

JUTE IN BENGAL

N. C. CHAUDHURY

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JUTE IN BENGAL

BY

NIBARAN CHANDRA CHAUDHURY

M.R.A.S., DIP. IN AGRI., SIBPUR

OF THE PROVINCIAL AGRICULTURAL SERVICE

BIHAR AND ORISSA

FORMERLY OF THE BENGAL SERVICE

AUTHOR OF

A Treatise on Agricultural Chemistry

A Treatise on Foods

Cultivation of Tobacco

Cotton Cultivation

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PREFACE TO THE NEW EDITION



THIS book was first published in 1908. One thousand copies of this edition were sold off within two years from the date of issue. But owing to my official touring duties, there has been a great delay in bringing out a revised edition of the work. However, I gratefully appreciate the approbation with which it was received by the public both in India and the United Kingdom. The book has now undergone a thorough revision and some new chapters have been added to it.

Jute is one of the most important crops in Bengal and a very valuable asset of the Indian Empire. But the landless middle and poorer classes of Indian population complain often-times against the cultivation of jute, as they hold that this crop is responsible for the high prices of food grains. I have endeavoured in these pages to convince my readers that high prices have little to do with the cultivation of jute. On the contrary, the growers of, and dealers in jute have materially been benefited by the extension of its cultivation, and many others have greatly been relieved of the pressure which would otherwise have been more acutely felt by them.

As a touring officer of the Agricultural Department of Bihar and Orissa, formerly of Bengal, I have been closely connected with the crop for about 25 years. So far back as 1898, I started, on my own initiative, an enquiry regarding the races and qualities of jute grown in Backergunge (Chapter IV—Part III). On receipt of my report, which was forwarded to him by the Director of the Department of Agriculture, Bengal, for an expression of opinion,

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Sir George Watt, then Reporter on Economic Products to the Government of India, was pleased to say "the note contains much of considerable value and interest" (Reporter's letter No. 796, dated the 21st March, 1899, to the Director of Agriculture, Bengal), and he desired that the Department of Agriculture, Bengal, should initiate, in other districts, similar enquiries regarding the races of jute. Thereupon, the Hon'ble Mr. P. C. Lyon, C.S.I., C.I.E., the then Director of Agriculture, Bengal, was pleased to entrust me with this important task. In the meantime, in 1901, Mr. W. Parsons, Secretary to the Calcutta Baled Jute Association, had addressed the Director of Agriculture, Bengal, on the subject of the alleged deterioration of jute and asked for assistance in connection with the question of improving the qualities of the fibre. As a result, field experiments were undertaken at the Burdwan Farm and I was selected to conduct the experiments. In regard to this work, Dr. D. Prain, M.A., M.D., F.R.S., as Chairman of the Sub-Committee, Board of Scientific Advice, was pleased to report to the Board as follows:—

"After visiting the Burdwan Farm and carefully examining the sample experimental plots, I am of opinion that the experiment has been carefully thought out and is being carefully conducted."
(*Vide* Chapter II—Part III—on Jute Experiments in Bengal.)

The raiyats cultivate jute without any discrimination as to its race. In fact, they sow seeds of different races together on the same plot of ground, causing the act of isolation of a race for a botanical study difficult. During 1899 and 1900, numerous botanical specimens of different races of jute, cultivated in the jute-growing districts in Bengal, were collected by me and forwarded to the Reporter on Economic Products to the Government of India. In my reports on the Jute survey work, special attention was

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invited to *Kakya Bombai* jute which I discovered in 1899, in a field in a village in the Serajganj Sub-division, Pabna (Chapter V—Part III—on Races of Jute in Pabna). As usual, it was grown indiscriminately with other races. I distinguished this race from others, as it appeared to be the most prominent, and named it as "*Kakya Bombai*"—the name by which the crop of the mixed races was designated by the raiyats of that locality, where it was just then introduced from Goalpara in Assam, by a seed-dealer. Experiments carried out afterwards, under my personal supervision, at the Experimental Stations (*vide* Chapter III—Part I—on Races of Jute) proved it to be one of the best and promising races. It was mentioned prominently, therefore, in this book published in 1908. Continuous and thorough trials have since been given to this race for a number of years by Expert Officers of the Agricultural Departments, Bengal, Assam and Bihar and Orissa, at various places. It gives me great pleasure to find that it has maintained its superiority and it is now the most favourite of all the races of jute cultivated in the jute-growing Provinces. In opening the first annual meeting of the Board of the Bengal Agricultural Department, in March, 1920, His Excellency the Governor of Bengal, Lord Ronaldshay, was pleased to remark :

"*Kakya Bombai* yields, on the average, about 2 maunds of fibre more per acre than the average local races, and the demand for the seed already outstrips the supply. In 1918-19 this selected jute was grown on an area of 100,000 acres, and the increased yield of fibre on this area is estimated to have been 200,000 maunds, worth Rs. 20,00,000."

