CHAPTER IV.

AGRICULTURE.

According to the 1881 census returns agriculture supported about 612,000 people or seventy per cent of the population :

Belgaum Agricultural Population, 1881.

Age.	Males.	Females.	Total.
Under Fifteen ...	121,133	113,240	234,373
Over Fifteen ...	186,776	191,158	377,934
Total ...	307,909	304,398	612,307

Husbandmen.

The bulk of the regular husbandmen are Lingáyats and Maráthás ; next in strength to Lingáyats and Maráthás come Jains, Musalmáns, Dhangars, Mhárs, Berads, and Bráhmans. Husbandmen of the better class live in tiled houses, own £30 to £100 (Rs. 300-1000) worth of ornaments and metal vessels, and have grain enough in store to meet all demands for food and for seed. Sometimes they have a surplus which is lent on interest. The poorer class of husbandmen live in mud-roofed houses or in grass huts, own £5 to £10 (Rs. 50-100) worth of goods, and have a store of grain barely enough to keep them for half a year. During the remaining months they have either to work as labourers or to run into debt. All are well-behaved, orderly, and religious, and, except the poorer classes who are a little given to drinking, sober. Bráhmans, Lingáyats, and Jains are clean in their persons and in their houses ; most of the other classes are more or less dirty and untidy. On the whole they are thrifty. Though hardworking, especially in Belgaum and Khánápur, their character as husbandmen is not high. As a rule they are landholders or *kháteddrs* who till their own land ; the rest are under-holders or labourers. As much land has passed into the hands of moneylenders there is a considerable body of under-holders. But these are not all dependent on the moneylender as well-to-do landholders or *kháteddrs* not unfrequently, in addition to their own holdings which as a rule they inherit, become the tenants of a moneylender, and till part of his land either as sharers in the produce or on payment of a money-rent. During the off season, that is from about February to May, the ordinary husbandman uses his oxen and carts for carrying grain and other produce to the two great grain markets of Nipáni and Belgaum. He also makes considerable profit by carrying cotton to Vengurla in Ratnágiri whence there is always a large return traffic in salt for local use and in the stores required by the residents in the large civil and military station of

Chapter IV. Agriculture.

Husbandmen.

Belgaum. Besides by carrying, the better class of husbandmen add to their income by moneylending, by the sale of dairy produce, and by cotton-spinning, cotton-ginning, and blanket-weaving. Poor husbandmen eke out their gains by fishing, hunting, and fowl-rearing. These additions to their incomes vary from £1 to £50 (Rs. 10 - 500). About twenty-five per cent of the husbandmen are free from debt; the remaining seventy-five per cent are indebted. This indebtedness is owing to expensive family ceremonies, law suits, crop failures, and unwillingness to part with their land. The amount of debt varies from £2 to £50 (Rs. 20-500). In almost all cases the indebtedness of husbandmen may be traced to family ceremonies. To meet the expenses which attend family ceremonies savings are spent, then the store of grain goes, next an ox or it may be a pair of oxen are sold, and last the family jewels are pawned. Stripped of his store of seed and food-grain, so soon as his stock of food is exhausted, the husbandman has to go to the moneylender. Once in the hands of the moneylender, charge gathers on charge, until the holding is mortgaged, at first without possession, but generally in the end possession passes to the lender. The moneylender's name appears in the Government books and the landholder sinks to a labourer. The yearly rates of interest vary from twelve to thirty per cent. Though in most parts of the district the people have to a great extent recovered from the 1876-77 famine, in Gokák and some other red and poor soils the effects of the famine are, in places, still apparent in ruined houses, in arable waste, and in impoverished husbandmen. Of late years the chief agricultural change has been the growing desire of the lending classes to get possession of land.

Soil.

Geologically the soils of the district may be divided into two classes, the red and the black. The red soils are primary soils, that is they are the direct result of the decomposition of the iron-bearing rocks. This variety of soil is generally found all along the western border; it also occasionally occurs in the plain country as in the tableland between the Ghatprabha and the Krishna, and in the Belavádi and Ambadgatti village groups or *khariyats* of Sampgaon. This red soil is mostly coarse and poor, and, as in these western parts the rainfall is plentiful, the chief products are the early, called the *kharif* (M. and H.) or *mungári* (K.) crops. In parts of Athni red garden lands are watered from wells. The black soils are secondary soils, that is, they are rock-ruins changed by the addition of organic matter. The black soil is not solely the result of the weathering and enriching of the ruins of trap rocks. Black soil occurs as largely and as typically in tracts where the rock is gneiss as it occurs in tracts where the rock is trap. The black soil covers most of the plain country and is best suited for the growth of cotton, Indian millet, wheat, and gram. In east Gokák it is so rich as not to need fallows. The husbandmen by careful changes secure a yearly crop. In the north-east of the district, bordering on the Don, are loamy plains of noted richness. Only in seasons of extreme drought do the crops in these lands fail, and in average seasons the harvest is almost always fair. The black soil of the Krishna valley is of most uncertain depth, the waving trap lying sometimes several feet, at other times only a few inches below the surface. Near the sandstone hills in Chikodi,

Soil.

Gokák, and Parasgad, owing to the crumbling of the sandstone, the soil is little better than sand. This sandy soil does not want much rain, but it wants constant enriching, and, with the aid of manure, yields fair crops of cereals, pulse, and oilseeds. Locally the black soil is divided into four classes: *káli* or rich deep black, *movat* or red and black mixed of middling richness, *karak* or thin black over stone, and *mali* or alluvial which near the Krishna is of unusual richness. For cotton-growing the *káli* and the *movat* are gronped together as *regur* (Tel.) or pure black. Two other varieties of black soil are recognised, a brown less-matured *regur* and a gray-black largely mixed with lime nodules and with a layer of lime two to ten feet below the surface. The pure black soil is best suited for local cotton and the brown soil is best suited for American cotton of which very little is now grown; the gray-black soil is inferior to the other two. Kánarese husbandmen describe their cotton soil as *yera bhumi* or melted earth. The cotton soil is very dense and is improved by a mixture of sand and pebbles. Its chemical properties show that it contains all the elements of vigorous growth. Much of this land is very deep. Three feet and npwards is common, and depths of twelve or fifteen feet and even of thirty and forty feet are not unusual.[1]

Arable Area.

The revenue survey returns give Belgaum an area of 2,979,840 acres. Of these 1,163,738 or 39·05 per cent are alienated, paying Government only a quit-rent; 1,179,300 acres or 39·57 per cent are arable; 398,720 acres or 13·38 per cent forest; 156,572 or 5·25 per cent unarable waste; and 81,510 acres or 2·73 per cent village sites and roads. Of 1,179,300, the total Government arable area, 1,072,820 acres or 90·97 per cent were in 1881-82 held for tillage. Of this 7860 or 0·73 per cent were garden land; 53,600 or 4·99 per cent rice land; and 1,011,360 or 94·27 per cent dry-crop land.

Holdings.

In 1881-82 the total number of holdings, including alienated lands in Government villages, was 63,201 with an average area of 25·50 acres. Of the whole number of holdings 8904 were of not more than five acres, 11,079 were of five to ten acres, 18,902 of ten to twenty acres, 18,207 of twenty to fifty acres, 4343 of fifty to a hundred acres, 1304 of 100 to 200 acres, 378 of 200 to 500 acres, sixty-four of 500 to 1000 acres, fourteen of 1000 to 2000 acres, and six of above 2000 acres. Of holdings above 500 acres, ten were in Chikodi, seventeen in Parasgad, twenty-three in Athni, twenty-eight in Gokák, and two each in Belgaum, Khánápur, and Sampgaon.

A Plough.

One pair of good oxen can work twelve to sixteen acres of dry-crop land and four to ten acres of garden land. In Chikodi and Athni the general practice in ploughing black soil, which when dry becomes very hard, is to use two to four pairs of bullocks. It

[1] An analysis of the best cotton soil showed, in 4500 grains, 3324 grains of very fine soil, 936 grains of impalpable powder, and 240 grains of coarse pebbles like jasper, with pieces like burnt tiles strongly retentive of moisture. The impalpable portion consisted of 18·000 grains of water, 0·450 of organic matter, 0·083 of chloride of sodium, 0·007 of sulphate of lime, 0·027 of phosphate of lime, 0·450 of carbonate of lime, 0·013 of carbonate of magnesia, 15·200 of peroxide of iron, 16·500 of alumina, 0·085 of potash, 48·000 of silica combined and free as sand, and 1·185 of loss. Walton's Belgaum and Kaládgi Cotton, 88.

Chapter IV. Agriculture.

is roughly estimated that twenty to forty acres of the better class of dry-crop land or six to ten acres of garden might enable a cultivator to live like an ordinary retail dealer, and that, except in seasons of failure of rain, forty to sixty acres of dry-crop land or ten acres of rich garden land would enable him to support himself, his wife, and two children and one field-labourer comfortably without being obliged to have recourse to other work or to the moneylender.

Stock.

According to the Collector's yearly returns the 1881-82 field stock included 60,204 ploughs, 22,510 carts, 206,313 bullocks, 127,089 cows, 138,719 buffaloes of which 89,975 were females and 48,744 males, 6218 horses mares and colts, 3598 donkeys, and 283,936 sheep and goats.

Field Tools.

The chief field tools are, two kinds of plough the large or *negali* (K.) and the small or *ranti* (K.), the large hoe-harrow or *kunti* (K.), the seed-drill or *kurgi* (K.), the grubber or *yedi-kunti* (K.), the weeder or *belli-salla* (K.), and the pick-axe or *báigudli* (K.)

The Plough.

Of the two ploughs the heavy or *negali* consists of a massive three-cornered block of very hard wood, rudely shaped by the village carpenter, so that the broad lower part forms the share on which a strong iron bar is fixed as a tongue. The hinder part under an acute angle forms the breast of the plough into which, near its upper end, a handle is let in from behind, while from the front side the plough-bar is fixed below the handle. This plough-bar consists of a somewhat bent or crooked beam, at least twelve feet long. It is laid on the necks of the rear pair of bullocks, which are always the strongest of the team. Instead of bullocks the rear pair are sometimes buffaloes which when well broken are heavier and steadier than bullocks. The team includes four, five, six, sometimes even eight pairs of bullocks, all harnessed with small cords to a long leather rope, which passes round the beam and the hinder part of the plough. An old man usually leads the team, while on the yoke of the third pair of bullocks a boy is seated, who with a strong leather whip belabours and urges the bullocks both before and behind him. This heavy plough is difficult to manage. In spite of every effort the ploughman is unable to keep it in anything like a straight line, while the acute angle between the share and the beam of the plough is constantly choked with earth. Still it is specially useful in bringing neglected black soil under tillage by uprooting the grass and weeds which stifle the crop. A heavy or *negali* plough costs 8*s.* to 16*s.* (Rs. 4-8) and is seldom owned by the poorer landowners. It turns over the soil to a depth of fifteen inches. Three ploughings are necessary, the first along, the second across, the third cornerwise. It takes about seven months to bring about twenty-four acres of black land under tillage. The light or *ranti* plough, costing about 4*s.* (Rs. 2), is used for ploughing the red and especially the sandy soils. It is of the same make as the big plough, but is so much smaller and lighter that the husbandman usually carries it to the field on his shoulder, and can work it with one pair of bullocks. It scratches the field three to six inches deep which in the red soil can be done only either immediately after harvest or when the occasional rains of March and April or the regular thunderstorms of May have again wetted the soil.

The hoe-harrow or *kunti* (K.) is a large rude tool. The chief part is a stout slightly crescent-shaped blade of iron about three feet long and four to five inches broad bladed on one side. This blade or cutting edge is turned forward and the ends are tightly fastened in stout timbers, which are again secured slopingly in a heavy bar of wood that has two narrowing poles, passing to the yoke to which it is harnessed by strong leather ropes. This tool is drawn by three or four pairs of bullocks. As it moves the earth is forced between the iron knife and the bar of wood. On the wooden bar the driver and sometimes a second man or boy stand to make it heavier and force the blade deeper into the ground, so that the clods are completely cut and the grass and other weeds are rooted out and brought to the surface. The hoe-harrow is used both before and after ploughing; it costs about 6*s.* (Rs. 3).

The Hoe-harrow

The seed is sown by the seed-drill, called *kuri* or *kurgi* (K.) a rude but a most suitable and simple contrivance. At the top it is a wooden cup pierced with a number of diverging holes. Into each hole the upper end of a hollow bamboo is fastened, whose under end is fixed into a wooden bill standing out from a wooden bar and armed with a small iron tongue. As the bullocks move the driver keeps feeding the cup with grain from a bag under his arm; the seed runs down the hollow bamboos, while the outstanding iron spikes at the lower end pass through the soil opening small furrows into which the seed drops. The number and the distance of the bills and the hollow bamboos vary according to the seed and also according to the soil. Through this drill all grains are sown. The seeds of the pulses and oilseeds called *akkadi* or mixed crops, which are sown in separate rows between the grain rows, are dropped through a supplementary thick hollow bamboo with a sharp point called in Kánarese *bukkada, kolu,* and *sudiki*. This thick bamboo is always tied to the drill and held by a ploughboy, who, walking some paces behind the drill, drops the pulse and oilseeds through the thick bamboo. If the pulse or oilseed ought to be unmixed with grain the corresponding hole in the cup is stopped. On account of its bulk and the greater distance between the rows cotton-seed is always sown through the extra big bamboos, two of which are fastened to the bar of the drill with only two furrowing bills and without the cup and its small hollow bamboos. The seed drill costs about 2*s.* (Re. 1).

The Dri

The grubber or *yedi-kunti* (K.) is used to clear grass and weeds between the rows of cotton, and to earth up the soil at the roots of the cotton plants. It is a kind of broad spud or share, made of iron, a little shorter than the distance between the cotton rows. The lower edge is sharp, and to each side of the spud a strong light bamboo is fastened to join it with the yoke. Two are worked together and the four bamboos are brought up at their proper place to the bullocks, the one bullock working between one set of rows, and the other between another set of rows, that is there is a row of cotton between them. The two grubbers clear the grass and weeds on either side of this row, and between it and the next, thus weeding two rows at a time. Near the handle of each grubber is a stick forked

The Grubber

Chapter IV. Agriculture.

Field Tools.

at the lower end and fastened by a rope to the horns of the bullock With these the driver can readily put on one side plants that come in the way of the machine, which, without this device, would be damaged. The grubber costs 2*s.* to 3*s.* (Rs.1-1½).

The Weeder.

The weeder or *belli-salla* (K.) is worth about 8*s.* (Rs. 4). It consists of two shares or spuds, one at each end of an arched crescent-shaped frame, whose arch passes over the row of corn, while the shares loosen the earth between the rows, tear up weeds, and heap the soil close to the roots of the seedlings.

Hand-hoe.

The hand-hoe or *báigudli* (K.) is a pickaxe with one end pointed and the other end bladed into a sharp adze. It is most effective in cutting and uprooting grass and other weeds after the land has been ploughed.

Carts.

Besides these field tools there are a weeding hook or *khurpi* worth 6*d.* (4 *as.*), a spade or *salki* worth 2*s.* 6*d.* (Rs.1¼), an axe or *kodli* worth 2*s.* (Re. 1), and a sickle or *kudgolu* worth about 1*s.* (8 *as.*). Sometimes for travelling in a large company within a narrow area, and almost always for bringing thrashed grain and loads of fodder to town, most well-to-do husbandmen have field carts. The field cart, which in Kánarese is called *hallibhandi*, is rudely shaped and heavy, requiring four to eight bullocks to drag it. It is nearly fourteen feet long and not more than four feet broad. The floor is made of two strong side bars of teak scarcely less than nine inches square joined by four cross pieces of about the same size, the spaces being filled either by planking or by small bamboos. The sides are generally temporary additions either of bamboo or of wicker work. The wheel is of solid wood, about four feet across, formed of two or three well-fitted sections, with edges three or four inches thick, and gradually thickening from the edge to the nave. It is generally of tamarind wood and is bound by a strong iron rim from two to two and a half inches thick. The nave is an iron cylinder. The whole machine is strong and well made and may last for nearly a century. It costs £6 to £8 (Rs. 60-80).

Irrigation.

[1]The greater part of the arable land of Belgaum is under dry crops. Except along the banks of rivers and near ponds little land is watered. As so much of the land trusts solely to rain for its moisture the outturn varies greatly from year to year. Still, only in rare cases is the rainfall scanty enough to cause failure of food. In 1881-82 of 16,000 acres under irrigation, 15,870 were garden land and 130 were rice land. The total area of watered land bears a consolidated assessment of £5268 (Rs. 52,680) of which four-fifths are credited to Irrigation and one-fifth to Land. Except on land watered from the Gaddekeri or Swamp lake at Mugutkhán-Hubli in Sampgaon no separate water-rate is charged. In 1881-82, besides wells, there were 1055 water-works, including reservoirs, dips, and water-courses. Of these 377 are in Khánápur, 249 in Sampgaon, 190 in Chikodi, ninety-nine in Belgaum, eighty-three in Gokák, forty-five

[1] Except the account of the Gokák canal the irrigation section has been contributed by Mr. A. Clarke-Jervoise, C.S.

in Athni, and twelve in Parasgad. The eastern sub-divisions, Athni, Gokák, and Parasgad, are worst off for water-works. It is these parts of the district which generally suffer most severely from a partial or a total failure of rain. Of the 1055 water-works, 561 are permanent, watering 9215 acres assessed at £3277 (Rs. 32,770), and 494 are temporary, watering 6785 acres assessed at £1991 (Rs. 19,910). Of the water-works, seventy-four water over fifty acres, 205 water between fifty and twenty acres, and 776 water less than twenty acres. Of the whole number of water-works 663 are reservoirs, 146 are watercourses, and 246 are river and stream dips. Of these three classes of water-works the reservoirs are the most important. Most of the larger reservoirs are in such a state that they cannot hold more than one season's supply, and many, however heavy the rainfall, are dry before the end of the next hot season. Of late, especially during the 1876-77 famine, much has been done by Irrigation engineers to improve the reservoirs. Of the improved reservoirs the chief is the Gaddekeri lake at Mugutkhán-Hubli about fifteen miles south-east of Belgaum. The Gaddekeri lake has an area of 126 acres and a maximum depth of five feet. The catchment basin measures 4·62 square miles and the average rainfall is 26 33 inches. Before the 1876 famine it was intended to raise the water surface 2·38 feet, thereby increasing the gross storage from 14½ to 27½ millions of cubic feet, and to build two waste weirs one at each end of the dam. The dam was begun as a relief work in 1877 and completed in 1878. The estimated cost of the proposed improvements was £1616 (Rs. 16,160); the expenditure on famine relief labour up to the end of 1877-78 amounted to £831 14*s.* (Rs. 8317); and the value of the work done, at normal rates, was £798 6*s.* (Rs. 7983). Since 1877, at a cost of £1130 (Rs. 11,300), the water surface as originally intended has been raised 2·38 feet, thus increasing the storage by thirteen millions of cubic feet. The improved lake will furnish a supply for 450 acres. On lands watered from the Gaddekeri lake a special acre cess of 10*s.* (Rs. 5) is levied for rice lands, and of £1 (Rs. 10) for garden lands. The rates are levied not according to the fitness of the land for rice or for garden crops, but according to the crop for which the water is actually used.

