and there is no attempt to turn the sod; indeed, such a thing as a sod is practically unknown. There is little difference between soil and subsoil, and this shallow cultivating action of the plough is not so primitive as would appear, when we consider that the conservation of moisture is the main aim in all field cultivation in this hot, dry country. In the Westerns and Northern tracts and in the main portion of the Coconadas the cultivation of the Canarese and Telugus is often very good; and its chief distinction from that in the southern area is that the crops are drill-sown. The drill itself, a contraption of bamboos and ropes and bits of wood and iron, is, according to competent agriculturists, one of the most efficient and economical in the world; and the sowing in lines has given rise to a whole series of cultivators, harrows, and hoes, of very light draught, which can be run over a number of rows of the crop at the same time. Three-tine implements are the rule, but they vary from one to twelve, all except the latter being easily drawn by a single pair of bullocks, and they are much simpler than the drill in structure, being made for a few shillings by the village carpenter and blacksmith.

In the south of Madras the Tamils are noted for their agricultural efficiency, and this is well seen in the cotton cultivation in the Tinnevellies

tract, although some very good work can be seen in the western focus of the Salems. But the drill is unknown to the Tamils, the seed being broadcast or dropped in the plough furrows; and this difference carries with it a world of others, the details of which cannot be even touched upon here. In place of the multitude of special implements in vogue in the northern region, the indigenous plough and hoe, with the right men behind them, are fully capable of dealing with all the needs of the crop.

The preparation of the ground is very carefully attended to, for the cultivators are well acquainted with the necessity of a perfect seed bed for germination and early growth. Cotton seedlings, because of their long tap root and large ear-like cotyledons, are specially liable to injury before the root branches, and foliage leaves appear. No manure is, however, given to the crop, because experience has taught the ryot that the rank growth thus induced during the warm, moist growing period would prevent the bolls from ripening before the hot, dry, early summer, when all immature flowers and bolls are quickly shed. Any manure that has been got together—cattle droppings, ashes, domestic rubbish, and crop residues—is given to the previous crop of the rotation; and this manure being of a slow-acting nature, while the rotation crop is a short one, much of it remains over unutilized.

Except in the case of poor farmers who, for financial reasons are, compelled to sow their cotton year after year, rotation is universally practised in Madras cotton cultivation; and the general selection of a cereal crop for this purpose is agriculturally sound. The cereal, besides being only for a short time in the ground, is shallow-rooted, and contrasts well with the deep-rooting cotton in its soil demands. The kind of cereal varies with the locality; but it is usually some form of millet, the staple rain-fed grain crop of the tropics of the old World; the great millet (*Sorghum*), Italian millet (*Setaria*), and spiked millet (*Pennisetum*) are the most important as regards rotation with cotton. Leguminous plants often enter the cotton fields, but this is more the case in the drill-sown tract; cotton is usually sown pure in the south.

Weeding, as already noted, is not a serious item, at any rate in the later stages of growth, but the land is continuously worked over after the rains have ceased, until the desired fine mulch of the black cotton soil is obtained, when the fields may be safely left for the maturing of the crop. Picking is not such a difficulty in India as elsewhere, and is usually done by gangs of women and children. It is, however, very badly done in the northern tracts, and, after close study, it has been found very difficult to see how this can be altered for the following reasons: In the Indian climate, where the sun becomes very hot soon after rising, it is most desirable that the cotton should be picked while the leaves and bracts are still pliable after the night's dew; for if this be neglected it is almost impossible for the pickers not to break off small bits when pulling the lint out of the bolls. According to the economic arrangements in the northern villages, picking falls to the lot of the women: these are quicker and better pickers than the men, and so have complete charge of the situation. As they have first to attend to the preparation and cooking of the day's food,

they are unable to enter the fields until the sun is well up, and the cotton suffers in consequence. The difficulty, moreover, appears to be a local one; the pickers spend the day in the field and rely mainly on the evening meal, while in other parts the midday meal is the rule.