I gratefully acknowledge the assistance rendered by Mr. D. N. Ghosh, Officiating Director of Statistics, Government of India, and Mr. H. M. Haywood, Secretary

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to the Bengal Chamber of Commerce, in placing the statistical records of their offices at my disposal.

Thanks are also due to Mr. S. N. Sil, Officiating Professor of Agriculture, Sabour, and to Mr. H. L. Dutt, Officiating Economic Botanist, Sabour Agricultural College, for allowing the artist of the College, Babu Mahendra Chandra Bhar, to draw the sketches of the plants and the insects incorporated in this book. The Chapter on Loose Jute has been re-written after consultation with Babu Bipin Behari Mitra, who has had long experience in the loose jute business. The Chapter on Baled Jute has been re-written, after discussions on various points of the "marks" of the trade, with many experienced balers of Calcutta.

I shall fail in duty, if I do not acknowledge the debt of gratitude I owe to the late Mr. James Luke of "Capital," to whom the popularity of this work is chiefly due. It was Mr. Luke who brought the first edition of the book prominently to the notice of the trades-people both in India and the United Kingdom.

It remains now to express my indebtedness to Messrs W. Newman & Co., Ltd., the reputed Publishers of Calcutta, who have kindly undertaken the publication of the present edition.

CALCUTTA,
The 16th August, 1920.

} N. C. CHAUDHURY.

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JUTE IN BENGAL

PART I—INTRODUCTORY

CHAPTER I

OBJECTIONS TO JUTE CULTIVATION*



AN agitation has, of late, been set on foot, in some quarters, against the cultivation of jute. The following are the three definite charges formulated against the growing of this crop :—

(i) Jute is responsible for the famine and the high prices of food grains in Bengal.

(ii) Jute causes malarious fever in Bengal.

(iii) Jute makes the raiyats extravagant.

I shall try to prove that these charges do not stand on facts.

First Charge

It is true that since 1828, when the exportation of jute to Europe commenced, the cultivation of the crop has expanded in Bengal and Eastern Bengal and Assam with rapidity. But the total area under jute does not, even now, exceed 6 per cent. of the total cultivated area in these two provinces. On the other hand, the area under rice is between 60 and 65 per cent. and it does not appear to have been reduced, to any extent, within the last 20 years or so. The increase of jute area, without reducing the

* This article, written in 1907, is reprinted without making any alterations.

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area under rice, may be accounted for by the fact that the area under cultivation has also considerably increased, specially in Northern Bengal. It will also be remembered that jute is immediately followed by transplanted paddy in the Northern districts where jute is very extensively cultivated. Thus two crops are obtained from one and the same land, in the same season, without any appreciable harm to either. But assuming that jute has reduced the area under rice, we should not, even then, grumble, as it pays the raiyats better. Further, jute is an early crop, harvested at a time when the raiyats are particularly in need of money. Again, in an emergency, jute may be cut at a comparatively early stage, bringing immediate relief, while in the case of the other crops, the raiyat is obliged to wait till they are ripe. There are also other reasons in favour of jute. The paddy crop, at times, fails in Eastern and Northern districts, owing to floods, which generally come in after the jute is off the ground. Thus a raiyat is sure to get at least one crop, even in such a bad year. It is also known to all intelligent raiyats that no crop does well on the same land year after year. Therefore, it is good to follow a system of rotation of paddy with jute where the soil is suitable for both of these crops. Owing to these and other reasons, the area under jute in Bengal was not very small even some 20 years back, when this crop was not considered nearly as paying as now.

The present abnormally high price of rice is chiefly due to two consecutive bad seasons in 1905-06 and 1906-07. The crop was seriously damaged by floods in Eastern Bengal and Assam in the former year and in Bihar in the latter, the net shortage, taking the two provinces together, amounting to 23 and 26 per cent.*

* In the two provinces of Bengal and Eastern Bengal and Assam, the normal outturn of cleaned rice may be estimated at about 52 crores of maunds.

OBJECTIONS TO JUTE CULTIVATION

respectively in the two years. Exports, too, have been high of late, though they fell off to some extent in 1906-07. It is not necessary for our present purpose to adjudicate as to what extent bad seasons, and in what measure foreign exports were responsible for the present high prices, but the fact remains that, but for jute, the situation in Eastern Bengal would have been far more serious. On the other hand, the condition of the raiyats of North Bihar would not have been so bad, this year, if they had jute. From my long experience, as a Travelling Agricultural Officer in Bengal, I am decidedly of opinion, that the jute crop has, on the whole, improved the condition of the raiyats of the jute-growing districts in Bengal; who form the bulk of the population. It has been estimated that in 1906 jute brought in about 15½ crores of rupees to the cultivators as a clear profit.

Second Charge

There are hardly any facts to prove that jute is responsible for the malarious fever in Bengal. If malaria had anything to do with jute, then there is no explanation to offer for its prevalence in other parts of India which do not grow this crop. On the other hand, malaria is not severe, if at all present, in some parts of Mymensingh, Dacca, Faridpur, Tippera, Rangpur and Bogra, where jute is very extensively cultivated. Goalpara and Sylhet are the only districts in Assam where jute is cultivated to any extent. These districts are almost free from this disease.