Three water-drawing appliances are in use, *mots* or leather-bags, *páts* or channels, and *dols* or bamboo baskets. The *mot* is a large leather-bag with two holes. One hole which is nearly the entire breadth of the bag, is kept at full stretch by a square or round frame with cross pieces, the other hole is narrow and pipe-like. A stout rope fixed to the bars of the great hole, is passed over a roller supported by side posts above the level of the reservoir, and is fastened to the yoke of the bullocks who draw up the bag. A smaller rope, fastened to the pipe-like hole of the bag, passes over a second roller below the first roller, and is fixed to the greater rope near the yoke. An inclined plane is prepared, down which the bullocks walk and draw up the full bag till at the top it spills into a masonry cistern. Then, while the empty bag falls into the water and fills, the bullocks back to the top of the slope and again walk down the slope dragging up another bagful. From the cistern into which the bag spills channels carry the water all over the land. Leather-bags are also used in drawing water

Chapter IV. Agriculture. Irrigation.

from holes dug near rivers and streams. Channels or *páts* are built to carry off water from rivers, streams, and reservoirs. The channels are supplied with water without the aid of bags from streams or other water-courses where water can be dammed to the proper level and turned into the channel. When the water in a stream or reservoir is below the level of the channel or *pát* the water is raised by a basket or *dol*, a three-cornered bamboo basket large enough to hold an ordinary jar of water. At two corners of the basket ropes are tied. The end of each rope is caught by a strong man, for the work is heavy, and they dip the basket into the water, and when it is full, lift it up and toss into the channel as much water as remains in the basket. In some places two to six baskets are worked at the same time.

Wells.

Of 11,818 wells used for watering, 3374 are step-wells and 8444 are dip wells. Of the 11,818 wells, 4214, of which 948 are step-wells and 3266 are dip-wells, are in Chikodi; 3073, of which 136 are step-wells and 2937 are dip-wells, are in Belgaum; 1832, of which 1191 are step-wells and 641 are dip-wells, are in Athni; 1028, of which 533 are step-wells and 495 are dip-wells, are in Gokák; 905, of which 337 are step-wells and 568 are dip-wells, are in Sampgaon; and 766, of which 229 are step-wells and 537 are dip-wells, are in Parasgad. In Khánápur no wells are used for watering. Water is always drawn from wells by the leather-bag or *mot*. Water is found near the surface in a small area close to the Nágzari springs in the Belgaum Cantonment and in the Chikodi villages along the Krishna. In other parts of the district, especially in Parasgad, wells have sometimes to be sunk as much as a hundrod and fifty feet. The depth of wells varies from five to sixty feet in Belgaum, from twelve to forty feet in Sampgaon, from ten to fifteen feet in Chikodi, from twenty to 150 feet in Parasgad, from twenty-five to fifty feet in Gokák, and from thirty to fifty feet in Athni. The cost of building a step-well varies from £50 to £400 (Rs. 500-4000), and of building a dip-well from £10 to £200 (Rs. 100-2000). At a good well four water-bags can be worked. With a sufficient supply of water one bag can water five acres, the area largely depending on the soil and the crop. In ordinary cases one bag waters from one-fourth of an acre to an acre in a day. The crop is watered by channels carried from the top of the well, where the bag is emptied, to the fields. The channels are made so as to allow the course of the water to be changed every two or three yards so that each row of crops may have an equal supply. The crops irrigated are rice, sugarcane, potatoes, onions, garlic, cabbage, and other vegetables, plantain trees, groundnuts, chillies, sweet potatoes, and turmeric. The husbandmen value irrigation, but few are able to bear the expense of sinking wells and building channels. Within the last five years the returns show a gradual fall in the area of irrigated garden land. In 1878-79 the garden area under irrigation was 17,900 acres, in 1879-80 it fell to 16,222 acres, in 1880-81 to 16,520, and in 1881-82 to 15,870 acres. This decline in the irrigated area is believed to be due to the fact that the lands are mortgaged to moneylenders and that as the mortgager may any day be foreclosed, the holders are unwilling to be at the expense of irrigating them.

A great water-work called the Gokák canal is at present being made at the expense of Imperial revenues. A project for a large canal with headworks on the Ghatprábha above the Gokák falls was first brought to notice in 1852 by Captain, subsequently Sir George, Wingate. A preliminary survey, made by Colonel, now Lieutenant-General, Walter Scott, R.E., showed remarkable facilities for leading a canal from a point about two miles above the falls to water the tract lying between the Ghatprabha and the Krishna and comprising portions of Gokák in Belgaum and Bágalkot in Bijápur and of the Mudhol and Jamkhandi states. The river has a sheer descent of about 170 feet at the lowest part, and at the spot chosen for the canal-head the total command is about 220 feet. Colonel Scott showed that, by cutting through a ridge of hills on the left of the valley, the canal could at once be brought out with complete command of the country beyond. From 1865 to 1867 the project was surveyed in detail by Lieutenant now Major Smith R.E., under the orders of Colonel now Lieutenant-General Fife R.E. It comprised a total length of 162 miles of main canal at an estimated cost of £485,000 (Rs. 48,50,000). Owing to the difficulties of carrying the canal through the native states the larger project was placed in abeyance, and a fresh scheme was drawn up for a definite project for watering only the lands of Gokák in Belgaum. In 1868 the project was submitted. It comprised fifty miles of main canal commanding an area of 135 square miles. The cost for works only was estimated at £150,000 (Rs. 15,00,000) and the return on expenditure at six and a quarter to six and three quarters per cent. The Government of India did not consider the scheme sufficiently satisfactory to admit of its being sanctioned from loan funds, and suggested further revision of the designs and estimates. This revision was in progress, when, in 1871, under orders from the Government of India, all large irrigation projects in the Bombay Presidency were placed in abeyance. In 1873 the revision of the scheme ordered in 1869 was carried out by Major now Colonel C. B. F. Penny R. E., and plans and estimates were made ready for an immediate beginning of the work. According to Major Penny's plan a masonry weir was to be thrown across the Ghatprabha at a site about two and a half miles above the falls. The great natural height thus obtained would allow the canal to be led from the left bank at right angles to the course of the river. The canal would run north for about nine miles where it would cross the Pamaldini streamlet by an aqueduct of thirteen arches each of thirty feet span. From this point the canal would take an easterly course generally parallel to the river and from six to eight miles from it. The canal would tail at the village of Shivápur forty miles from the head. A branch about twelve miles long would be taken off at the third mile. The scheme included provision for complete regulation and distribution. The canal was designed to carry 430 cubic feet a second at the head and to command a total arable area of 77,319 acres or 121 square miles at an estimated cost of £97,500 (Rs. 9,75,000). During the 1876 famine the Gokák canal project was brought forward as a means of usefully employing the

Chapter IV. Agriculture. Irrigation. *Gokak Canal.*

people. Between the end of 1876 and December 1877 the earth-works on a length of nine miles of canal, beyond the deep cutting in the first 3½ miles, were partially completed. The highest number of people employed was 11,946, the outlay was £17,788 (Rs. 1,77,880) on wages and charitable relief, and the value of the work done was £7646 (Rs. 76,460). In October 1877 a gang of about 600 convicts was employed on the heavy cuttings through the ridges in the first 3½ miles of the canal. The works during the famine were in the charge of Mr. H. G. Palliser, the Executive Engineer for Irrigation in Belgaum and Dhárwár, acting under the orders of Colonel now Major-General Merriman R. E., then Chief Engineer for Irrigation. In December 1877 the Mudhol Chief desired to have the Gokák canal extended through his territory. Steps were taken to ascertain how far it was possible to modify the designs so as to allow the canal to debouch on to the watershed between the Krishna and the Ghatprabha near the village of Mantar about 110 miles from the head works, from which point branches could be thrown to command the Bágalkot sub-division of Bijápur on both sides of the water-shed. In April 1879, Sir Richard Temple, then Governor of Bombay, visited the country intended to be cut by the canal. As he considered it necessary as far as possible to utilize the work already done by famine and convict labour, fresh plans and estimates were made. The part of the new project sanctioned in March 1882 comprised the weir and headworks on the Ghatprabha four miles above Gokák with two and a half miles of main canal and a branch eleven miles long to the village of Vaddarhatti eight miles north-east of Gokák. This section which is nearly completed (February 1884) commands the country between the Ghatprabha and its tributary the Pamaldini which includes about 25,200 acres of good arable land. The cost is estimated at at £45,800 (Rs. 4,58,000) including all charges.[1] The extent to which the scheme, as sketched out by Sir Richard Temple, may eventually be expanded, comprises a length of about 180 miles of main canal with very extensive storage works to supplement the natural supply of water in the river during the dry season. The total area that would thus be commanded is about 625 square miles, of which about 375 square miles are in British territory and the remainder in the neighbouring native states. The entire cost of such a scheme is estimated at £1,400,000 (Rs. 1,40,00,000) and the return at four and a half per cent. The canal would have a discharging capacity at head of 1200 cubic feet a second and the storage works would impound 10,580 million cubic feet.[2]

Manure.

Pure black soil does not require manure, but the yield from red and sandy soils depends on the amount of manure they receive. Husbandmen value manure highly. Each landholder has his manure-pit into which every morning house sweepings, ashes, and cattle litter are thrown. To this all kinds of rubbish and decayed vegetable

1 The works have been designed and carried out by Mr. R. B. Joyner, C. E., Executive Engineer for Irrigation in Belgaum, Dhárwár, and Bijápur.

2 Fuller details are given by Mr. R. B. Joyner under Gokák in Places of Interest.

matter and fallen leaves are added. By the time it is ready for carting the rubbish and litter have decayed to powder which is generally spread in the fields from about the middle of March till the end of May between the thunderstorms which are commonly known as the mango showers. The supply from the manure-pit is supplemented by gathering into heaps in the field and burning roots of the former crop, dried weeds, and rubbish. In rare cases, as soon as the first rain falls, a farmer plants some quick-growing crop and ploughs it green into the land as manure for the main crop. Bone manure is not used. The supply of manure would be much greater if the bulk of the cattle dung was not burnt as fuel. The husbandman's belief in liberal manuring is shown by the high price house-sweepings, litter, and other garbage command in all large towns and villages. To manure an acre of land ten to fifteen cartloads are required, each cartload costing 1*s.* to 2*s.* (8 *as.* - Re. 1).

Manure.

Millet is the least exhausting and cotton is the most exhausting crop. In places where land is scarce, husbandmen frequently raise red millet for many years from the same red soil fields without change; and on rich black soil there is no more profitable course than to grow an unbroken succession of crops of white millet. It is believed that yearly crops of white millet might be raised for a century without wearing out the land. As a rule, cotton and other cold-weather or *hingári* crops are raised in alternation with each other. Cotton, particularly, does not thrive two successive years on the same ground; it must be followed by white millet or by wheat. Among the various rain or *mungári* crops, when other considerations admit of such a course, some variety, though not a systematic circle of changes, is observed.

Rotation.

Formerly large tracts in the more open parts of the forests were cultivated by brushwood-burning or *kumri*. The chief brushwood burners were Maráthás. In the cold season, on a space of ground, commonly on a hill-side, the Maráthás cut down the bushes and the lower branches of the larger trees. They let the brushwood and dead branches dry during the hot season and burnt them before the rains set in. The effects of the fire pass three to six inches below the surface. In some places, without touching the surface with a tool, on the fall of the first south-west rain, the seed is sown in the ashes. In other places before the seed is sown the ground is ploughed or hoed by the hand. *Rági* Elensine corocana, and in the next year *sáva* Panicum miliare occasionally mixed with pulse, are the grains raised by bush-burning. After the second year's crop the plot is considered exhausted and is left. After ten or twelve years, when the ground is again clothed with bushes and its surface regains something of a turfy texture, the process is repeated. This form of tillage, because of the destruction it caused to the brushwood, was for many years very greatly restricted. The restriction pressed heavily on the hill-people. They found no other employment and yearly made long journeys to Sávantvádi and Goa where wood-ash tillage was allowed. Under these circumstances, subject to certain conditions, arrangements have been made for allotting tracts of bush-land for wood-ash tillage.

Wood-ash Tillage.

Chapter IV. Agriculture.

Tillage.

Tillage is either dry, *kádáramba* (K.), or wet, *periráramba* (K.). The dry field tillage varies according as the soil is black or red and sandy. For dry tillage a black soil field is first ploughed and cleared of grass and weeds by the heavy or *negali* plough. Three ploughings by this heavy plough, one along, one across, and one cornerwise, are almost always given. These, especially in cotton fields, are necessary to uproot a grass called *kurige* Cynodon dactylon which, eight to ten inches below the surface, forms a thick mat and chokes all other growth. If after three ploughings any bushes are still standing they have to be uprooted by the hoe. When the large clods left by the plough, after having been thoroughly burnt by the sun, are slightly softened by the first south-west rains, they are crushed by drawing a block of heavy wood over them and the ground is two or three times loosened by the hoe-harrow or *kunti*. When a black soil field has been once brought under tillage it requires no more ploughing. The only care of the husbandman in after-years is to keep the surface as firm and consistent as possible. All that is wanted before the yearly sowing is to hoe or harrow the field so that all weeds may be cleared from it and the surface loosened. To save himself the trouble of using the heavy plough, whenever he sees new shoots of *karige* or other grass the farmer removes them by digging the weedy spots during the dry season with a hand-hoe. If he is careless and allows the weeds to grow, their turfy roots year after year gain strength and widen the area that is unfit for crops. Red and sandy soils, especially sandy soils which are apt to harden and cake after rain, are kept loose and friable by ploughing the field every year with the light plough or *ranti*. Two, if not three, ploughings are necessary; the first lengthwise, the second across, and the third, if at all, cornerwise. Hardworking landholders generally give the first ploughing immediately after the crop has been cleared and the second ploughing after the first heavy fall in the next south-west rainy season. Afterwards the clods are broken and the surface smoothed and prepared for sowing by a scalping knife which cuts up the old stubble *hanchichuru* (K)., stout stalks of weeds, and whatever else presents itself. If a considerable time has passed since the last scuffing this operation is repeated immediately before sowing. Both in red and in black soils the seed is sown from the drill or *kurgi*. After the seed has been sown it is covered with loose earth and the field is harrowed. Delicate seeds in particular soils are sometimes sown broadcast and then covered by having a bundle of prickly bamboos or other thorny bushes drawn over the field. The same is sometimes done in detached and uneven spots that do not admit of the use of the seed-drill.

Crops.

According to their seed times and harvest times Belgaum crops belong to three classes, early-rain or *tusi* (H.); main-rain called *kharif* (H. and M.) or *mungári* (K.); and late or cold-weather called *rabi* (M. and H.) or *hingári* (K.). Crops sown in the latter half of May and the first half of June and gathered before the end of September are called *tusi* or early-rain crops. To this class belong *náchni* (M.) or *rági* (K.), Eleusine corocana; *udid* (M.) or *uddu* (K.), Phaseolus mungo; *til* (M.) or *yallu* (K.), Sesamum indicum; maize, *makái* (M.)

or *mekke jala* (K.), Zea mays; and *rála* (M.) *káng* (M.) or *navni* (K.), Panicum italicum. The *kharif* or main monsoon crops include crops sown towards the end of June and in the beginning of July, that is when the first heavy fall of rain is supposed to be over, and reaped in December and January. The main monsoon crops are Indian millet, *jvári* (M.) or *jvála* (K.), Sorghum vulgare; spiked millet, *bájri* (M.) or *saji* (K.), Penicillaria spicata; rice, *bhát* (M.) or *bhatta* (K.), Oryza sativa; *máth* (M.) or *madki* (K.), Phaseolus aconitifolius; *tur* (M.) or *togri* (K.), Cajanus indicus; *kulthi* (M.) or *hurli* (K.), Dolichos biflorus; *mug* (M.) or *hesru* (K.), Phaseolus radiatus; *pávta* (M.) or *avri* (K.), Dolichos lablab; *javas* (M.) or *agsi* (K.), Linum usitatissimum; *tág* (M.) or *sanbu* (K.), Crotalaria juncea; and *ambádi* (M.) or *pundi* (K.), Hibiscus cannabinus. The *rabi*, that is the late or cold-weather crops, comprise all cold-weather crops that is those which require little or no rain. They are sown in September and October and are reaped in January and February. The chief cold-weather crops are gram, *harbhara* (M.) or *kadli* (K.), Cicer arietinum; wheat, *ghau* (M.) or *godi* (K.), Triticum æstivum; cotton, *kápus* (M.) *hatti* (K.), Gossypium herbaceum; tobacco, *tambáku* (M.) or *hage soppu* (K.), Nicotiana tabacum; castor, *erand* (M.) or *audla* (K.), Ricinus communis; and safflower, *kardai* (M.) or *kusbi* (K.), Carthamus tinctorius.

In 1881-82, of 1,072,820 acres held for tillage, 196,815 acres or 18·34 per cent were fallow or under grass. Of the remaining 876,005 acres 69,921 were twice cropped. Of the 945,926 acres under tillage, grain crops occupied 698,337 acres or 73·82 per cent, 422,945 of them under Indian millet, Sorghum vulgare; 64,774 under rice, Oryza sativa; 63,499 under wheat, Triticum æstivum; 58,381 under spiked millet, Penicillaria spicata; 38,016 under Italian millet, Panicum italicum; 30,016 under *rági* or *náchni*, Eleusine corocana; 9416 under *sáva*, Panicum miliare; 4360 under *harika*, Paspalum scrobiculatum; 1972 under maize, Zea mays; 57 under barley, Hordeum hexastychon; and 4901 under other grains of which details are not given. Pulses occupied 92,767 acres or 9·80 per cent. Of these 29,757 were under cajan pea, Cajanus indicus; 25,534 under gram, Cicer arietinum; 23,975 under *kulthi*, Dolichos biflorus; 3379 under peas, *vatána*, Pisum sativum; 2381 under *mug*, Phaseolus radiatus; 1337 under *masur*, Ervum lens; 564 under *udid*, Phaseolus mungo; and 5840 under other pulses. Oilseeds occupied 36,578 acres or 3·86 per cent, of which 4668 were under gingelly seed, Sesamum indicum; 1507 under linseed, Linum usitatissimum; 1082 under rape, *sarau*, Brassica napus; 108 under mustard, Sinapis racemosa; and 29,213 under other oilseeds. Fibres occupied 92,988 acres or 9·83 per cent, of which 91,407 were under cotton, Gossypium herbaceum; 982 under Bombay hemp, Crotalaria juncea; and 599 under brown hemp, Hibiscus cannabinus. Miscellaneous crops occupied 25,256 acres or 2·67 per cent, of which 4176 were under sugarcane, *us* (M.) or *kabbu* (K.), Saccharum officinarum; 9314 under tobacco, Nicotiana tabacum; 7967 under chillies, Capsicum frutescens; 84 under coffee; and the remaining 3715 under various vegetables and fruits.

The chief details of some of the most important crops are: Indian

Chapter IV. Agriculture.

CROPS.