The marketing of the cotton leaves much to be desired, although improvements are being gradually introduced by the Agricultural Department in co-operation with the larger cultivators and merchants, and with the Indian Central Cotton Committee, which is devoting special attention to the prevention of the mixture of inferior cottons with good kinds that goes on so largely, and damages the reputation of the latter. The poorer cultivators—who constitute the bulk of the growers—always in need of money, are more or less in the hands of middlemen and money lenders, both functions being often performed by the same individual. Without external help, it is thus idle to expect the ryots to make any change in their time-honoured customs, although they may be very well aware that they do not receive the full value of their produce. The explanation of the anomaly is, however, fairly simple, in that mixing of inferior lint is a well-established practice in most parts of India, the idea being to do this so circumspectly that it will either not be noticed and the value of a superior kind obtained, or that the fine imposed will not be large enough to equal the gain obtained by this fraudulent practice. The introduction of co-operative selling, the establishment of regular buying markets, and the formation of buyers' associations, which would remedy these defects are not easy matters, because of the vested interests involved. And there is always the fact that the local middleman will go from door to door and pay cash down, knowing that the poor growers often cannot afford to wait, even if he be free to sell where he likes—which is not often the case. But improvements are gradually making headway, especially in those areas where new and better kinds of cotton have gained a definite status on the Liverpool market. In general, the local practice of judging the value of the cotton by its place of origin, using past experience for thus classifying it, makes it almost impossible for any improvement to be made in quality unless this is done on a large scale by co-operation.

A considerable amount of research work has been devoted to cotton in Madras since the formation of the Agricultural Department about twenty years ago; and in various directions marked success has been obtained in improving the character of the lint. The problem is, however, a different one in each tract, and a description of the way in which favourable results have been obtained would necessitate a much longer article than the present. Good work has been done in both the Westerns and Northern tracts in selection among the indigenous varieties, but it is in the Tinnevelly that the most outstanding success has been obtained, after years of patient separation in the fields, mass selection, and selection along progeny lines; and, when a good strain has been evolved, by introducing co-operative growing and selling among the larger cultivators and influencing the firms buying the cotton. The net result of this work, started in 1905, is that at the present time there is a grade of superior cotton sometimes known as "Tinnevelly American," but better known as "Pure Karunganni,"

which is well known and appreciated on the Liverpool market. The length of lint is  $\frac{9}{16}$  to 1 inch, and the ginning percentage 25 to 26, as against  $\frac{1}{8}$  to  $\frac{7}{8}$  inch and 27 for ordinary Tinnevellys.

A further success has been obtained along an entirely different line—that of the introduction of a form of American Uplands, first grown in Tinnevelly, but reaching its greatest development in the western focus of the Salems, round Coimbatore. The Uplands type of cotton has not the deep-rooting system of the indigenous Indian species and does not, therefore, succeed in growing on the exiguous rainfall and in the black cotton soil; but, with occasional irrigation from wells, in land of lighter texture and colour devoted to the intensive growth of food grains and vegetables—land that is well manured and carefully cultivated—this cotton, called after its place of origin “Cambodia,” has spread right over the southern part of Madras. The length of lint of this type is a little over 1 inch, and the ginning percentage 33, and it fetches a price equal to or slightly higher than ordinary Uplands cotton.—The Empire Cotton Growing Review, Vol. II. No. 2.

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## RECENT RESEARCH WORK ON COTTON.

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An inspection was made by the cotton specialist (Mr. Wells) recently, of the Cotton Research Station at Melton, where the Department of Agriculture, in conjunction with the Empire Cotton Corporation and the Commonwealth Government, is conducting experiments to ascertain the cultural methods most suitable for the growing of Durango cotton in that area. A striking illustration of the effect on the growth of a cotton plant, that thinning has at different stages of the plant's development, was shown in an experiment in which small blocks of the plants were thinned when they were 4, 6, 8, 10, 12 and 15 inches in height respectively. The plants in the blocks which were thinned when the plants were 4 inches to 6 inches in height were of a blocky, thick-stalked nature—well laden with squares which were soon to commence flowering, while the plants which were thinned when 12 inches and 15 inches high were of a slender, spindly stalked type, with just a few squares developing in the top of the plant.

Another experiment of decided interest was that demonstrating the value of cross-harrowing in the early stages of the development of the plant. Material advantage had been obtained by cross-harrowing with a spike-toothed harrow, in that the amount of cultivating with a machine and hand clipping had been greatly reduced in the period before the plants were thinned, and if the season had been less favourable it is believed that the extra mulching in the row around the plants would have been shown to be of decided assistance in conserving the moisture. Close examination of the plants failed to show any signs of injury having been done to the plants, even where harrowed once a week, and from the results obtained in the experiment and also from the experiences of growers in other districts it appears that where the grower has a good strike he may do very efficient work with the spike-tooth harrow up to time of thinning when the plants are 4 to 6 inches in height.—Queensland Agricultural Journal, Vol. XXIII. Part 1.