Indian Millet.

millet, *jvári* (M.) or *jvála* (K.), Sorghum vulgare, in 1881-82 covered 422,945 acres or 44·71 per cent of the whole tilled area. It is grown all over the district, especially in Athni, Parasgad, Chikodi, Sampgaon, and Gokák. It is the chief main-rain or *mungári* crop and is grown in all red soils, except in the lighter and more sandy lands where spiked millet is often mixed with it. Sometimes it is mixed with one or several pulses together with a few seeds of Bombay hemp. The reason why pulses are sown with Indian millet is that in case the rains fail and the corn crop is scanty, the pulses, which can bear up against drought and ripen with the help of dew alone, may yield some return. Where the millet does well, it smothers the pulse without taking any harm. In growing millet after the first heavy fall of rain generally early in June, the field is three times ploughed under ordinary circumstances with the light plough or *ranti*. The seed is sown by the seed-drill or *kurgi* (K.), one row out of every two or three being sown with pulse. The sowing season is the second half of June and the first half of July when the first heavy fall of rain has softened the soil. Indian millet as a rule is ready for reaping about the middle of November, nearly a fortnight after the end of the south-west rains. Several weeks before the crop ripens, as soon as the corn heads begin to form, guards, some on foot others on stages or in trees, are set to keep off birds and pilferers.[1] When the reaping is over the grain is trodden out by the feet of cattle and winnowed. It is then ready for use. Indian millet is the common food of the people and the straw is used as fodder for horses and cattle. After years of scarcity millet straw becomes so valuable near Belgaum that much of the cotton land is given to millet. One advantage of millet is that it takes very little out of the soil. Where land is scarce, farmers often raise Indian millet on the same red fields year after year. The pulses which are grown with Indian millet take longer to ripen, and remain in the fields till after the beginning of January nearly two months after the millet has been reaped.

Spiked Millet.

Spiked Millet, *bájri* (M.) or *saji* (K.), Penicillaria spicata, in 1881-82 covered 58,381 acres or 6·17 per cent of the tillage area. It is grown chiefly in Athni, Gokák, and Chikodi. The time and the way of growing spiked millet are almost the same as the time and way of growing Indian millet. In sandy plains they are often sown together. The chief difference is that spiked millet ripens about the end of October, that is a fortnight before Indian millet. Spiked millet is eaten chiefly by the labouring classes. The straw makes excellent thatch. It is also eaten by cattle but is not esteemed as fodder.

Rice.

Rice, *bhát* (M.) *bhatta* (K.), Oryza sativa, in 1881-82 covered 64,774 acres or 6·84 per cent of the tillage area. It is chiefly grown in Khánápur, Belgaum, and Sampgaon. There are five modes of rice tillage, three regular modes, and two extra modes which are used only when the regular modes fail. The first and best form of rice tillage is called *rop* (M.) *natihackhona* (K.), or planting, but many

[1] A head of Indian millet commonly contains 400 to 500 grains; in a remarkably fine head 2000 grains have been counted. Marshall's Belgaum, 10.

husbandmen shrink from it because of the cost and the heaviness of the labour. In Khánápur and Belgaum during April or early May a small nursery or seed-bed, a plot to which water has easy access, is covered with leaves, wood, straw, and rubbish, and this covering is burnt in late May before the first rainfall. At the same time the fields into which the seedlings are to be planted are being got ready. The field-banks are mended, the water-ways cleared, stiff plants and stalks are cut out, and as much of the ground as possible is covered with grass, weeds, and rubbish, and burnt. When the first rain falls the seed-bed is thrice ploughed and harrowed. When well soaked it is covered with a thick broadcast sowing of rice in husk. The ploughing of the fields into which the seedlings are to be planted is not begun until the bullocks sink in the mud to the knees, a dreadful toil both to man and bullocks. Every field is thrice ploughed, and after the third ploughing, to clear it of roots, is harrowed with a long-toothed harrow. In a good season, that is heavy rain with gleams of sun, after five weeks or early in June the seedlings are fifteen to eighteen inches high and fit for planting. When the seedlings are ready, if possible in a break of bright weather, cowdung-ashes, litter, and leaves decayed to dust in the manure-pit are brought from the village, spread equally over the field, and trodden deep into the mud. When the field is manured the surface is levelled by dragging over it a loaded board called *hendor* (M.) or *karadu hodiyona* (K.). A day or two later, still if possible in fine weather when the field is not deep in water, the seedlings are rooted by the hand out of the seed-bed and brought to the fields in baskets. A rake with short teeth, ten to twelve inches apart, is drawn over the smooth ground to mark the lines in which the seedlings are to be set. The workers, who are generally women, follow with baskets from which they take small handfuls of eight to ten plants, and, at ten to twelve inches apart and as far as possible opposite the middle of the interval of the next row, thrust them about a foot deep. Except so much as is wanted to flood the lower fields the water is kept in the field and when each field has had its share the channel to it is blocked. Two weedings are given, but, as the field has been so carefully cleaned, the weeds are seldom strong. In ordinary years planted rice is ready for cutting in November or December. The second mode of growing rice is the *kivri* or *kurgi*, that is the seed-drill plan. This system is adopted in the hope that enough rain will fall within a week after the seed has been sown to make the soil muddy. It saves much labour, but should the rain hold off for about a fortnight the ground becomes heated and the seed suffers from the dryness and is eaten by birds and lizards. At best the outturn is small. The third method is adopted when the early rain is so heavy that the seed-drill cannot be worked. Furrows are made by the light plough and the seed is sown in the furrow. This furrow-sowing system never yields a good crop. When one of the three regular modes fails, in the hope that the harvest may not be entirely lost, sprouted seed or *málaki* (K.) is sown. A sackcloth or matting bag is filled with grain, dipped in water, and laid in a warm close place. In three or four days the seeds sprout and are thrown

Chapter IV. Agriculture. Crops. Rice.

thick and broadcast on the field. The fifth mode of growing rice is to root out the sprouted rice seedlings where they have come too thickly and plant them into the bare fields. This is the rice-grower's forlorn hope. It is called *surdi* (K.) or the cold crop, perhaps because it does not ripen till the close of the cold weather.

Ripe rice is reaped and thrashed either by striking the ears against a board, or by beating them with a stick. After winnowing the grain is carried home and dried in the sun. The husks of as much as is wanted for immediate use are beaten off in a stone mortar, *ukhal* (M.) or *varalu* (K.), by a wooden pestle, *musal* (M.) or *vanaki* (K.), and the rest is stored in high cylindrical baskets called *kungi*, the openings in which within and without are closed by a coating of cowdung.

In parts of Khánápur near the Sahyádris two crops of rice are grown every year. The first crop is sown with a seed-drill about the end of June, or is sown sprouted in August. It ripens towards the end of October and is called the *Kártik* or October-November crop. The second crop is sown sprouted in November and December, and ripens towards the end of April. It is called the *Vaishákh* that is the March-April or the *sugi* crop. The April crop is reckoned better than the October crop because it is not exposed to the cold weather winds.

Wheat.

Wheat, *gahu* (M.) *godi* (K.), Triticum æstivum, in 1881-82 covered 63,499 acres or 6·71 per cent of the tillage area. It is grown in Belgaum, Sampgaon, Parasgad, Athni, Gokák, and Chikodi. Three varieties of wheat are grown in Belgaum, *támbda* or red, *khapli*, and *holi*. The *támbda* or red is the best variety and is like English wheat. The *khapli* is a bearded wheat like English barley except that the grain is oblong. It is grown as a watered crop in garden lands. The *holi* is an inferior wheat grown in rice lands after the rice has been carried. Wheat is a cold-weather or *rabi* crop. It prospers only in good black soil. In October, soon after the first heavy burst of the north-east or Madras monsoon, the wheat is sown like *jvári* in carefully prepared and manured land and is reaped in January and February. The quantity of seed varies from twelve to thirty-two pounds the acre. In wheat-growing lands the best succession of crops is said to be Indian millet the first year, cotton the second year, wheat the third year, Indian millet the fourth, cotton the fifth, and wheat the sixth, and so on in the same rotation. In some places wheat alternates with sugarcane and gram; occasionally *kusbi* or safflower is raised two to six feet apart between the rows of wheat. The safflower does not ripen till one month after the wheat, that is about the end of March, and in no way interferes with its growth. Instead of safflower, linseed or gram is often grown. Wheat takes three to three and a half months to ripen and grows eighteen inches to two feet high in good soils and one foot high in poor soils. Towards the end of December one good shower is wanted to make the wheat crop safe. Southerly winds are said to be bad for wheat, northerly or easterly winds are preferred. An excessively cold wind causes a blight called *ittangi* (K.), also called *kunkam rog*, which turns the wheat red and reduces the outturn. The average wholesale rupee price of wheat is about 2*s.* the

CROPS.

Wheat.

quarter (28 pounds the rupee). Wheat is not the staple food of the people. Only the rich and well-to-do can afford it for everyday use. The poorer classes eat it only on holidays. Wheat is brought from Dhárwár and Bijápur, and is sent to Goa, Vengurla, and other Konkan ports, and thence to Bombay. A small quantity goes to Kolhápur. Wheat from Athni finds its way to Belgaum, Kolhápur, Vengurla, Chiplun, and Rájápur. No wheat is carried to any railway station from any part of the district. The nearest stations are Poona 210 and Bársi 140 miles from Belgaum. The cart-hire to these stations varies from £1 to £2 (Rs.10-20). The hire of a cart which carries 1000 pounds from Belgaum to Vengurla, a distance of about sixty miles is 16*s.* to £1 (Rs.8-10). Belgaum traders buy wheat from the Bijápur growers and send it to Vengurla and to Bombay on their own account.

Sugarcane.

Sugarcane, *us* (M.) *kabbu* (K.), Saccharum officinarum, in 1881-82 covered 4176 acres or 0·44 per cent of the tillage area. It is grown chiefly in Chikodi, Belgaum, Sampgaon, and Khánápur. It is raised in the same lands as rice, and it is usual to have one crop of cane followed by two crops of rice. The first step in growing sugarcane is taken in the first half of January when the land receives three ploughings with the light plough, one lengthwise, one across, and one coruerwise. As much manure as the landholder is able to gather is harrowed into it; about three tons an acre is a fair quantity. All roots bushes and rubbish are harrowed out. In the beginning of February furrows are drawn all over the field by the light plough nine or ten inches deep and nine or ten inches apart. Water is let into the furrows till the bottom is deep in mud. Into the mud sugarcane cuttings, fifteen to eighteen inches long and with three to five joints, are laid flat and firmly pressed into the bottom of the furrow by the foot. The plough is driven between the furrows to cover the cane-cuttings. If the cane is the common white kind no more watering is required, and the field is levelled by drawing over it a cross beam of wood. It is covered with straw to keep the surface from parching in the sun and is enclosed with a hedge. Except two hand weedings, no further expense is incurred. If they are of the black cane, after the cuttings are covered with earth, the furrows are not entirely filled with earth, as, from February until the rains in June, water must be let into the field at least once every fourteen days. The cane ripens at the end of a year. To plant an acre of sugarcane 20,000 cuttings are required. They cost about 1*s.* (8 *as.*) the thousand for the white kind and 2*s.* (Re.1) for the black. In the raw state as the black is sweeter it fetches a higher price than the white, the black cane selling for ¾*d.* (½ *anna*) and the white for ⅜*d.* (¼ *anna*) a piece. Both varieties are used for making molasses or *gur*. Molasses is made in a press of two upright solid wooden cylinders on one of which is cut an endless male screw and on the other an endless female screw. These are set in pivots cut in a strong plank which is fixed at one edge of the bottom of a pit two or three feet deep. The pit is large enough to hold, besides the press, the boiling apparatus and the workmen. The male screw cylinder is about a foot higher than the female and into its head a horizontal bar is let to

Chapter IV. Agriculture. Crops. Sugarcane.

which a bullock is yoked and keeps the machine constantly revolving. The bullock's path is on the level ground outside the mouth of the pit, and the bar as it circles passes clear of the top of the female cylinder. The canes are broken off close to the ground and cut into pieces about a foot long. A man sits above and keeps feeding the cylinders with pieces of cane. The juice is thoroughly squeezed out, and runs into a large earthen vessel at the base of the press. A bamboo spout leads it into a flat copper pan under which a hole is dug for the fire, and the juice is kept gently and constantly boiling. When it has gained a proper consistency it is baled into a cloth which lies loosely over a hole in the earth about a foot across and four or five inches deep. The molasses is thus formed into a flattish cake called *dhep*.

Ragi.

Rági or *náchni*, Eleusine corocana, in 1881-82 covered 30,016 acres or 3·17 per cent of the tillage area. It is grown chiefly in Khánápur, Belgaum, Chikodi, and Sampgaon. *Rági* is one of the early monsoon crops, being sown in April or May and reaped in September. It is grown on all red soils in West Belgaum and Khánápur. *Rági* is sometimes raised on fallow ground to make it fit to yield a crop of *sávi* Panicum miliare in the next year. In some places it is grown on plots that have yielded a *til* crop in the previous year and in the year after will yield *sávi*. The ground is prepared by burning on it wood, leaves, and rubbish. Commonly some pulses and not unfrequently a few seeds of mustard and Indian maize are sown with the *rági* for home use. In parts of the country *rági* seed is mixed with cowdung and a small quantity is dropped with the hand at intervals of about nine inches apart into furrows drawn by the small plough about seven inches apart. After this the seeds are covered and the field smoothed either by the levelling block or *karadu* or by a smaller scalping knife called *balsál*. In every seventh furrow some pulse or other bush grain as *mung*, *tur*, *pávta* and *údid* are sown. *Rági* is sown with the first shower of the south-west monsoon, that is immediately after the thunderstorms in April and May. It ripens and is ready for gathering in September before the end of the rains. It is cut by the sickle, tied in small sheaves, and stacked on the spot until the October rains are over, when it is thrashed. *Rági* is a very productive crop and can be raised in places too steep for the plough or harrow. The grain is generally eaten by the poorer classes. It is ground into flour and dressed in various ways. *Rági* straw is reckoned better than rice straw for all kinds of cattle.

Tobacco.

Tobacco, *tambáku* (M.) *hágesoppu* (K.), Nicotiana tabacum, in 1881-82 covered 9314 acres or 0·98 per cent of the tillage area. It is grown chiefly in Athni and Chikodi in gardens or on favourable plots near villages or along rivers and streams. The best tobacco is raised on the deep alluvial lands near the Krishna. The seed is sown in nursery beds, usually in gardens, about the beginning of July. For the first month, if there is no rain, the beds must be watered every other day, and, after the first month, every fifth day. The seedlings are fit for planting towards the end of August. Before this the field, which is generally of the best soil, is manured

by penning sheep and cattle on it for several nights. Then the light plough is drawn over it, once lengthwise and once across, about two feet apart. Where two furrows cross the seedlings are planted and watered from a pot whenever the weather keeps fair for more than a day or two. After a fortnight a little dung is put to each plant and the field is hoed with a scalping knife. This hoeing has to be repeated several times to keep the soil open and powdered. At the end of about six weeks the top shoots are pinched off, and the pinching is repeated several times after. In December or January when it begins to whiten, the tobacco is fit for cutting. The stems are cut within two or three inches of the ground and are then split lengthwise, and the halves strung in a line and spread to the sun and air for twenty days, being turned every third day. After this the leaves are taken into the house, piled in a heap, covered with straw, and pressed with a large stone, and turned every fourth day. After this pressing and turning has been repeated four or five times the tobacco is fit for sale. Tobacco is generally grown every third year. In Chikodi and Athni, at a cost at £2 5*s.* (Rs. 22½), the acre yield in a good season is 420 pounds, but over a series of several years the average outturn is probably not more than 280 pounds. This at 5*s.* to 6*s.* (Rs. 2½ - 3) for twenty-eight pounds brings to the husbandman from £2 10*s.* to £3 (Rs. 25 - 30) or a net acre profit of 5*s.* to 10*s.* (Rs. 2½ - 5).

Cotton.

Cotton,[1] covering 91,407 acres or 9·66 per cent of the tillage area, is the most valuable and next to Indian millet the largest crop grown.

As cotton-growers the different sub-divisions of Belgaum come in the following order, Parasgad, Athni, Sampgaon, Gokák, Chikodi, Belgaum, and Khánápur.[2] The soil, roads, climate, and position of Sampgaon fit it to hold the first rank among the Belgaum cotton-growing tracts. The reason why it holds the third place is that its nearness to the Belgaum market makes grain pay better than cotton. As regards climate the Belgaum cotton plain has two great advantages. Its 1500 to 2000 feet above the sea keeps it comparatively cool, and the two fairly light monsoons in which it shares prevent the air from growing excessively dry, save the roots from being rotted with damp, and help the under-soil to keep moist far into the hot weather. In the cotton plains of Belgaum the average yearly rainfall for the twenty-three years ending 1882 varied from seventeen to twenty-three inches. Thermometer readings at Belgaum show a greatest heat of 101° in May and a least heat of 57° in December. Mr. Mercer, the American planter, who in 1840 travelled over a considerable part of India, noticed that the climate of the Bombay Karnátak was more like that of Mississipi than any climate he had experienced in India and that this had probably

[1] The account of Belgaum cotton is prepared from a pamphlet written by Mr. W. Walton, late superintendent of cotton gin factories and cotton improvements.

[2] In 1881-82 the areas under cotton in the different sub-divisions were, Parasgad 26,607 acres, Athni 24,258, Sampgaon 15,949, Gokák 13,784, Chikodi 9395, Belgaum 1405, and Khánápur 5 acres.

Chapter IV. Agriculture.

much to do with the exceptional success of Mississipi seed in Belgaum and Dhárwár.[1]

Crops. Cotton. *Kinds.*

Three kinds of cotton are grown in Belgaum. Gossypium arboreum or *devkápus* (M.) that is God's Cotton, used in making sacred threads; Gossypium indicum or *juvári-hatti* (K.) that is country cotton; and Gossypium barbadense or *viláiti-hatti* (K.) that is foreign cotton. Of these three kinds Gossypium arboreum, a perennial bush growing ten to twelve feet high is much like the Peruvian or Brazilian cotton plant. It is raised in small quantities all over the district, both in the black eastern plains and close to the hilly forest-clad west. The cotton is white silky and of long staple, but too brittle to be used for ordinary purposes. It is never grown as a field plant and its wool never comes to market. Bushes are occasionally grown in gardens beside wells and streams and near temples. From the cotton of this plant Bráhmans make their sacred threads spinning it from a small reel called *bhirki*, temple servants make their lampwicks, and Bráhman and other high caste Hindu women spin it into thread for other purposes. Gossypium indicum or *juvári-hatti*, generally known as Kumta cotton, is largely planted everywhere. Gossypium barbadense, which is planted only sometimes and to a small extent in Parasgad and Sampgaon, is the American cotton which was introduced in 1845 by Government planters. Both Kumta and American cotton are grown as annuals.

Seed.

In former times great care was paid to the seed. Landholders, when their seed showed signs of losing strength, sent for a fresh supply from any part of the district where the crop was specially good. Of late years less care has been shown in the choice of seed, and the seed is also allowed to suffer from the practice of leaving the cotton unpicked after it is ripe. Showers fall and the damp seed tends to sprout and loses vigour. Cotton whose seed is meant for planting should be separately ginned. Separate ginning is necessary because seed for sowing should be as well preserved as possible, while the seed of cotton ginned for wool must be thoroughly dried in the sun before ginning. Seed for sowing must be kept in a dry and even temperature, and through the early rains must be often looked at and aired to check untimely sprouting. The people pay great care to the seed, keeping it in well covered dry earthenware pots, and taking it out and examining it every now and then until sowing time. It is easy to tell if cotton seed is good or is bad. Cut across it with a sharp knife and look at the kernel. If the seed is good the kernel is cream-coloured, moist, and speckled with little dark spots; if the seed is bad the kernel is a dirty yellow or brown and is shrivelled. In sending cotton seeds from one district or one country to another, especially by sea, the greatest care should be taken. The seed should

[1] Observations in the American cotton country between 30° and 34° north latitude and 78° and 96° west longitude show for eight towns in the more western tract (96°-90° west), a variation from 64° to 74° in means and from 47° to 87° in extremes, and for six places in the more eastern tract (82°-78° west) a variation from 57° to 72° in means, and from 42° to 83° in extremes.

Seed.

be packed in a cool, dry, airy place, where the temperature is as even as possible. On board ship the parcels should when practicable be in cabins or rooms on deck. Stowing below hatches often does much mischief to cotton seed. Some German authorities go so far as to say that no seed can keep its life if packed in the hold below the ship's water-line. This is not the case, as instances are known in which seed so packed sprouted and gave a middling crop. Still great risk is run and serious harm is almost always caused. With the more delicate kinds of cotton it is best to send the seed with the wool, just as picked from the plant. No seed should ever be placed near a ship's engines or boilers.

Soil.

In India for the growth of cotton, the soil should be loose and open enough to allow the air and sun to pass below the surface and still more to let excessive and untimely rain drain under the roots. These qualities the crumbling gaping soil of the deep black Belgaum plain has in an unusual degree. The black cotton soil, which the Kánarese husbandmen call *yera bhumi* (K.) or melted earth is of three classes, *regar* (Tel.) or pure black, a brown soil much like *regar* but geologically less matured and containing much disintegrated trap, and a gray black soil largely mixed with lime nodules and an underlayer of lime two to ten feet below the surface. The *regar* or pure black is best suited for the local cotton and the brown for the American cotton. The gray black is inferior to the other two, the staple being poorer and scantier. One great merit of the black and brown soils is the wonderful time the under-soil keeps moist. It is this underground dampness that enables the cotton plant to mature as late as March. When the surface is baked and gapes with the heat the cotton bushes are still green because the tap-roots are down in the cool moist undersoil. Cotton is seldom grown on red soil; the ontturn is too small to pay at ordinary prices. Mr. D'Oyley, an assistant collector, once experimented with foreign cotton on red soil. He found the plants flourish so long as the rains lasted, bnt as soon as the dry weather set in they withered. Examination showed that the hardness of the soil had kept the roots from passing any distance below the surface.

Watering.

Much interesting information was collected in 1855 as to the effect of watering cotton in Belgaum. Mr. Goldfinch, of the Civil Service, stated that water was considered unnecessary if not hurtful. Some New Orleans plants failed in watered land, while others throve near at hand in the same soil without water. Mr. Seaton-Karr, of the Civil Service, had never seen cotton watered; he believed that watering would harm the plant. The late Colonel Meadows Taylor, C.S I., who had paid close attention to the subject, condemned the watering of cotton. He tried several kinds at the same time some with and some without water.. In all cases, except only with the Sea Island, watering was a failure. With Sea Island, up to a certain time, watering did good, but continued watering did harm. He thought that in deep black soils watering would always harm cotton, but in stony and shallow soil one or two judicious waterings might do good. In any case water should never be given after the 15th of December. He thought that the staple of watered

Chapter IV. Agriculture. Crops. Cotton. *Watering.*

cotton would always prove weaker than the staple of unwatered cotton. The husbandmen whom Colonel Taylor consulted had never tried irrigation and agreed with him in all essential points. The result of experiments in watering cotton in Belgaum was in red soil an outturn of cotton worth 2*s.* 6*d.* (Rs. $1\frac{1}{4}$) at a cost of £1 0*s.* 8*d.* (Rs. $10\frac{5}{16}$); in black soil an outlay of 11*s.* 10*d.* (Rs. $5\frac{15}{16}$) yielded little more than half the quantity grown without water. Between 1845 and 1851, Mr. Channing, an American planter who was engaged by the East India Company and was sent by Government to Belgaum, made some experiments in red and clayey soils. He thought that in these soils water helped cotton, but it must be applied most carefully, after sunset and before sunrise and without wetting the leaves. He also held that the watered plants were more liable to blight and to injury from insects. In 1854, Mr. L. R. Ashburner, of the Civil Service, noticed that watering made cotton run to wood and seed and lessened the outturn of wool and weakened the staple. This view was supported by the American planters who declared that after the tap-roots had taken hold, soil and climate could hardly be too dry. In Dhárwár watering the cotton plants showed the same result. On one occasion, when want of rain threatened to destroy his crop, Mr. W. Shearer (1867-1875), the superintendent of cotton experiments, endeavoured to save it by watering. The watered plants yielded no more cotton than the unwatered plants, and the staple of the watered plants was exceptionally weak. So far as Mr. Shearer's experience went the only effect of watering either foreign or local cotton was to develop the plant at the expense of the fibre. Apart from the difficulty of keeping the plants in health during the whole of an ordinary hot season the annual cotton plant would seem to yield better cotton than the plant yields when it is allowed to remain in the ground for more than one season. In 1874, Mr. Walton, the superintendent of cotton gin factories in Belgaum, noticed that after a very heavy and late rainfall cotton was deficient in quantity and unusually weak in staple. At the beginning of the next rains the plants were so green that some landholders allowed them to stand till the next season. This attempt to make cotton perennial failed. In every place where it was tried the yield was very small, and the length and strength of the fibre much less than usual, while in the fields grown in the regular way, that is treating the plant as an annual, the crop was unusually large and good.

Change.

Mr. Mercer, an American planter, who was in Dhárwár between 1841 and 1846, came to the conclusion that, though poverty often prevented him from doing what was best, no one understood the benefit of a regular change of crops better than the Indian husbandman. On the other hand Dr. Wight maintained that in his rotation of crops the Indian husbandman was more governed by chance or caprice than by system. Mr. Walton's experience during the fifteen years ending 1880 satisfied him that Mr. Mercer's view was the correct view. The Belgaum husbandman, when well-to-do, is careful to change his crop according to regular rules. He knows that cotton takes much out of the soil, and, unless he is tempted by high prices, does not grow cotton oftener

than once in three years. Other circumstances besides a tempting price of cotton lead to the rule of rotation being broken. A landholder may make the proper field ready for cotton but the rain may be unsuitable for cotton and another crop may have to be sown. Cotton is one of the late, called *rabi* (M. and H.) or *hingári* (K.), crops. If rain falls well for the early crops the husbandman leaves less land than he ought for the late crops; if the early rain fails more land than he ought to leave is left for the late crops. Again as high cotton prices tempt the husbandman to grow more cotton than he ought to grow, so high grain prices tempt him to grow less cotton than he ought to grow. Still cotton is the husbandman's great money-bringing and rent-paying crop and he is always anxious to grow as much cotton as he can. Enquiries into the composition of cotton seem to show that the cotton or wool absorbs potash, lime, phosphoric acid, magnesia, and sulphuric acid, the proportions being about half of the whole potash, one-quarter lime, one-fifth phosphoric acid, and the greater part of the small remainder magnesia with a very little sulphuric acid. The total quantity absorbed is very small. It was calculated that some twelve pounds of the above ingredients were amalgamated in about two thousand pounds of cotton wool, so that the total quantity was only about one ounce to an acre. An analysis of the seed showed that the seed absorbed half as much again as the wool. Of ninety-six parts forty-five were phosphoric acid, thirty lime, twenty potash, and the small remainder sulphuric acid. No analysis of the plant is available.

Change.

Manure is not put on the ground in the same year in which the land is sown with cotton. The husbandmen say that fresh manure heats the soil too much for cotton; they therefore put on the manure the year before the cotton is sown. The manure is the pulverised produce of the manure-pit in which dung, cattle litter, house sweepings, fallen leaves, ashes, and rubbish of all sorts have been laid to rot. Three to six cart-loads of manure an acre are generally spread on the fields in the hot season (March-May) between thundershowers. To this is added the burnt roots of the former crop and occasionally some quick-growing crop is raised and ploughed in.

Manure.

The field tools used in growing cotton have been already described.

Tools.

Mr. Mercer, the American planter (1841-1846), came to the conclusion that the system of growing cotton in the Kánarese country was not nearly so defective as was supposed. Many of the better class of husbandmen take great care in preparing their cotton land. It is cleared of all the stumps of the previous crop, partly by hand partly with the hoe or *kunti*. It is then ploughed either with the smaller or larger plough. The main object of working the large plough is not so much to turn the soil as to cut out the roots of weeds and wild plants, particularly the entangled and almost incredibly strong webs which the matted roots of *harrihalli* (M.) or *kariki* (K.) grass, Cynodon dactylon, form eight to twelve inches below the surface. Unless the *kariki*, which though hurtful as a weed is the best horse grass in the Karnátak, is cleared the cotton roots have no chance of striking into the subsoil and the

Tillage.

Chapter IV. Agriculture. Crops. Cotton. *Tillage.*

plants rapidly wither as the moisture withdraws from the surface to the subsoil. Even repeated workings of the heavy plough are not always sufficient to remove the roots of this grass. After several ploughings the weeds have often to be destroyed by men going round separately and cutting and uprooting them with a bladed pick or *bái-kudali*. After the ground is cleared the hoe is used to break the clods, but these are often so large and stubborn that they have first to be roughly separated by a heavy beam of wood, locally called the *koradu* (K.), dragged by several pairs of bullocks. After the beam the hoe or *kunti* (K.) is used. Even this is sometimes not enough and the clods have to be softened by rain before it is possible to break them. Another effectual way is to break the land by manual labour. Large numbers of labourers turn out with pickaxes or *bái-kudalis* (K.) and dig the land often two feet deep. This is very slow and hard work, but the result repays the severe labour and expense. The soil thus broken and smoothed is ready for seed.

A point which was often urged by the American planters, and which has since been strongly recommended by many outsiders, is early sowing. It is often stated that Belgaum cotton has to pass through many hardships because the seed is not sown soon enough. No rule can be laid down as to the correct time for sowing. In each district the time depends on the rainfall. No cotton seed can be successfully sown until enough rain has fallen to bring the soil into proper condition for starting the seed. This condition of the earth is much better understood by the local husbandman than by any stranger. In 1860, Mr. Mansfield, who had long known the Kánarese country, drew the attention of Government to an advertisement of the Bombay Chamber of Commerce, in which people were advised to sow cotton in May and November. All persons who followed this advice would, Mr. Mansfield observed, inevitably lose both their seed and their labour. In May the Belgaum soil is much like cinders at a temperature of one hundred and fifty degrees; and, if sowing is delayed till November, the cotton has not time to ripen before the fierce sun forces open the half-ripe bolls.

Cotton is sown in August, early or late according to the rainfall, but generally in the latter part of the month. As a rule cotton-sowing begins in the west fully a fortnight before it begins in the east. This is owing to the difference in rainfall. In fact the eastern country has often to wait for what the Kánarese call the *muggi mulli*, or return monsoon, that is rain from the east, before their land is in proper order for cotton and other late or *hingári* sowings. By the latter part of August the land has been thoroughly soaked, and is so far drained that the surface is comparatively dry. Land fairly dry on the surface with much moisture below is in the proper state for sowing cotton. It helps the seed to sprout and it draws the roots deep enough to support and bring the plant to perfection when the hot weather and trying east winds set in. Between the time of smoothing and of sowing the land the surface generally becomes more or less covered with weeds and grass. The husbandman easily removes these weeds with his hoe, and the hoeing also stirs the surface and makes it ready for the seed. The seeds are rubbed in

fresh bullock-dung and water, which gives them a hard smooth surface, prevents their sticking together, and enables them to run freely through the sowing drill. The rubbing with cowdung is also said to quicken and help the sprouting. The seed is sown with the aid of the seed-drill or *kurgi* (K.), which has two iron teeth as far apart as the distance between the two rows of cotton. To each of the teeth a hollow bamboo tube called *yellishedi* (K.) is fastened. Bullocks are yoked to the seed-drill, and as the drill moves the iron teeth plough two drills, and in these the cotton seed is dropped through the bamboo tube. Two rows are thus sown about eighteen inches apart. The seed-drill is immediately followed by the hoe which closes the drills. The seed-leaves show in six to twelve days. In about a month, when the plants are three or four inches high, the farmer takes his simple but effective grubber or *yedi-kunti* (K.), and works it between the cotton plants doing two rows at a time. The grubber roots out all young weeds and grass, and, at the same time, turns over the surface soil and prevents it from souring, and also heaps the soil at the roots of the young plants. This heaping of the soil is repeated several times, the oftener the better, until the plants grow too high. The more hardworking and careful husbandmen besides the grubber employ hand labour. For this men women and children are hired on 3*d.* to 6*d.* a day (2-4 *as.*), weeding at a surprising speed with a *kurchigi* or miniature sickle. By the middle of October hard cutting east winds set in which are very trying to the cotton plants. These east winds last fully a month, when the strain is eased by occasional genial westerly breezes, and sometimes by timely showers. Then easterly winds again set in, and with an occasional break blow more or less heavily, until January and sometimes February. Meanwhile the plants have flowered, and these steady east winds rapidly mature them and ripen the bolls, so that the crop is ready for a first picking late in February or early in March. A good crop yields five and sometimes six pickings; a poor crop not more than three or four. All the picking, and in the case of the local cotton all the ginning, is done by women and children, the labour of the men ceasing when the plants reach maturity. The main anxiety with cotton is to plant it so that it will be ripe and get picked when there is no danger of rain. This essential is too often overlooked by those who think that the Belgaum husbandman might sow his cotton earlier, and thus have it sooner ready for export. Experience has taught the people that by sowing in August the chances of success are greater than by sowing at any other time.

The payment of the cotton-pickers causes frequent disputes. When the price of the staple rules high the husbandman wishes to pay the women in cash. When the price of the staple is low he wishes to pay them in kind. The pickers know well how cotton is selling, and as their interests are the opposite of the husbandman's, disputes are common. When the crop is large labour is generally scarce, then the women strike in the most determined way, and generally make the owner of the cotton come to terms.[1] In America when

[1] In 1850, according to Mr. Channing, the people were paid 1½*d.* (1 *anna*) for every

Chapter IV. Agriculture. Crops. Cotton. *Tillage.*

it grows too freely the cotton plant is topped or pruned. This is done to prevent the plant running to wood and leaf and to make it flower and fruit. Belgaum cotton plants are never pruned. During the fifteen years ending 1880 only in the heavy rains of 1874 did the plants grow to any great size. Even then they were no larger than the usual height in America. European agriculturists, both practical and amateur, have often remarked upon and condemned the crowded way in which the people of Belgaum grow their cotton. In this, to a considerable extent, the people are right. That at times they overcrowd the plants is true. Still in so dry a climate and so dry a soil moderately thick planting is required. What injures the staple most is the practice of picking whether the day is dry or wet, and at the picking time wet days or at least thunderstorms are not uncommon. The women bring in the cotton packed in large bundles on their heads. These loads are weighed or the weight is guessed at and the bundles are thrown on the rest of the heap in the room, shed, or cattle-house, where the husbandman may be storing his seed cotton. This goes on for days, often for weeks, and when the huge heap is finished, it is often allowed to lie for months without being examined or even looked at. The result is that the huge mass steams and heats through the rainy months, and the fibre is hopelessly weakened and impaired. When the raw cotton is brought out of such a store-room it is never fit to gin, either with the saw-gin or the foot-roller. No machine will work it; they clog and choke and will not turn out the cotton wool until it has been thoroughly dried in the sun, and often until it has been flogged with bamboos, a process which, to some extent, damages the fibre.

Disease.

Though naturally very hardy sudden changes of weather sometimes harm cotton. What tries cotton most are untimely sudden and heavy falls of rain, frequent changes of wind, and cloudy weather. Frost also injures the plant, but frost seldom happens in Belgaum. The people often say their cotton plants are smitten with disease when unusual heat and excessive dryness occur before the tap-roots have passed into the cool subsoil. When this happens the branches and leaves droop, then dry and turn brown, and in the end look as if they had been burnt. The people distinguish six blights or diseases from which cotton is apt to suffer. These are *Banti Rog* (K.), the yellow disease, caused especially in badly drained fields by untimely rain and flooding. The stems and branches become a dirty yellow, the leaves grow red, and the bush droops, and if the flooding or excessive damp lasts long enough the plant dies. *Banji Rog* (K.), the barren disease, is caused by hard east winds blowing night and day accompanied by cloudy weather. This disease seems to stop growth. The plant almost ceases to show fresh leaves, and the flowers and bolls no longer develope. The name *Gugari Rog* (K.), that is the half-cooked grain disease, shows that the soil and air have partially boiled or cooked the cotton plants. It is caused by excessive moisture and dull weather with heavy clouds and slight changing winds. The leaves shrivel and dry. *Shidi Hayu* (K.) of

twenty-eight pounds of American unginned cotton. With local cotton they were paid in kind, generally about one-sixth of what was brought in.

unknown meaning is caused by long continued harsh north-east winds. The leaves droop but the plant seldom dies. *Majghi Rog* (K.), or the white disease, is brought on by excessive dews at night followed by heavy winds during the day. The leaves turn a dull white and both leaves and flowers droop and die. *Kari Jigi Rog* (K.), the black sticky disease, is the worst of all cotton ailments. When it takes hold of a field and the plants are far advanced they hardly ever recover. It is caused by long continued dews and unceasing easterly winds. The leaves become so thickly covered with a dark gumlike substance, that leaves flowers and half-formed bolls die and drop, and, in a short time, a field of strong green healthy bushes turns to charred-looking dirty sticks. Both kinds of cotton are subject to these ailments, but the acclimatised American suffers more than the local cotton. The plants show wonderful life and hardiness in recovering from disease when the cause of disease is removed, and healthy weather again gives the bushes a chance. Genial seasonable weather stops all forms of disease. Young plants generally recover, but the full grown suffer and yield short weak and often dull fibre.[1]

Yield

According to the season the acre yield of clean cotton ranges from forty to fully one hundred pounds. In America the outturn is higher, the average yield over the whole states varying from one hundred and thirty to one hundred and seventy-five pounds. In considering these results the further difference in the proportion of yield of wool to seed in Indian and American cottons has to be remembered. In Indian cotton the usual outturn is three parts seed to one part fibre; in the American cotton it is two parts seed to one part fibre. In other words the American yields fully thirty-three pounds of fibre to every one hundred pounds of seed cotton, and the Indian twenty-five pounds. According to the 1882-83 Bombay Cotton Report, during the five years ending 1882-83 the average estimated acre yield was of American cotton twenty-two pounds and of local cotton thirty-two pounds.[2]

Cost

The cost of growing cotton is difficult to determine. Much depends on the condition of the grower, the number of cattle he owns, the area of land he holds, the number of persons in his house,

---

[1] Dr. Forbes, then Cotton Commissioner, has left the following detailed description of a deadly blight from which the cotton suffered in 1867. In December unusually dark and cloudy weather accompanied by untimely and heavy rain, checked the plants and made them droop. Towards the middle of December the first signs of wind blight were seen, and from that time forward the plants passed from bad to worse. The American plants suffered first in their foliage. The leaves grew dark and shrivelled as if blasted and soon after dropped leaving the pods unsheltered. The most advanced pods soon lost their plumpness and opened prematurely, while the younger bolls withered and fell to the ground. The local plant kept its leaves and for a time seemed likely to yield a fair crop. But the bad weather continued, the pods suffered, and their failure was almost as complete as the failure of the American crop.

[2] The details are: In 1878-79 ten pounds of American and twenty-eight pounds of local cotton; in 1879-80 fifteen pounds of American and thirty-four pounds of local cotton; in 1880-81 sixteen pounds of American and thirty-two pounds of local cotton; in 1881-82 thirty-seven pounds of American and twenty-eight pounds of local cotton; and in 1882-83 thirty-one pounds of American and thirty-seven pounds of local cotton. These figures are probably of little value.

Chapter IV. Agriculture. Crops. Cotton.

and many other conditions which more or less affect his actual cash outlay on cotton operations. Roughly the acre cost of growing cotton is 6*s.* 3*d.* (Rs. 3⅛) and the value of the produce is £1 4*s.* (Rs. 12) leaving a net profit of 17*s.* 9*d.* (Rs. 8⅞) an acre.[1]

In the care and skill which they give to the growth of cotton the small landholders are in no way inferior to the large proprietors. Since the intoduction of the survey settlement between 1849 and 1857, especially in Athni and Chikodi, the area under cotton has surprisingly increased.

Experiments.

1819.

In 1819, soon after the Karnátak passed to the British when Belgaum was still under Madras, the commercial residents of Bellári recommended that Brazil cotton should be introduced along the Krishna, Malprabha, and Ghatprabha. There is no evidence to show whether these views were approved or acted on. In 1820, Mr. Marshall, then statistical reporter to Government, recommended the growth of Bourbon cotton. Some of it was tried in Belgaum

1828.

and did well on dry and rather gravelly soils.[2] In 1828 the Court of Directors authorized the Bombay Government to pay premiums or to give some other encouragement to native cultivators who would prepare approved parcels of cotton of not less than five *khandis* grown from local seed or from foreign seed supplied from Government farms. Soon after this, selected foreign seed, chiefly American, was sent to Bombay with two Whitney saw-gins and several books on the growth of cotton. In the same year Lord Ellenborough, the chairman of the Indian Board, pressed on the East India Company the importance of improving the cotton supply.

'9.

In 1829, a beginning was made by Dr. Lush as superintendent of botanical experiments for the Bombay Government. The chief aims of these experiments were to procure a better variety of cotton, to introduce a better system of growing cotton, and to improve the ginning or cleaning of the staple. In the Kánarese country Dr. Lush's operations were in great measure confined to Dhárwár

1832

In 1832 the produce was decided to be no better than common field cotton, and the experiments in the Kánarese country were pronounced a failure. In 1832, at Báil-Hongal in Sampgaon experiments were made with Sea Island cotton, Black-seeded Barbadoes, and

---

[1] The details are: Government land rent Rs. 1¼, seed 1 *a.* first hoeing 6 *as.* ploughing 7 *as.* second hoeing 6 *as.* drill sowing and hoeing 7 *as.* grubbing 9 *as.* picking 10 *as.*, total Rs. 3⅝. In 1846, Mr. Inverarity, the Collector of Belgaum, estimated that an acre of cotton returned a sum of £1 15*s.* (Rs. 17½) of which £1 6*s.* (Rs. 13) had been spent in raising the crop, and 9*s.* (Rs. 4½) was a balance of profit. The land on which Mr. Inverarity's calculations were based paid the exceedingly high acre rental of 10*s.* (Rs. 5) and in 1846 cotton was worth only half of what it was worth some years later. In spite of the much higher land rates then in force it paid to sell Belgaum cotton in Bombay at 2*d.* a pound. In 1850, Mr. Channing calculated the cost of growing cotton, exclusive of assessment, at 3*s.* (Rs. 1½) an acre. He also estimated the cost of manuring at 4*s.* (Rs. 2) an acre. As the land is manured the year before the cotton is sown only half of it belongs to the cost of cotton-growing. For the five years ending 1856-57 excluding assessment the mean acre cost of cotton-growing was roughly estimated by local officers at 4*s.* (Rs. 2) in 1852-53 and 1853-54, and at 3*s.* (Rs. 1½) in 1854-55, 1855-56, and 1856-57.

[2] Marshall's Belgaum, 61. Mr. Walton thought the *dev-kapás*, Gossypium arboreum a remnant of the Brazil cotton introduced in 1819. It seems unlikely that so re a foreigner should gain a place among the holy plants of India.

Gujarát. Some of the seed did not sprout and all failed. The American saw-gins were condemned as unsuitable, which they certainly are for ginning local cotton. To tempt landholders to improve their cotton Government stated that they were willing to take their rents in cotton instead of in cash and that for specially well cleaned cotton they were ready to pay twenty per cent over the market price. No advantage was taken of these offers. Only a very small quantity of clean well-picked cotton was secured. A special agent was appointed to try and improve the preparation of cotton in Belgaum, Dhárwár, and Bijápur, but his endeavours met with little success. In or shortly after 1832, under Dr. Lush, a Government experimental farm was started at Sigihalli in Khánápur. The site of the farm was badly chosen as Khánápur is the part of the district least suited for cotton. The objects aimed at in establishing the Sigihalli farm were to introduce new and better kinds of cotton, and to improve the growing, cleaning, and packing of the local variety. In 1834 a committee of Pársi cotton merchants in Bombay reported so highly on some of the Sigihalli cotton, that Government sent it to England. In England it was pronounced clean and showy, but much injured in cleaning, containing very objectionable small white knots. Of nine lots sent from Bombay the valuation varied from five pence to nine pence the pound. The experts, who made the valuations, added that the value of the injured cotton could not be given with confidence as spinners might refuse to take it, though it might be bought in moderate quantities at the prices named by candlewick-makers, jewellers, and others. These opinions were repeated on another sample of the same white-seeded perennial kind subsequently sent to England from the Sigihalli farm. Relieved by occasional successes the result of the Sigihalli farm continued disappointing till it was closed in 1836 by Sir Robert Grant, then Governor of Bombay (1835-1838), who held that enough had been done to show that the attempt to improve the Karnátak cotton was a failure.

1835

In 1835, Lord Ellenborough, President of the Board of Commissioners for the Affairs of India, suggested that Egyptian seed should be tried in Western India. He also suggested that, to ascertain the best means of cleaning cotton, specimens of the machinery used in America, Brazil, India, and Egypt, should be sent to London. To carry out these views Dr. Lush sent a foot-roller and a common ginner or *charka*. At the same time Dr. Lush noticed that he had not found the foot-roller able to clean any foreign cotton; he probably meant any New Orleans. In 1836, when the experiments to improve the cotton were stopped, Government offered for five years to forego the assessment on all Government land under cotton. This concession did not meet with the approval of the Court of Directors, and the mission was cancelled in January 1838. In 1839 further enquiries into the causes of the unsatisfactory state of Western India cotton led Sir J. Rivett-Carnac, then Governor of Bombay (1839-1841), to the conclusion that dirty cotton gave the local dealers and middle men a better return than clean cotton. About this time the Court of Directors determined to try how far Indian cotton could be

Chapter IV. Agriculture. Crops. Cotton. *Experiments.* *1840.*

improved by employing American planters in India. Captain Bayles, of the Madras Army, was sent to America. He not unnaturally met with great opposition. The cry was raised that it was an English scheme to ruin the American cotton trade; the American papers urged that it was a public duty to prevent Captain Bayles securing planters; he had to go about armed and was forced to work in secret. At last twelve planters accepted his terms and agreed to come to India to conduct experiments in growing cotton. Three of the twelve arrived in Bombay in 1840. In 1841 Mr. Mercer one of the American planters, with two assistants Mr. Hawley and Mr. Channing, was sent to Dhárwar, where they began an experimental cotton farm at Kushgal, five miles north east of Hubli.

The American planters came to the country with the object of introducing the American system of growing cotton. They naturally at first paid little attention to the local modes of tillage, and viewed their roughness and imperfection with contempt. Experience taught them that American tools and American rules were unsuited to the country, and that the local tools and the local rules were suited to the country. Only after adopting local methods did their operations prove at all successful. In 1841 the American planters noticed adulteration as one of the chief causes of the depression of the Indian cotton trade. They said that both European and native merchants found that dirty and falsely packed cotton yielded a better return than clean.[1]

1845. In 1844-45, 185,388 and in 1845-46 117,188 acres were under cotton. In 1845 experiments were begun in Belgaum with the view of introducing foreign cotton and saw-gins. Mr. J. W. Channing, who since 1841 had been Mr. Mercer's assistant in Dhárwár, was transferred to Belgaum. In March 1845, Mr. Frere the Collector of Belgaum, reported that Mr. Channing had decided to begin work at Neganhál in Sampgaon and wished to have three hundred acres of land. Government considered Mr. Channing's estimate too high and thought the experiment would succeed better farther east. Mr. Channing kept to his opinion that Neganhál was the most suitable place for experiments, and a farm was accordingly started at Neganhál. Mr. Channing proposed to sow his fields with New Orleans, Broach, and Sea Island cotton. Broach seed was ordered, and New Orleans, probably supplied by Mr Shaw the Collector of Dhárwár, was largely planted. In October the prospects of the American cotton were so promising that the superintendent applied for two gins of twenty-five saws each. The stock of machinery was so small that Government could spare only one machine of fourteen saws. Early

1846. in 1846 some American gins arrived in Bombay for sale, and two of these, one of twenty-two, the other of twenty-five saws, were secured for the Belgaum cotton farm. Mr. Channing proposed to keep one for his own work and sell the other, and this was sanctioned. Early in February 1846 bad weather set in, and the superintendent complained that, though the plants looked healthy

---

1 Adulteration was no new feature in the Bombay cotton trade. As early as 1810, before the Karnátak came under the British, the Court of Directors called the attention of the Government of Bombay to the disgraceful state in which cotton arrived from India.

and showed quantities of flowers, the crop would not mature, but fell off just as the bolls were forming. When Government heard of this failure they asked whether it was due to the unfavourable season and not rather to the unsuitable situation of the farm. In reply Mr. Channing reported a great improvement in the crop, and begged that for the present judgment regarding the farm might be suspended. He also brought to notice a demand among dealers for the use of gins, and asked that spare machinery lying at Broach might be sent to him. This was sanctioned, and he recommended that for two shillings (Re. 1) 756 pounds (27 *mans* at 28 lbs. the *man*) of well picked and 672 pounds (24 *mans*) of average seed-cotton should be ginned. Though the result was not completely satisfactory the market price of the New Orleans was twelve per cent above that of the local staple. The results with Broach seed were encouraging and the crop turned out a success.

In 1845-46 the American planters came to the conclusion that the local cotton was nearly as good as any cotton grown in India. It was the dirt-trash mixed with it, in most cases wilfully, that ruined its name in European markets. The Bombay cotton trade showed so serious a decline that in 1844 and again in 1846 a committee was appointed in Bombay to enquire into the reasons and to suggest a remedy.[1] In 1846-47, from the experience of the previous season, Mr. Channing recommended that at Neganhál he should cultivate only as much land as could be managed by his two pairs of bullocks and that he should be authorized to make contracts at four Parasgad and at two Sampgaon villages to have twenty acres in each village cultivated on Government account. These proposals made necessary another ginning establishment at Murgod, about fifteen miles north-west of Saundatti. The superintendent considered these new measures so successful that, towards the end of the year, he asked leave to give up the Neganhál farm, and carry out all his operations on the contract plan. In supporting this proposal the Collector stated that 1300 acres were under Orleans seed and 726¾ under Broach. He believed that these two varieties would be grown to any extent that Government might wish if the produce could find a market. Government sanctioned the superintendent's proposals and granted him two gin-learners. On the whole, as in the previous year, the Broach was a success, but New Orleans after a good promise failed to ripen. Further experience showed that Broach cotton was unpopular with the people because of the difficulty in clearing the stumps of the old plants. In addition to the experiments with New Orleans and Broach the superintendent planted 248 pounds of Narma or Central Indian cotton, eighty-eight pounds of Georgia, fifty-six pounds of Sea Island, and thirty-six pounds of Bourbon. None of these sowings succeeded. The purchases and sales of cotton in 1846-47 showed a considerable balance in favour of Government. New Orleans, which cost Government £7 15*s.* (Rs. 77½) to lay down in Bombay, was sold in Bombay for £12 (Rs. 120); Belgaum-grown Broach cost £6 15*s.* (Rs. 67½) to lay down in Bombay and fetched

[1] Details are given in the Trade Chapter.

Chapter IV. Agriculture. Crops. Cotton. *Experiments.*

£12 10*s.* (Rs. 125); local Belgaum cost Government £7 1*s.* (Rs. 70½) to lay down in Bombay; what it fetched is not stated. In this year Belgaum New Orleans sold at 14*s.* (Rs. 7) a *khandi* above Dhárwár New Orleans. In 1846 Mr Mausfield, the Collector, in describing the results of the American experiments recorded the opinion that the Indian system of tillage was better suited for India than the American system. In his opinion the American system was more costly than India either could afford or required.

1847.

In 1847-48, 2617 acres were under New Orleans and 115,888 under local cotton. The result of the sowings of New Orleans was far from encouraging, the rainfall was scanty, and much of the crop was lost by heavy wind and rain in the picking season. Mr. Channing feared that so few fields had yielded a good crop that in the next year many of the people would keep from sowing New Orleans cotton. The superintendent was unable to buy in Belgaum all the New Orleans cotton required by Government. He bought the balance in Ron, Hungund, and Bágalkot, where the growth of New Orleans had spread. At this time the tillage in some parts seems to have been very slovenly, the average acre return of clean cotton varying from thirty to fifty-five pounds or about one-third to one-half of the yield of well-tilled ground. In 1847, about nine thousand pounds of New Orleans, Broach, and local cotton, the produce of the Neganhál farm, together with four hundred bales of bought local staple cleaned by the saw-gins at Báil-Hongal and Saundatti, were sent to Vengurla. On the way to Bombay the native vessel met such severe weather that eight of the packages had to be thrown overboard and most of the rest was so damaged that it had to be sold at Bombay by public auction.

In the same year (1847) the Belgaum and Dhárwár experiments were united under one superintendent, and it was proposed that Mr. Channing should have the double charge and should be transferred from Belgaum to Kushagal in Dhárwár, with a mechanical assistant under him. Under instructions from the Board of Directors Government ordered Belgaum to provide a yearly supply of seven hundred and fifty bales of local and seven hundred and fifty of New Orleans. The number was afterwards reduced to five hundred bales of each kind and from the want of saw-gins the actual purchases came only to about two hundred bales. The Bombay Government applied to the Court of Directors for five thousand more saws for fitting new gins. In some places the cultivation of New Orleans had taken such a hold of the country, and the farmers understood its cultivation so well, that Mr. Channing estimated that some landholders near Báil-Hongal had raised crops yielding an acre outturn of about one hundred and twenty pounds of clean cotton. The actual area under New Orleans seed in five sub-divisions, two of which are now in Bijápur, was slightly under four thousand two hundred acres.

News of the unusually heavy crops that were gathered near Báil Hongal brought some Bádámi and Hungund landholders to buy the American seed. The President of the Manchester Commercial Association declared that some of the cotton received from Mr.

Channing was superior to American uplands. New Orleans now fetched fifteen per cent more than the local Belgaum. Through the agency of the Government planters, Mr. Turner, a Manchester merchant, bought (1847) a quantity of the Southern Máratha acclimatized New Orleans. The cost of delivering the cotton in Manchester was $3\frac{3}{4}d.$ ($2\frac{1}{2}$ *as.*) the pound, and Mr. Turner realized $6d.$ to $6\frac{1}{2}d.$ ($4-4\frac{1}{4}$ *as.*) a pound. He also had fifty pounds of it tested with ordinary Orleans from America. The result was in favour of the Indian Orleans which when unadulterated beat the American by about two and a half per cent. The result of Mr. Turner's purchases shows what could be done, even in those days, when the staple was carefully grown and honestly ginned and packed. The high value of the Indian New Orleans was again recognized in September 1847. Some five hundred bales of Belgaum and Dhárwár New Orleans sent to England by Government were shown for sale in the Manchester Exchange. The cotton caused a considerable sensation. Before the day was over nearly four hundred of the bales were sold at $6\frac{1}{2}d.$ ($4\frac{1}{4}$ *as.*) a pound, when the highest price of other Surats was only $5d.$ ($3\frac{1}{4}$ *as.*) The spinners thought the Belgaum unadulterated American equal to middling Boweds and well suited for all counts of yarns under forties.[1] The Manchester newspapers strongly urged the local manufacturers to buy their cotton direct in the Indian districts. So long as Bombay afforded a ready market for dirty dishonest cotton Government efforts to stop the evil were futile. The papers thought that a large and certain supply of honest Indian cotton could be secured only by the co-operation of the Lancashire manufacturer. This appeal seems to have had little practical effect. For many years Government were left, almost unaided, to the work of attempting to suppress fraud and secure pure cotton.

At the same time (1847) the high value of the Belgaum cotton in the English market was being seriously threatened by the prevalence of adulteration and fraud. This adulteration of cotton was in a great measure due to the small number of saw-gins. Only three gins were in use on Government account and of the three one at Saundatti was sold during the season for £22 (Rs. 220). Sixteen more were being made for Government and four for private persons. During the season adulteration was so rife that many officers recommended that a law should be passed making adulteration penal. Government thought that the provision of Regulation III. of 1829 if enforced would do much to suppress the evil. Notices were printed and circulated warning growers and dealers in cotton that Government were determined to put down gross adulteration and false packing. These threats and warnings had little effect. Before a committee of the House of Commons, Mr. Turner, who, as noticed above, had large dealings in Belgaum cotton, stated that his firm were on an average out of pocket £7000 (Rs. 70,000) every year from the clay, sand, twigs, and seed which were mixed with the cotton. So bad a name did this adulteration give Indian cotton that

[1] This cotton was called Boweds because before the saw-gin was invented it was cleared by the Indian cotton-bow.

Chapter IV. Agriculture.

CROPS. Cotton. *Experiments. 1848.*

as a rule spinners used it only when they could find nothing else to use.

In 1848-49, partly in Belgaum partly in Bijápur, the area under New Orleans rose to 6750 acres. The yield was good, but the people found it difficult to get buyers. The want of a market for New Orleans was more felt than for the local cotton, as large quantities of the local cotton were spun and woven in the district. In this year two proprietors or *jágirdárs* and two cotton dealers in private villages applied to the Collector for saw-gins. An English cotton broker's report on the staple sent to England in 1847-48 described the Belgaum New Orleans as clean and bright, of good colour and staple, in every respect superior; the Belgaum local cotton was good ordinary Surat with leaf and dirt, of short staple, and similar to average Surat. The 1848-49 shipments of New Orleans are described as of rather high colour, good staple, and very clean; and of the local cotton as of high colour, but of good staple and clean. Both kinds sold at 7½*d.* the pound. Early in 1848, the Honourable Mr. Reid, then Member of Council, stated that Belgaum and Dhárwár cotton was quoted at £11 4*s.* (Rs. 112) a *khandi* while no other Indian cotton fetched more than £8 10*s.* (Rs. 85). He urged that more saw-gins should be sent from England and that a fresh supply of Orleans seed should be brought from America. At this time in Liverpool, ordinary Orleans cotton was worth 6¾*d.* a pound, Belgaum Orleans 6¼*d.*, and the best Surat 5¼*d.* At the same time Belgaum Broach seed sold in Bombay at five per cent above Belgaum Orleans. Next year, in consequence of Mr. Reid's representations, twelve hundred new saws were brought from England and sent to Belgaum.

In the same year (1848) the Board of Directors, in London, reviewed the recent attempts to introduce New Orleans into the Kánarese districts. They thought that the time had come when the growth of New Orleans might be left to make its own way. They wished Government to limit their action to supplying new seed and introducing improved ways of preparing the staple. They also stated that they were sending from Liverpool one hundred bushels of New Orleans and fifty of Georgian seed from the best selections of the forthcoming American crop. The Georgian was recommended for poor soil. In 1848, according to Mr. Channing, the practice in the Belgaum cotton trade was for the dealers to make advances to the landholders on the security of the growing crop. The ordinary interest for an advance on the security of a growing crop was thirty-eight per cent. Not content with this heavy interest, when the dealers received the cotton they exacted a further levy of about fourteen per cent (3-4 lbs. the *man*). The landholders resented these exactions and to be revenged on the dealers wilfully mixed dirt with the cotton. Mr. Inverarity, the Collector, confirmed Mr. Channing's explanation of the origin of much of the dirt in cotton. He doubted if adulteration could be put down except by opening roads and letting in capital to compete with the local dealers. In the same year (1848) the Bombay Chamber of Commerce drew the attention of Government to the grave injury to the cotton

trade caused by adulteration. They suggested that inspectors should be appointed to examine and stamp the staple before shipment, and that every package should have marks which would make it easy to trace the person who had ginned it and grown it. In America provisions of this kind had nearly put an end to fraud. Adulterated cotton should, they thought, be taken before a magistrate, and half of the penalty given to the informer. If Government approved, the Chamber were ready to submit a draft Cotton Frauds Bill. Of all the cotton that came to Bombay perhaps the worst and the most fraudulently packed came from the Kánarese districts. The Chamber's proposals were referred to some leading firms who did not belong to the Chamber, and, with one exception, the Chamber's statements were confirmed and their proposals approved.[1] Government officers were less agreed than the merchants as to the wisdom of the Chamber's proposals. Mr. Townshend, the Commissioner, thought that the Chamber's proposal could not be carried out in Belgaum and matters were allowed to remain unchanged.

1849.

In 1849-50, 3059 acres were under Orleans and 145,216 under local cotton. The crop was good in the east and poor in the north. The average acre yield of clean cotton was estimated at about thirty-seven pounds for Orleans and thirty-nine pounds for local cotton. There was a good demand for the cotton. Government bought about a quarter of the experimental crop. The indebtedness of the landholders made them indifferent. Mr. Townshend, the Commissioner, noticed that the superintendent gave 1*s.* 4½*d.* (11 *as.*) for twenty-eight pounds of well-picked Orleans and only 1*s.* 1½*d.* (9 *as.*) for twenty-eight pounds of well-picked local cotton. These terms Mr. Townshend thought unduly favourable to the New Orleans. He thought the American cotton might now be left to take its natural place in the market. The superintendent explained that the native dealers were hostile to the New Orleans and that unless Government bought it, it would find no sale. Mr. Inverarity, the Collector, supported the superintendent, noticing that the dealers failed to see that the crop which paid the grower best must in the end pay the dealer best.

In 1850, Mr. Mackay, the special commissioner sent by the Manchester Chamber of Commerce to enquire into the condition of the cotton trade in India, was struck with the injury caused to the cotton trade by adulteration. He found bales whose ropes were so thickly coated with mud that instead of four and a half pounds they weighed fourteen and a half pounds. In the same year (1849) the Bombay Chamber of Commerce wrote to Government complaining of the state in which Belgaum American reached Bombay. It was not cleaned in any way and was so full of seeds and dirt as to be nearly unsaleable.

1850.

In 1850-51, 2332 acres were under New Orleans and 181,728 under local cotton. The season was marred by exceptionally trying

[1] The exception was Messrs. Forbes and Co. who expressed the opinion that the only way to improve the cotton trade was to abolish the land-tax. This proposal Lord Falkland, then Governor of Bombay (1848-1853), described as not worthy of notice.

Chapter IV. Agriculture. Crops. Cotton. *Experiments. 1850.*

and severe east winds. In five sub-divisions the experiments failed and in four there was only half a crop. The average acre yield of New Orleans was thirty pounds of clean cotton. Government, who were anxious to encourage private enterprise, refrained from buying. Mr. Davis, the first recorded English agent, was sent by Messrs. Lancaster and Company of Bombay to buy and gin cotton. Mr. Davis was provided with gins by Government but most were faulty and were returned. In his report for this year Mr. Channing noticed that much might be done to prevent seed from declining by shifting it from one part of the district to another. His experience also showed him that large plants did not yield the best staple. Plants of about two feet high gave the best and largest crops. Mr. Walton's experience during the fifteen years ending 1880 confirmed the correctness of Mr. Channing's views on both of these points.

At this time the Manchester Commercial Association repeatedly pressed on the Court of Directors the advisability of inducing the people of Belgaum and Dhárwár to grow their cotton earlier in the year. Mr. Channing strongly supported this recommendation and did his best to help the change. He did not succeed. It has already been noticed that further experience has shown that in the choice of the seed-time the people were right and Mr. Channing and the Manchester Association were wrong.

In 1850, Government approved a suggestion of Mr. Shaw, Collector of Dhárwár, that when cotton was not wilfully ill-treated the penalties of Regulation III. of 1829 should be sparingly inflicted. No information has been traced to show how far this proposal was carried out in Belgaum. In the same year the Bombay Chamber urged Government to take steps to improve the state of the local Belgaum cotton. In the Chamber's opinion it was the worst adulterated and the most fraudulently packed cotton that came to Bombay.

In 1850, Government distributed foreign cotton seed sent by the Court of Directors. It was called sugar-loaf cotton seed and was probably the variety best known as Bourbon kidney seed cotton. Three barrels, containing about three hundred pounds of seed, were sent to Belgaum, and it was planted in about thirty-two acres at Saundatti. About two-thirds of the seed failed to sprout. The plants that did come were at first small and sickly. In November they looked healthy and promised fairly, though inferior to New Orleans cotton. The Collector advised that no more of this kind of seed should be sent. In this year Government insisted on the importance of keeping the Orleans seed unmixed. New Orleans seed was also distributed in Chikodi and Sampgaon.

In 1850, Mr. Townshend, then Revenue Commissioner, expressed the opinion that experimental farms were costly and were of little use. That certain cotton could be grown in an experimental farm at a profit was no proof that it would pay the ordinary landholder to grow it. The Governor, Lord Falkland (1848-1853), approved of Mr. Townshend's views and expressed the opinion that more good might be done by improving the cleaning, growing, picking, and carrying of the local cotton than by introducing foreign varieties.

In 1851-52, 2212 acres were under New Orleans and 158,372 acres under local cotton. During this year Mr. Channing died. He was succeeded by Mr. Blount who had been in charge of cotton experiments in Dhárwár. The season was unfavourable. Mr. Blount estimated that the average acre yield of clean Orleans was not more than six pounds.

In 1851, Mr. Reeves, then Collector, reported that he had sent to Bombay 46,256 pounds of Orleans and 76,040 of local cotton of this and of the previous year's crop. This was only half of what he had been asked to send, but the rest of the crop had been bought by outside merchants. Two more cotton-gins were ordered and Mr. Reeves was asked to send Belgaum New Orleans for trial to Sindh.

Meanwhile Mr. Mackay, the special commissioner of the Manchester Chamber of Commerce, had drawn up a lengthy report in which among other things he made some remarks on the system of tillage in Belgaum. Mr. Mackay's report was sent to the Collector of Belgaum for opinion. With reference to Mr. Mackay's remarks, Mr. Havelock, then (1851) for some time in charge of Belgaum, wrote that he thought that if Mr. Mackay knew more of the country he would change his views about the defects of the Belgaum system of tillage. In his own case increased knowledge of the local system had led to increased respect for it. He knew that some of the American planters frankly admitted that there was much in the native system of farming to admire and that it was well suited to the circumstances of India. Mr. Walton's experience (1865-1880) confirmed this opinion. No experiments had succeeded except those which were based on local methods.

In 1851 adulteration was as bad as ever. The Bombay Chamber again complained that the Southern Marátha cotton had all the worst characteristics of Indian cotton in the days of its greatest shame. Nothing but the strong hand of authority could stop the wholesale mixing of seed. Government asked merchants to help by giving information whenever they received falsely packed and adulterated cotton. This the merchants said they could not do; only Government could stop the export of unmarketable cotton. Government called on the Collector to enforce the provision of Regulation III. of 1829 as strictly as possible. In the same year (1851) Mr. Channing, shortly before his death, urged on the Collector of Belgaum the necessity of securing pure seed. Strict attention to purity of seed was the more necessary because Government were retiring from the cotton trade and were trying to introduce Bombay agencies into Belgaum. As regards the mixing of cotton, Mr. Reeves, the Collector, after examining much of the growing crops, was satisfied that the mixing was not as a rule done in the fields, but at the gins. Mr. Reeves also reminded Government that much of the cotton which reached Bombay so shamelessly adulterated was not grown or ginned in Belgaum though it had passed through the district.

1852.

In 1852-53, 1950 acres were under New Orleans and 168,427 acres under local cotton. The New Orleans was almost a complete failure. In 1852 adulteration was as bad as ever. The coast

Chapter IV. Agriculture. Crops. Cotton. *Experiments.* *1852.*

dealers petitioned Government to pass an enactment to punish cotton frauds. They were helpless. If they refused to take adulterated cotton their rivals took it or the up-country dealers sent it straight to Bombay. In 1853-54, 1386 acres were under New Orleans and 192,284 were under local cotton. The east of the district suffered from drought and over large tracts the cotton crop was an almost total failure. Mr. Inverarity the Collector, and Mr. Courtenay the Revenue Commissioner, agreed in recommending that the experiments should cease. Government approved of their opinion and said that if it was found to pay New Orleans would of its own accord spread north from Dhárwár to Belgaum. In 1853 the experiments were given up. At the same time orders were issued that every encouragement should be given to any undertaking that tended to a free and natural extension of the cultivation of New Orleans. Orders were also issued to give every facility for the repair of saw-gins and the distribution of seed.

In 1853, a decision of the Belgaum Judge, which was confirmed on appeal, made the provision of Regulation III. of 1829 almost a dead letter by allowing the owner of adulterated cotton to plead the credulity, negligence, and error of his servants. In 1854-55, 1911 acres were under New Orleans and 167,317 acres under local cotton. In 1855-56, 1728 acres were under New Orleans and 124,185 were under local cotton.

In the discussions about the evils of mixing and false packing it had often been said that the saving of the cotton trade would be for a European merchant to go or to send a European agent to the cotton country to buy as nearly as possible from the grower. In 1855, one English merchant went to Belgaum. He found he had to travel hundreds of miles with his rupees on his back, and that he had no resting-place but the ground. He had to weigh the cotton himself in little lots and when he bought it he had no place to warehouse it and no means of carrying it to the coast. In 1856-57, 4461 acres were under New Orleans and 183,091 acres under local cotton. In 1856, the Court of Directors noticed that in 1854-55 in Belgaum only 1911 acres were under New Orleans. They considered that the experiments had led to no results of any consequence and that a continuance of them was unlikely to bring any permanent good effect. Except the distribution of improved seed the Court thought that experiments might be left to private enterprise.

For the three years ending 1846-47 the cost of Government cotton experiments in Belgaum, including the superintendent's pay during some of the time, appears to have been about £827 (Rs. 8270); while the receipts in India were only about £26 (Rs. 260). Of the value of the cotton which was sent to England, which in every case formed the bulk of the crop, no details are available. In 1847 the charges are entered at about £385 (Rs. 3850) and the receipts at £21 (Rs. 210) apart from the proceeds of more than 100 *khandis* which were sent to England. In 1848, the operations cost £1581 (Rs. 15,810) and the receipts amounted to £221 (Rs. 2210) in addition to over one hundred *khandis* of cotton shipped to England. In 1849, the cost amounted to £1949 (Rs. 19,490) and the

recoveries to 8*s.* (Rs. 4) besides about ninety-five *khandis* sent to Great Britain. In 1850, the expenses were £2522 (Rs. 25,220) and the receipts about a hundred and fifty-six *khandis* exported. In 1851, the expenditure was £2306 (Rs.23,060) and the receipts about £213 (Rs. 2130) and about fifty-eight *khandis* shipped to England. In this year an adjustment of cotton transactions was made between the Dhárwár and Belgaum collectorates, by which Belgaum was credited with refunds of about £1162 (Rs. 11,620). A farther shipment of about twenty-five *khandis* was also made on account of the Belgaum experiments. In 1853-54 the staff was reduced to one clerk and the charges fell to £18 (Rs. 180) and the receipts to £1 15*s.* (Rs. 17¾). In this season there is no record of any shipment of cotton. In 1854-55, as experiments had been altogether discontinued, the only expenditure was £1 10*s.* (Rs. 15) paid for lithographing a number of vernacular notices telling husbandmen how to obtain the best seed and cotton-ginning machinery. Experiments were thus carried on for about ten years (1845-1855), and during the greater part of that time were under the control of an experienced planter. The total cost appears to have been £9590 (Rs. 95,900), which, with receipts in India returned at £1646 (Rs. 16,460), leaves a net cost of £7946 (Rs. 79,460). The records show that during these ten years some five hundred and thirty-four *khandis* of cotton were shipped to England to be sold on Government account and more than this was probably sent. Even if only 534 *khandis* were sent the cost would be only £15 (Rs. 150) a *khandi*. In Mr. Walton's opinion the long series of experiments showed that New Orleans cotton was well suited to Belgaum. It suffered from the uncertainty of the climate, but accidents of climate also injured, sometimes destroyed, the outturn of the local crop. The chief difference was that the New Orleans seed tended to deteriorate. Mr. Walton believed that if Government had adopted Mr. Reeves' advice to have the saw-gins repaired by the superintendent at the owner's cost as was done in Dhárwár, Belgaum like Dhárwár might still have a large trade in New Orleans. The New Orleans crop was much more valuable than the local crop. It took less time to ripen, it was in more general demand in Europe, it yielded a greater outturn of uncleaned cotton, and the proportion of wool to seed was much greater in New Orleans than in the local cotton. Mr. Walton estimated that with the same tillage area, if, over Belgaum and Bijápur, New Orleans had taken the place of local cotton, the addition to the crop, partly from greater outturn partly from the higher proportion of wool, would represent 40,000 bales at the average prices of 1878, worth £400,000 (Rs. 40,00,000).

1857.

In 1857-58, 1487 acres were under New Orleans and 230,548 acres were under local cotton. In 1857, the Chamber of Commerce represented to the Government of Bombay that from the systematic mixture of the seed cotton in the gins the name of American Belgaum and Dhárwár cotton had greatly suffered in Bombay. They also complained that the American and the local were mixed in the same field. Government ordered their officers to take such steps as they thought advisable to check the evils of which the Chamber complained. In this year experiments were made with Egyptian staple in three sub-divisions of Belgaum and in two of Bijápur. The results were

Chapter IV. Agriculture. Crops. Cotton. *Experiments.* *1857.*

unsatisfactory and Mr. Seton-Karr, the Collector, feared that the seed had been damaged in transit. It was sown much more thickly than usual, but not half the seeds sprouted. Mr. Seton-Karr thought it might succeed if watered, but the people were unwilling to undertake further experiments. Nearly fifty acres were planted in thirty-four Bijápur villages. Only in a portion of these did the seed come up, and even there the return was miserable. In five Athni villages there was no outturn. Forty acres were planted in three Parasgad villages, but the average acre yield was only seven pounds of cleaned cotton. Samples sent to the Bombay Chamber of Commerce were found damaged by insects. The uninjured cotton was superior, and if well ginned would fetch a price equal to Egypt-grown Egyptian. In 1858-59, 1558 acres were under American and 244,787 under local cotton. Almost the whole area under New Orleans between 1854 and 1858 was in Bádámi in Bijápur and not in the present Belgaum. In 1858 the Bombay Chamber said that it was useless for European firms to send agents to the cotton districts in the absence of security against frauds and impositions in preparing and packing cotton. *1859.* In 1859-60, 1977 acres were under New Orleans and 288,668 under local cotton. In the same year Egyptian seed was distributed gratis in twenty-two Bijápur and eighteen Belgaum villages which had some of the best cotton land in the district. Instructions were given regarding the sowing. Of the Bijápur villages in Bádámi the seed came up in two villages and failed in other two; in Hungund it sprouted in six villages and failed in nine; and in Bágalkot it came up in one and failed in two. Of the Belgaum villages the seed sprouted in twenty-four fields and failed in two; in Tásgaon, now in Sátára, it came in five and failed in two; and in Gokák it failed in nine and came in one. Mr. Seton-Karr believed that the seed was good and sound. The results were miserable and the people were averse from any further attempt to grow Egyptian cotton. Mr. Seton-Karr sent Dr. Gibson four pounds of the seed and asked him to try it in the Government gardens at Dápuri and Hewra in Poona. The seed was sown at the end of April, and when they seemed to want it the plants were helped with water. Mr. Walton doubted if the Belgaum people had given the Egyptian seed a fair trial. In 1859 the Bombay Chamber of Commerce explained the fall in the quality of the Belgaum Orleans by supposing that it had been crossed with the local variety. This seems to have been a mistake. Dr. Forbes, the Cotton Commissioner, made enquiries which satisfied him that the decline in the quality of Orleans was not due to crossing with the local cotton.[1]

In 1859, the Bombay Chamber again appealed to Government for help against adulteration. The merchants had no means of inducing

[1] In 1845 Mr. A. Elphinston, the Collector of Ratnágiri, paid much attention to the crossing of cotton. He succeeded in getting some seeds which he called mixed Bourbon. These seeds were distributed by Government, but the result was unsatisfactory. In 1872 experiments were made in Sind and it was hoped that they had succeeded in producing a cross, but this proved a mistake. Mr. Walton's experience led him to agree with Dr. Wight of Madras that, though by a freak of nature a cross might take place, there was no reason to hope that local Indian and American cotton could ever be hybridised.

the landholder to improve his cotton. They could not refuse to accept mixed or adulterated cotton because the mixing was universal. In 1860-61, the Civil War in America increased the area under New Orleans to 6514 acres and under local cotton to 243,823 acres, and in 1861-62 New Orleans rose to 6620 and local cotton to 278,963 acres. In 1860 it was stated, in Mr. Walton's opinion, correctly, that the chief cause of the badness of the Belgaum cotton was the greed and the fraud of the local cotton-dealer or middleman as he was called. The local dealer was said to be able to secure for himself the benefit of all the improvements effected by Government. It was a common practise in the ginning yards to find a large heap of trashy local cotton and near it a pile of American of about the same bulk. The space in front of the ginning room was covered with a mixture of the two heaps spread in the sun to dry. It was this mixture which was being cleaned in the gins. No cotton details are available for 1862-63 and 1863-64.

Adulteration.

The unusual demand and rapid rise of price caused during these years by the war in America led to a great increase in adulteration, mixing, and false packing. The Commissioner, Mr. Hart, found the local officers unable to prevent these frauds. They urged him to move Government to take measures to check these abuses which they were satisfied must end in making Belgaum cotton unsaleable. It was found that the presence of European agents in the cotton-growing districts caused no diminution in the frauds. The agents represented merchants, not manufacturers; they bought to sell again, and in the turn-over dirty cotton might yield more profit than clean. The penal provisions of Regulation III. of 1829 were practically a dead-letter chiefly owing to the fact that the possession of mixed or dirty cotton was not an offence unless, which was often impossible to prove, the cotton was shown to be offered for sale. About the same time the Bombay Chamber once more drew the attention of Government to the ruin which adulteration was working in the cotton trade. Matters were worst in the Bombay Karnátak where cotton adulterating was a recognised calling. These representations and special inquiries satisfied Government that fraud was so widespread that, unless it was checked, the value of Bombay cotton must seriously suffer. They appointed a Commission who took evidence in Bombay and visited and made enquiries in the cotton-growing districts.[1] In the Kánarese districts the Commission found many of the traders and growers so anxious that adulteration should cease that they were willing to pay fees to support the necessary establishment. An examination of the evidence collected by the Commission led Government to ask them to prepare a draft Act for the suppression of cotton frauds. After much discussion and with various changes the draft became Act IX. of 1863. The value of the Act was greatly lessened by the absence of a definition of what constituted adulteration. This point was to a great extent left to the discretion

[1] The Commissioners were: Mr. G. Inverarity, Commissioner of Customs, president; Messrs. Forbes and Forjett, appointed by Government; and Messrs. Scott, Hannay, and McIlwraith, chosen by the Chamber.

Chapter IV. Agriculture. Crops. Cotton. *Adulteration.*

of the magistrate, and, as many magistrates were disinclined to convict, prosecutions often broke down. Still, in Mr. Walton's opinion, the fear of punishment to some extent reduced the amount of adulteration.

In 1864-65 Bijápur was formed into a separate collectorate. In that year within the limits of the present Belgaum were 3731 acres under American and 145,928 acres under local cotton. The American staple was so largely mixed with the local that no pure American was available. In 1865-66, 3730 acres were under American and 163,676 under local cotton. The season was unfavourable and there was a marked deficiency both in the quantity and quality of the crop. In 1865, Mr. Walton attempted to revive the growth of American cotton in some of the best central sub-divisions of Belgaum. The seed was sent to Sampgaon and grew well, but the attempt failed for want of gins. Under the Cotton Frauds Act Kánarese cotton was carefully examined at the Ratnágiri port of Vengurla. This had a marked effect in checking adulteration. In 1866-67, 1865 acres were under American and 130,810 acres under local cotton. Under the influence of the cotton inspectors New Orleans was grown much more purely than formerly. In 1866 Mr. Bulkley, the Inspector-in-Chief of Cotton, brought to the notice of Government that the existing provisions of the Cotton Frauds Act failed to check the mixing of different kinds of cotton and the adding of seed or uncleaned cotton at the ginning establishments which were scattered all over the district. Unless the inspector caught a gin-master in the act of mixing the prosecution failed. The people knew when the inspector was at hand and the mixing stopped till he was gone. In the yards were the heaps of different kinds of cotton ready for mixing and the seed-cotton ready to be thrown in to make weight. The inspector knew with what object the different cottons and the seed were there, but he could not interfere. The cotton must be offered either for pressing or sale, and as there were no local presses and the cotton was not sold till it reached Bombay the mixers and dirt-adders were safe. In 1867-68, 2825 acres were under American and 122,191 under local cotton. The increase in the area of New Orleans was chiefly due to the improved arrangements for keeping the saw-gins in repair. The opening of a new ginning factory at Navalgund in Dhárwár proved a great convenience to the people of Parasgad. Early in the year the bushes were attacked by a blight which, it was calculated, destroyed thirty-five per cent of the crop. The local cotton suffered more than the American.

In 1868-69, 3093 acres were under American and 120,677 under local cotton. The cultivation of American was well maintained. Blight reappeared and did great damage, in some places destroying nearly the whole crop. In Parasgad the adulteration of American by foot-rolling local staple into it was detected. In 1869-70, 7588 acres were under American and 205,672 under local cotton. These are the largest areas on record. In 1869 a draft Bill to amend the 1863 Cotton Frauds Act was introduced into the Bombay Legislative Council by the Honourable A. H. Campbell. After much discussion

and several changes the Bill was passed. But it was not sanctioned by the Government of India and the Act of 1863 was continued for nine years more. In 1870-71, 13,166 acres were under American and 163,072 were under local cotton. This rise in the area of American cotton was owing to an improved arrangement for repairing gins. The new arrangements were not continued and the spread of American ceased. The arrangement with the Navalgund ginning factory for repairing gins in Belgaum villages came to an end and the area under American fell to 7295 acres. In 1871-72, 7295 acres were under American and 154,181 under local cotton. The fall in the cotton area was partly due to the discouragement caused by the blight in the previous year, partly to a decline in the quality of the American seed. Many attempts to adulterate cotton were detected. This was a bad year for cotton. The growers tried to make up for the shortness of the crop by increased adulteration which to some extent was checked by several successful prosecutions. The Collector urged the need of a more efficient Frauds Act. The question was not solely a merchant's question. The fortune of the most valuable export in Western India was at stake. In 1872-73, 7570 acres were under American and 161,232 under local cotton. The crop was fair, there was much less adulteration than in the previous year, and the cotton came to market in fair order. In this year the efficiency of the Act was much increased by extending its working to the villages of the estate-holders or *jágirdárs* of the Kánarese districts. Many prosecutions had broken down on the plea that the cotton had been mixed in a private or estate village.

In 1872 an inquiry into the working of the Cotton Frauds Act of 1863 showed that in Belgaum the dealers were in favour of stronger provisions for repressing fraud. The reason why the dealers as a class were so much more in favour of penal provisions in 1872 than they had been in 1863 was that in the years between 1863 and 1872, they had lost much from frauds in cotton. The wealth which had come to the cotton-growers during the American War to a great extent had made them independent of their former patrons, the cotton-dealers. Instead of the uncleaned cotton coming into the hands of a comparatively small body of dealers and being ginned at a few centres and under their control many of the growers had set up gins and ginned and mixed the cotton before selling it to the dealers. Much when it reached Bombay was found dirty and mixed and was thrown on the dealers' hands.

In 1873-74, 7570 acres were under American and 160,622 were under local cotton. A blight seriously damaged the crop. In 1874-75, 2139 acres were under American and 175,589 under local cotton. In Bombay, American sold at 5⅜*d.* and local cotton at 4⅞*d.* the pound. The crop was large and late and there was much adulteration. *Kumta,* that is the local Belgaum cotton, was in much demand in the Bombay mills. In 1874-75 the adulteration was so great that in six cases the fraudulent mixture ranged from thirty-four to forty-seven per cent. The Collector urged Government to import fresh American seed and to take steps to check the destructive state of the saw-gins. In 1874 in consequence of an agitation in

Chapter IV. Agriculture. Crops. Cotton. *Adulteration.*

Bombay to put a stop to special measures for preventing cotton adulteration a Commission was appointed to consider whether a Cotton Frauds Act should be continued, and if it should be continued, what changes should be made in the existing Act.[1] The Commission collected a large amount of evidence. The majority were of opinion that though it was not advisable to annul the Act, it was advisable to place it in abeyance for a time. The report of the Commission was considered by Government and the papers were forwarded to the Secretary of State. The Secretary of State held that the majority of the evidence taken before the Commission was in favour of the continuance of the Act. Certain portions of the Act, he thought, should be modified and other portions made more stringent. He directed the Government of Bombay to prepare a fresh Act, with the object of remedying the defects of the existing measure.

In 1875-76, on account of the success of the previous year, the area under American cotton rose to 5941 acres and under local to 214,983. But the price fell and the season was not successful. Adulteration was more general than it had been for some years.

In the famine year of 1876-77 the area under American cotton fell to fifty-nine and the area under local cotton to 70,281 acres. Except in a few spots in the west what was sown failed to come to maturity, and next year the people were left almost without seed cotton.

In 1877-78, 167 acres were under American and 146,701 acres were under local cotton. Considering the losses and trials of the previous season the farmers showed wonderful energy and command of resources. Still cattle were scarce and the crop suffered much from the failure to keep it clear of weeds. Sir Richard Temple, then Governor of Bombay (1877-1880) visited Belgaum and enquired into the cause of the fall in value of the American cotton. The Cotton Department was ordered to resume the control of the gin-repairing establishments, but Government shortly afterwards decided that, for the present, operations were to be confined to Dhárwár. A supply of five hundred pounds of new American seed was ordered.

In 1878-79, 984 acres were under American and 177,374 under local cotton. The outturn of cotton suffered again from the dearness of food grains and from the want of cattle to clean the fields. These evils were small compared with the plague of rats which swarmed over Dhárwár and part of Belgaum. They attacked all crops, and to none did they do more harm than to cotton. They cut the bolls off the bushes before they were ripe, opened them and devoured the seed, leaving the unmatured fibre strewed over the field. In some places not thirty per cent of the crop was gathered. This plague seriously reduced the already scarce supply of cotton seed. Much of the produce of the five hundred pounds of fresh American seed was destroyed. Not more than three thousand pounds were available for distribution. A second supply of 500 pounds was brought from

[1] The Commission were: The Honourable A. Rogers, President; and the Honourable E. W. Ravenscroft, the Honourable Narayen Vásudev, and Messrs. H. P. LeMesurier and E. M. Fogo, members.

America. In 1878, after long discussion, Act VII. of 1878 was passed. The provisions of this Act, though milder than those of the former Act, were more effective and they worked well. In September 1879 the Government of India recommended that all special legislation for the suppression of cotton frauds should cease. The Secretary of State did not agree with the view held by the Government of India. At the same time, on the 4th of March 1880, he sanctioned the proposals of the Government of India and desired the Bombay Government to do away with the special cotton fraud preventive establishment. According to Mr. Walton the opinion of the local European agents and native merchants was opposed to the giving up of Government efforts to check fraud.

In 1879-80, 592 acres were under American and 174,103 under local cotton. People sometimes spoke and wrote as if false packing and mixing would cease if English merchants or their agents came into the district. It was certainly less hopeless for English merchants to come to the district and buy than it had been in 1855; roads had been opened and rest-houses had been built. Still in Mr. Walton's opinion it was impossible for the exporter to buy small quantities from the growers without the help of a local dealer. In 1880 most of the cotton trade was carried on by a number of middlemen or local dealers who either went from village to village or remained in country towns and bought for their employers who were either local export merchants or the representatives of Bombay firms. Many of the local dealers instigated frauds both in cleaning and in packing in which the grower had seldom any objection to join. In spite of their losses in the famine which had reduced many of the smaller holders to their old position of dependence on the local dealer, the cotton growers were to a considerable extent independent of the local cotton-dealer or middleman. The cotton-growers knew the market price and were in a position to demand it. In Mr. Walton's opinion the chief drawback to the change was that the local dealer's profit was so reduced that he was forced to be more tricky than ever, and practised his ingenuity in devising fresh modes of cotton adulteration and false packing. The usual method of mixing local cotton is to store in a small room two heaps of cotton, a good and a bad, an old and a new, a damaged and a sound. Two men go into the room, each with a bundle of thin canes in his hand. They tie cloths over their mouths and noses and shut the door. They spread out the two kinds of cotton together and keep whipping the mixture, every now and then throwing on handfuls of seed-cotton or seed. The whipping is done with such thoroughness and skill that the mixture is surprisingly passable. Mixing with saw-gins is still easier and more perfect. The saw-gin is wilfully kept in disrepair because in that state it lets an immense weight of heavy dust and rubbish pass through powdered among the ginned cotton so as not seriously to take from its appearence. According to Mr. P. Chrystal, a Bombay merchant who is well acquainted with the Belgaum and Dhárwár cotton trade, the Bombay dealers and merchants in American Dhárwár and Kumta cotton think (1883) that the Cotton Frauds Act failed to stop adulteration in the Bombay Karnátak. Since the Act has been stopped he thinks there has been no noticeable increase in

Chapter IV. Agriculture. Crops. Cotton.

adulteration. The American Dhárwár has declined in staple and lost its silkiness but this he thinks is due not to more mixing but to deterioration in the American seed.

The following table for the thirty-five years ending 1882-83 gives the areas under the two varieties of cotton, American and local:

Belgaum Cotton Area, 1846-1882.[1]

Year.	American.	Local.	Total.	Year.	American.	Local.	Total.
	Acres.	Acres.	Acres.		Acres.	Acres.	Acres.
1846-47 ...	2017	110,103	112,120	1866-67 ...	1865	130,810	132,675
1847-48 ...	2617	115,888	118,505	1867-68 ...	2825	122,191	125,016
1848-49 ...	4190	134,514	138,704	1868-69 ...	3098	120,677	123,775
1849-50 ...	3059	145,216	148,275	1869-70 ...	7588	205,672	213,260
1850-51 ...	2332	181,728	184,060	1870-71 ...	13,166	163,072	176,238
1851-52	2212	158,372	160,584	1871-72 ...	7295	154,181	161,476
1852-53	1950	168,427	170,377	1872-73 ..	7487	161,232	168,719
1853-54 ..	1386	192,284	193,670	1873-74 ...	7570	160,622	168,192
1854-55 ..	1911	167,317	169,228	1874-75 ...	2139	175,589	177,728
1855-56 ...	1728	124,185	125,913	1875-76 ...	5941	214,983	220,924
1856-57 ..	4461	183,091	187,552	1876-77 ...	59	70,281	70,340
1857-58 ...	1487	230,548	232,035	1877-78 ...	167	146,701	146,868
1858-59 ..	1558	244,787	246,345	1878-79 ...	984	177,374	178,358
1859-60 ..	1977	288,668	290,645	1879-80 ...	592	174,103	174,695
1860-61 ...	6514	243,823	250,337	1880-81 ...	21	192,106	192,127
1861-62 ...	6620	278,963	285,583	1881-82 ...	344	163,504	163,848
1864-65 ...	3731	145,928	149,659	1882-83 ...	929	230,090	231,019
1865-66 ...	3730	163,676	167,406				

Famines.

1396

On account of its uncertain rainfall Eastern Belgaum is one of the parts of the Bombay Presidency which is most liable to suffer from failure of crops. The earliest recorded failure of rain is the great Durga Devi famine. It began in 1396 and is said to have prevailed over the whole of India south of the Narbada and to have lasted for nearly twelve years. This famine was caused by the total want of seasonable rain. Almost no revenue was recovered and a large proportion of the people died. There is no record that any measures were adopted to relieve the distress.[2] In 1419 no rain fell and there was a grievous famine throughout the Deccan and Karnátak. Multitudes of cattle died from want of water. Ahmad Sháh

1419.

Bahmani (1419-1431) increased the pay of his troops and opened public stores of grain for the use of the poor. In 1420, there was again a failure of rain and the country was much disturbed.[3] The

1472.

years 1472 and 1473 are described as seasons of exceptional distress. No rain fell and no crops were sown for two years. Many died and many left the country. In the third year when rain at last fell scarcely any one was left to till the land.[4] In consequence of continued drought and great swarms of locusts there was a gradual failure of crops which began from 1787-88 and continued to 1795-96 and caused great distress among all classes.

1790.

In 1790 the march of the Maráthás under Parashurám Bháu through Belgaum and Dhárwár to Maisur was accompanied by such

---

[1] From 1846-47 to 1861-62 the figures include those of the three sub-divisions of Bágalkot, Bádámi, and Hungund in the present district of Bijápur. For 1862-63 and 1863-64 no figures are available. From 1864-65 to 1882-83 the figures are for the present district of Belgaum including alienated lands in Government villages and native state lands mixed with Government lands. In 1881-82 the cotton area in Government villages was 91,400 acres.

[2] Grant Duff's Maráthás, 26.

[3] Briggs' Ferishta, II. 405.

[4] Briggs' Ferishta, II. 494.

Famines.

devastation that on its return from Maisur the victorious army almost perished for want of food. In the following year 1791-92 the complete failure of the early rain caused awful misery. Hardly any records have been found regarding this famine. But tradition speaks of it as the severest famine ever known, extending more or less over the whole of the Bombay Presidency except Sind and to Madras and the Nizám's territory. In Belgaum the distress seems to have been heightened by the disturbed state of the country and by vast crowds of immigrants from more afflicted parts. Under these influences grain could hardly be bought. Some high-caste Hindus, unable to get grain, and rejecting animal food, poisoned themselves, while the poorer classes found a scanty living on roots, herbs, dead animals, and even corpses. The famine was so severe that it was calculated that fully half the inhabitants of many villages died; of those who survived many wandered and never returned. In 1791-92, in the town and district of Gokák, from starvation alone twenty-five thousand people are said to have perished.[1] A story remains that a woman in Gokák under the pangs of hunger ate her own children, and in punishment was dragged at the foot of a buffalo till she died. From the numbers of uncared-for dead this famine is still remembered as the *Dongi Bura* or the Skull Famine. The estate-holders or *jágirdárs* are said to have done what they could to relieve the distress, but the Peshwa's government seems to have given no aid.[2] Plentiful rain fell in October 1791 and did much to relieve the distress.[3] In 1791 from the 7th to the 15th of May the rupee price of rice was six pounds (3 *shers*) at Dudhvad, Murgod, Bendvád, Ráybág, and Kudsi, eight pounds (4 *shers*) at Gokák, and ten pounds (5 *shers*) at Athni. The rupee price of gram was six pounds (3 *shers*) at Dudhvad and Murgod, eight pounds (4 *shers*) at Ráybág and Kudsi, and ten pounds (5 *shers*) at Athni. The rupee price of Indian millet was eight pounds (4 *shers*) at Dudhvad, Murgod, Ráybág, Kudsi, Gokák, and Bendvád; and twelve pounds (6 *shers*) at Athni.[4] In 1802-3 Belgaum again suffered severely from famine. This famine was less due to want of rain than to the depredations of Pendhári and other robbers, which, over large tracts, were so constant as to put a stop to tillage. The local distress was heightened by the arrival of crowds of people from the Godávari districts which the ravages of Holkar's army had turned into a desert. In the Gokák sub-division 15,000 people are said to have died of famine. The Peshwa's government seems to have made no attempt to relieve the distress.[5]

1790.

1802.

In 1832-33 almost no rain fell and almost no crops were reaped in the east of the district. The distress, though very severe, hardly amounted to famine. Many cattle died and some people are said to have sold their children for food. In 1853 the drought in the

1832-33.

[1] Walton's Cotton, 65. [2] Walton's Cotton, 6.
[3] Colonel Etheridge's Report on Past Famines, 103.
[4] Moore's Narrative of Captain Little's Detachment, 232.
[5] Colonel Etheridge's Report on Past Famines, 103.

Chapter IV. Agriculture.

Famines. 1876.

east of the district caused distress which was heightened by crowds of the destitute from Sholápur, where the failure of rain was more complete. Government granted considerable remissions.[1]

In 1876 a scanty and ill-timed rainfall of 21·34 led to failure of crops and distress amounting to famine over nearly half of the district.[2] The early crops failed almost entirely in Athni and Gokák, and over the greater part of Chikodi and Parasgad; in the three remaining sub-divisions they were less than half the average. In addition to the failure of the early rains, September and October passed with only a few showers, and, except on river banks, little or no cold-weather crops were sown. With high grain prices, Indian millet at fourteen instead of forty-three pounds the rupee, and no demand for field labour, large numbers of the poorer classes fell into distress. The need for Government help began about the middle of September, when relief works from local funds were started. Early in November there was scarcity of grain, and increasing distress. Soon after large supplies began to pour in and the pressure lightened. In the hot months, with rising prices, distress returned, and the scanty fall of rain in July and August caused much anxiety and suffering. The timely and plentiful rainfall of the next two months saved the growing crops, and the condition of the people gradually improved. At the close of November the demand for Government help ceased.

The following details show, month by month, the phases through which the distress passed and the measures taken to meet it. In September 1876 rain held off and the early crops almost wholly perished in Athni, Gokák, and the east of Chikodi; elsewhere they were withering. Cold-weather crops could not be sown, and the loss caused by the very scanty early rains began to deepen into distress. On the 28th of the month 1·28 inches of rain fell in Belgaum and 1·88 inches in Sampgaon and did great good to the early crops. In Gokák and Athni water was failing, and, especially in Gokák, fodder was so scarce that the Collector asked that the usual order against cutting *asan* Briedelia retusa branches should not be enforced. Cattle were being fed on the withered crops and numbers were dying. About the middle of the month local fund relief works were started. Late in October three inches of rain fell in Parasgad, one inch in Belgaum, and showers in some Gokák and Chikodi villages. In a few places cold-weather crops were sown. The condition of the early crops was generally unfavourable. They had almost entirely failed in Athni and Gokák, nearly three-fourths had gone in Chikodi and Parasgad, and, in the rest of the district they were withering. In the beginning of the month grain was scarce in the Belgaum markets. Later large quantities were imported by sea, but, as most of the imported grain passed through Belgaum to Dhárwár, Kolhápur, and the Patvardhan states, the local supply was only slightly improved. Water and

---

[1] Walton's Cotton, 58, 65.

[2] The estimate was in area 2660 square miles of a total of 4600, and in population 500,000 out of 940,000.

Famines. *1876.*

fodder were growing scarce, and, in the north, people were moving about in search of work, and were sending their cattle to the Sahyádri hills. The scarcity of food and the want of water caused an increase of crime, and for a time the unsafe state of the roads interfered with the import of grain. Local fund relief works gave employment to large numbers, but more works were wanted. November passed without rain and most of the early harvest perished. Except on river banks few cold-weather crops were sown, and where they had been sown they were withering from want of moisture. In Gokák and Athni there was great distress. People were moving to Dhárwár and Maisur, and cattle were dying in great numbers from want of fodder and water. Grain kept pouring in freely from Vengurla for export to Kaládgi, Bágalkot, and other inland towns. The Belgaum market was plentifully supplied, but in Gokák and Athni, owing to the stoppage of exports from Mudhol and Jamkhandi, traders found it so difficult to get supplies that grain had to be sent to the Parasgad relief works. In the beginning of the month, *jvári* rose as high as twelve pounds the rupee, but quickly fell to sixteen pounds. Public works were started. Of 9573, the average daily number relieved during the month, 8839 were able-bodied expected to do a full day's work and superintended by ordinary public works officers, and 734 were aged or feeble expected to do two-thirds of a day's work and superintended by assistant collectors, mámlatdárs, and special officers.[1] December passed without rain and with no change in crop prospects. Grain continued to be largely imported and *jvári* fell from seventeen pounds at the beginning of the month to twenty pounds near the close. About the middle of the month cholera broke out. During the month the numbers of the destitute rose on public works from 8839 to 11,471, and on civil works from 734 to 7749.

1877.

In January no rain fell. Grain importations continued, and the supply was plentiful, except in Athni, where prices slightly rose. *Jvári*, after rising in the beginning to nineteen pounds, fell about the close of the month to twenty pounds the rupee. Cholera continued prevalent. On the 19th of the month the pay of weakly workers was reduced.[2] The result of this change was a fall in the number of civil agency workers from 10,088 in the beginning of the month to 6966 at its close. At the same time, by enforcing distance and task tests, the numbers on public works fell from 13,133 to 8909. During the month 388 persons were charitably relieved. Late in February eight cents of rain fell. Grain supplies continued sufficient, and *jvári* remained steady at nineteen pounds the rupee. In Athni and Gokák water was very scarce. Cholera continued prevalent and the mortality was high. The numbers on relief fell, on public works from 19,106

[1] The original wages were, for a man 3*d.* (2 *as.*) a day, for a woman 2½*d.* (1½ *as.*), and for a boy or girl 1½*d.* (1 *anna*). About the middle of November a sliding scale was introduced, providing that when prices rose over sixteen pounds the rupee, the money rate should vary with the price of grain, and that a man should always receive the price of one pound of grain in addition to one *anna*.

[2] The new rates were, for a man, the price of one pound of grain and ¾*d.* (½ *anna*) instead of 1½*d.* (1 *anna*); for a woman, the price of one pound and ¾*d.* (½ *anna*) instead of ¾*d.* (½ *anna*); and for a boy or girl, the price of half a pound of grain and ¾*d.* (½ *anna*).

Chapter IV. Agriculture. Famines. 1877.

to 13,235, and on civil works from 7910 to 4507; on charitable relief they rose from 388 to 451. March passed without rain. There was a general, and, in some places, a very great scarcity of water. Grain continued to pour into the district and *jvári* remained steady at eighteen pounds the rupee. The mortality from cholera was very heavy. Against a fall on civil works from 4507 to 4113, the numbers on public works rose from 13,235 to 19,659, and on charitable relief from 451 to 1000. About the middle of April rain began to fall and before the end of the month had averaged 1·20 inches. In Athni grain was scarce; elsewhere, though dear, the supply was sufficient; *jvári* rose from eighteen pounds at the beginning of the month to fifteen pounds about the close. In Athni the scarcity of water was very severe. The cholera mortality was heavy but was decreasing. The numbers on relief rose, on public works from 19,659 to 25,670, on civil works from 4113 to 5615, and on charitable relief from 1000 to 2974. In May good rain fell in Athni, Belgaum, Sampgaon, and Parasgad, and showers in other parts. The sowing of quick-growing crops and rice made considerable progress. In a few places the ordinary early crops were sown, but more rain was required before sowing could be general. Grain supplies continued sufficient, and *jvári* remained steady at fifteen pounds the rupee. Cholera was still prevalent. The numbers on public works rose from 25,670 to 40,389, and on charitable relief from 2974 to 7631. On civil works the numbers fell from 5615 to 2807. In June there was an average fall of 10·89 inches of rain. Rice-sowing was nearly completed, and the sowing of the other early crops was progressing. Over the whole district people were coming back and setting to work on their fields. Grain importations ceased, but the supply was sufficient. *Jvári* rose from fourteen pounds in the beginning of the month to twelve pounds about the close. Cholera continued prevalent but was on the decline. Partly from the good prospects, partly because the distance test was more strictly enforced, the numbers receiving relief fell on public works from 40,389 to 26,818, and on civil works from 2807 to 1638; on charitable relief there was a rise from 7631 to 7972. July passed with very little rain, an average of only 1·61 inches. The break in the monsoon caused much anxiety. Except in Sampgaon the early crops were withering. In Parasgad and Khánápur grain was scarce, and *jvári* rose from eleven pounds in the beginning of the month to 8½ pounds near the close. By the end of the month cholera had almost disappeared. The numbers on relief fell, on public works from 26,818 to 22,294, on civil works from 1638 to 287, and on charitable relief from 7972 to 5486.

In August there was an average fall of 4·80 inches of rain. The fall was chiefly in the west, where the crops considerably improved. In the east there were only a few showers, and in some villages the fields were withering. About the end of the month good rain fell, and such crops as were not past recovery were much benefited. The supply of grain continued sufficient and *jvári* fell from 9½ pounds in the beginning of the month to ten pounds about the close. Cholera, of a mild form, continued prevalent. The numbers on public works rose from 22,294 to 24,995, and on charitable relief

from 5486 to 8898. On the 4th of the month all civil agency works were stopped.[1] In September there was an average fall of 15·44 inches. Except in a few places in the east where the rain came too late to save the crops, by the end of the month, over almost all the district, the prospects of the early harvest were good and the sowing of the cold-weather crops was begun. Grain continued abundant and *jvári* fell from 10½ to eighteen pounds the rupee. There was a marked improvement in the state of the people. Cholera altogether disappeared, and against a rise on charitable relief from 8898 to 13,807, the numbers on public works fell from 24,995 to 21,319. In October rain fell so heavily, 8·98 inches, as, in some places, to harm the ripening crops. *Jvári* rose in the beginning of the month to 15½ pounds but before its close had again fallen to 16½ pounds the rupee. The numbers on public works fell from 21,319 to 9662, and on charitable relief from 13,807 to 9234. In November the weather continued favourable. Except in a few places the sowing of the late crops was over and the harvesting of the early crops was vigorously pushed on. The rupee price of *jvári* fell from nineteen to thirty-one pounds. The numbers on public works fell from 4699 in the beginning of the month to 112 on the 24th when all works were closed; on charitable relief they fell from 9234 to 1260. In December there were a few showers at Belgaum and Khánápur. The late sowing was completed, and the harvesting of the early crops was nearly over. By the end of November all relief-houses were closed.

The following statement of prices and numbers relieved shows that, during the first two months of 1877, grain prices ruled at nineteen pounds the rupee or more than twice the ordinary rates, that its price rose steadily till in July and August it averaged something less than ten pounds, and that between August and November it fell to twenty-seven pounds. As early as December 1876 the numbers on relief works reached 19,220. By lowering wages and enforcing task and distance tests the total was in February reduced to 17,742. From this it advanced till, in May, it stood at 43,196, when it again fell. The decrease was slow in July, August, and September, and more rapid in October and November, when the works were closed. The numbers on charitable relief rose steadily from 388 in January to 7972 in June. They then fell to 5486 in August, and, after rising to 13,807 in September, fell in November to 1260, when almost all charitable relief ceased:

---

[1] Though civil works were stopped, payment at civil agency rates was continued at the public works to labourers, who, under Government orders, were not entitled to the full wages.

Chapter IV. Agriculture.

Famines. *1876-77.*

Belgaum Famine, 1876-77.

Month.	Average Daily Number Relieved.				Jva'ri, Pounds the Rupee.	Rainfall.
	On Works.			Free.		
	Civil.	Public.	Total.			
1876.						
November ...	734	8839	9573		14¾	·11
December ...	7749	11,471	19,220		18¼	..
1877.						
January ...	7910	19,106	27,016	383	19	...
February	4507	13,235	17,742	451	19	·8
March	4113	19,659	23,772	1000	18¼	...
April ...	5615	25,670	31,285	2974	16¾	1·20
May	2507	40,389	43,196	7631	15½	2·3
June	1638	26,818	28,456	7972	12½	10·39
July	287	22,294	22,581	5486	9¾	1·61
August	128	24,995	25,123	3393	9¾	4·80
September	...	21,319	21,319	13,807	13¾	15·44
October	...	9662	9662	9234	16	8·98
November	...	1526	1526	1260	27	0·5
December	...	...	...	56	34	0·79
Total ..	35,488	244,983	280,471	59,157	...	47·43
Average ...	3548	18,845	21,575	4929	...	..
Cost in Rs. ...			9,98,648	1,55,314		...
			1,153.962			

Relief Houses.

Twenty relief-houses or camps were opened in the district. Of these the camps at Chikodi, Hukeri, Kubbur, Eksambe, Saundatti, Yergatti, Herekop, Gokák, Athni, Kokatnur, Shedbal, and Telsang were opened in the month of November 1876; those at Nándgaon and Páchhápur in the following December; those at Sampgaon and Deshnur in January 1877; those at Yádvád in March, and at Pamaldini in April 1877; and those at Belgaum and Mudalgi in May 1877. The relief-houses at Páchhápur and Eksambe were closed in January 1877, those at Kabbur and Mudalgi in July, at Deshnur in August, at Belgaum and Nándgaon in October, and the rest in November. At Belgaum a rest-house was for long used as a relief-house. Afterwards in the rainy season a shed was built about a mile from the town. In other places no relief houses were built, usually some rest-house or other large building was turned to account. The total number of men women and children fed at the relief-houses was 2,071,838, giving an average of 103,592 for every relief-house, or a monthly average of 172,653 for the whole. Some of the upper and middle classes, weavers and dyers, thought it a disgrace to go on the relief works or to the relief-houses. To help these people Government placed £150 (Rs. 1500) at the disposal of the Collector. From this sum raw materials were bought and advanced to the people, who, on the receipt of the manufactured articles, were paid their market value minus the amount of advance they had received in the shape of raw materials. In this way many families of weavers and dyers in Gokák, Chikodi, and Athni were relieved.

Relief Staff.

In November 1876 the permanent mámlatdárs of Sampgaon, Parasgad, Gokák, and Athni were relieved of their usual duties and deputed to superintend relief works, to inspect crops, and inquire into the condition of the people. In May 1877, when the number

of immigrants passing through Belgaum and the number of the relief works were increasing, it was found necessary to appoint a relief mámlatdár for the Belgaum sub-division also. Mr. T. H. Stewart, C.S., was relieved of his ordinary duties as an assistant collector from December 1876 till the end of the famine, and was deputed for famine duty. Captain G. Coussmaker remained on special famine duty from the 8th of May to the 25th of November 1877. Mr. A. Dalzell, of the survey department, was also appointed temporarily to famine duty from the 23rd of September to the 2nd of December 1877. Captain Coussmaker was detached for duty in Chikodi and Athni and Mr. Dalzell for duty in Gokák. In addition to these officers, from February 1877 to the end of the famine, two sub-overseers on £5 (Rs. 50) a month were appointed to superintend the civil agency relief works. The mahálkari of Chándgad was also appointed on famine duty to help the relief mámlatdár at Gokák as the distress in that sub-division was specially severe. Besides the above staff of officers fifty-two circle inspectors were appointed, ten for Athni, twelve for Gokák, eighteen for Chikodi, and twelve for Parasgad. A group of villages was placed under each of these inspectors. Each village in the inspector's beat was to be visited by him at least twice a week to see that the village officers did their relief duty properly.

Grain.

In October and November 1876 the certainty of a failure of crops induced the holders of grain to hoard their stocks. So closely were the stocks held that in some places grain was most difficult to get. The local stocks were not very large and the holders were chiefly husbandmen and a few local dealers. The people who believed that there were immense stores of grain became discontented and committed many acts of violence and robbery. Very inferior grain was brought to market and sold at very high prices. The better sorts of grain were kept back until the scarcity increased. At this stage of the famine, when no grain was to be had, the Belgaum municipality brought from Vengurla £200 (Rs. 2000) worth of grain which they retailed at cost price to the poorer classes. Municipal sales of grain lasted only about two weeks. Then a few Belgaum, Nipáni, and Gokák merchants began to import grain from Nágpur, Sind, and parts of the Bengal Presidency, either direct or through Bombay agents. Many dealers also bought grain from Bombay merchants. The only Government help offered to grain merchants was by issuing money-orders at par on its being shown that the order was to pay for grain. To the grain-dealers of other districts every facility was offered for importing by stopping the levy of octroi duties on grain. Special police arrangements were made to protect the main roads and on several roads grass was stored. With these encouragements large quantities of grain poured in. Bohorás and cloth-merchants, whose own trade was at a stand, joined in the import. The grain was brought by sea through Vengurla to Belgaum, Gokák, Saundatti, and Khánápur, and through Chiplun and Rájápur to Nipáni, Chikodi, and Athni. It was also brought in smaller quantities from Kárwár by the Kodra and Unshi passes to Belgaum, and was sent from Belgaum to the interior. Every effort was made to help the passage of grain

Chapter IV. Agriculture.

Famines. *1876-77.*

towards Bijápur where the distress was severer and grain dearer than in Belgaum.

Cart-rates.

Before November 1876 the ordinary monthly rate of cart-hire was £2 18*s.* (Rs. 29). During the fourteen months ending December 1877 the monthly cart-rate rose from £2 10*s.* (Rs. 25) in February 1877 to £4 (Rs. 40) in July 1877, and from that fell to £2 16*s.* (Rs. 28) in November and December.[1] About the middle of the famine and before grass stores were opened so many cattle died from overwork and want of food that labourers had to be employed in dragging the grain-carts from Vengurla.

Emigration.

Of the number of people who left the district during the famine no accurate estimate can be formed. It is known that from the west a considerable number of labourers and poor husbandmen went to Kánara, Goa, Kolhápur, and other places in search of work and food, and that from the east numbers went to Haidarabad and Bijápur. Compared with 1872 the 1881 census shows a fall of 80,900 in population. The addition of the normal yearly increase of one per cent during the remaining seven years gives 147,000 as the loss of population caused by death and migration in 1876 and 1877.

Famine Census.

On the 19th of May 1877, when famine pressure was general and severe, a numbering of relief workers showed that of 44,757 labourers, 41,447 on public and 3280 on civil works, 28,447 belonged to the sub-divisions where the works were carried on; 10,218 belonged to different sub-divisions of the same district; 1721 were from other districts; and 4371 from neighbouring states. As regards their occupation, 1309 were manufacturers or craftsmen, 19,731 were holders or sub-holders of land, and 23,717 were labourers.

Cost.

The total cost of the famine is returned at £115,396 (Rs. 11,53,960), of which about £99,865 (Rs. 9,98,650) were spent on public and civil works and £15,531 (Rs. 1,55,310) on charitable relief. Of the whole amount £106,126 (Rs. 10,61,260) were paid from Imperial and £9270 (Rs. 92,700) from local funds.

Effects.

Compared with those of the previous year, the crime returns of 1877 showed an increase of 1209 offences, almost all of which were due to the pressure of want on the lower classes. Of the 1209 offences, 848 were thefts, 293 cattle thefts, nineteen cases of mischief, fourteen criminal breaches of trust, eleven culpable homicides, twelve dacoities, seven house-trespasses, three robberies, and two grievous hurts. The loss of farm stock during the famine to some extent interfered with the carrying of grain and in a marked degree hampered field work. Many landholders who had lost their cattle had to give up their land and a large amount of revenue remained outstanding. The yearly village returns show a fall in the number of cattle from 432,634 in July 1876 to 320,267 in July 1878, a loss of 112,367 head.

[1] The details are: November and December 1876 £2 14*s.* (Rs. 27), January 1877 £3 12*s.* (Rs. 36), February £2 10*s.* (Rs. 25), March and April £2 18*s.* (Rs. 29), May £3 4*s.* (Rs. 32), June £3 12*s.* (Rs. 36), July £4 (Rs. 40), August £3 6*s.* (Rs. 33), September and October £3 2*s.* (Rs. 31), November and December £2 16*s.* (Rs. 28).

This loss was not so serious as the numbers suggest. The majority of the animals which perished were maimed or diseased bullocks or cows which had ceased to give milk. Still the working and rent-paying power of the district was a good deal affected. The tillage area fell from 946,203 acres in 1875-76 to 651,325 in 1876-77, in 1877-78 it rose again to 868,632 acres, and in 1878-79 to 838,020 acres. In 1876-77 the revenue for collection was £126,473 (Rs. 12,64,730) of which £114,178 (Rs. 11,41,780) were collected in the year. In 1877-78 the amount for collection was £126,679 (Rs. 12,66,970), of which £122,978 (Rs. 12,29,780) were collected in the year. Of the balance of £15,996 (Rs. 1,59,960) £13,632 (Rs. 1,36,320) were collected in subsequent years and £2163 (Rs. 21,630) were remitted.

Rat Plague.

In October 1878, rats, of which there are no less than ten local varieties, swarmed in the northern and eastern sub-divisions of Gokák, Athni, and Parasgad, and in a less degree in Chikodi. Of the ten varieties of which some details are given in the Production Chapter the most destructive to crops was the large-eared field-rat, Golunda mettada. In June and July 1879, though not in such swarms as in some of the Deccan districts, rats were again found in great numbers in the north and east of the district. They did much damage by scratching out and eating the seed grain. Some fields had to be thrice sown. In July 1879, Government offered a reward of 2*s*. (Re. 1) for every hundred rats killed, and the district officers were urged to rouse all classes to bestir themselves to help in ridding the country of the plague of rats. The bulk of the husbandmen from their dislike to take life were of little service. Low-caste Hindus and Musalmáns, though willing to help, were too ignorant of the habits of the rats to be of much service. The Vadars proved excellent rat-catchers digging the burrows and killing the rats in large numbers. Between August and October about 135,000 rats were destroyed and £135 (Rs. 1,350) spent in rewards. Before a reward was paid the rats had to be produced at a Government treasury, where the tails were cut off. The reward was paid to the rat-catcher and the tail-less bodies were returned to him to be eaten. Rewards were continued till the 15th of October 1879. Though the employment of rat-catchers to destroy the rats probably saved the crops from considerable loss, the disappearance of the rats was not solely or even chiefly due to the skill of the Vadars. Towards the end of the year large numbers of rats were killed by very heavy rain and afterwards by cold. The bodies of many rats were also covered with a red tick which was believed to have been the cause of death. By the end of December 1879 the rats had disappeared.