Malaria prevails badly in localities where the drainage is imperfect, and where, in the vicinity of dwelling houses, dead rivers and stagnant ditches are found overhung by thick trees and shrubs obstructing the sun and free air. These are the villages which suffer most.

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The modern theory of malaria is that it is contracted through the bites of a species of mosquitoes whose favourite breeding grounds are stagnant pools and marshes.

Of course, jute-steeping may cause drinking water to become foul, where reserved tanks or wells are not available. This filthy water may produce diarrhoea, indigestion or some other diseases rather than malaria. In fact the cultivators themselves never attribute any unhealthiness to jute-steeping. The stench is not certainly nice, but the discomfort to the nostrils is not without a very substantial set-off.

Third Charge

The third charge brought against jute is that the crop has turned the raiyats to become extravagant. This charge hardly deserves any serious notice. After the harvest of jute and the completion of their hard labour, if the raiyats spend small sums of money on some *hilsha* fish, milk or sweetmeats, none should grudge them such small comforts. On the other hand, we ought to rejoice at this. Even if there is any indulgence at present, we may hope that by and by they will of themselves learn economy. It will be a better training for them than the forced economy of poverty. We should be rather proud of our Bengalee Hindu and Muhammadan raiyats, who do not spend a single copper on drink, which brings about ruin on similar classes in other countries.

In conclusion, I may remind my readers that from an agricultural point of view, Nitrogen is the governing factor in the fertility of the soil. Any country, therefore, that exports nitrogenous compounds loses fertility, whilst a country that imports such compounds gains in fertility at the expense of the former. The export of food grains from India not only means the stiffening of present prices,

but, what is far more serious, it means increasingly diminished outturns in years to come. On the other hand, the export of fibres (such as cotton and jute), oils (as distinguished from oil-seeds), sugar and starch—which are all non-nitrogenous products—from a country, does not, in any way, impoverish its soil. Add to it the fact, that in our country we have no special deposits of nitrogenous manures, and, unlike the farmers of other countries, the Indian raiyats would not buy such manures on account of their poverty and ignorance. From the point of view of agricultural economy, the export of jute fibre cannot, therefore, be considered harmful.

CHAPTER II

CHEMISTRY OF JUTE



CELLULOSE forms the chief constituent in all the vegetable fibres, varying in its purity in different fibres. Cotton is rather purely a celluloid fibre. Bast fibres such as jute, hemp, flax, etc., contain more or less lignine. The cellulose of these fibres is called ligno-cellulose which is changed more or less into woody tissue. Cotton consists of one single cell with little incrusting matters, while the bast fibres are made up of an aggregation of cells bound together in a compact form with more or less gummy and resinous matters together with oils, mineral matters and lignified tissue. This lignified tissue lowers the economic values of the bast fibres. Highly lignified fibres are stiff and brittle, and they are little adapted to the spinning of fine yarns. There are more or less pigment matters in all the vegetable fibres, brownish or yellowish colours predominating. The colours are due to incrusting impurities. When fibres are purified or freed from such impurities, they are white and possess a high degree of lustre. Purified fibres are more elastic than those containing impurities: fibres containing more lignified matters are less elastic.

Albuminous matter is found in the dried tissue of the bast fibre. Silicic acid is sometimes found in epidermal cells. Silicic matter in the ash is not dissolved in Hydrochloric acid, whereas the rest is readily dissolved by it. Crystals of calcium oxalate occasionally occurs. It is insoluble in acetic acid, but dissolved in Hydrochloric acid. There is also cutose originated from plant wax. It is slightly soluble in caustic potash, but not soluble in Sulphuric acid. It is dissolved by the

action of alkalis and hydrochlorides in bleaching process. Woody fibre is readily detected by Aniline sulphate reagent, which gives it a golden yellow colour. When treated with Nitric acid, or boiling with caustic potash under pressure, most of the lignine matter is removed, then exhibiting characteristics of ordinary cellulose.

Fibres which contain only pure cellulose are coloured blue when treated with Iodine Sulphuric Acid; while fibres containing lignine are coloured yellow to brown with the same reagent.

This reagent colours cotton blue and jute yellow to brown, and Ambari hemp, San hemp, and flax are coloured blue to copper red. Cotton and San hemp treated with Aniline sulphate solution are not changed, while jute changes to orange colour. Vegetable fibres are not weakened or disintegrated by the action of dilute alkalis. Free Sulphuric or Hydrochloric acids of moderate strength will quickly attack the fibre. Vegetable fibres are more conductive of heat than the animal fibres. Hence animal fibre burns very slowly, while vegetable fibres burn very quickly. The fabrics made of wool and silk are warmer than those made of vegetable fibres.

Jute fibre is relatively weak in comparison with other fibres. But for its fineness and silk-like lustre it is of special value in spinning. The chief defect is its lack of durability. It rapidly deteriorates when exposed to dampness. Even under ordinary conditions it gradually becomes brittle and weaker. Bleached fibre is also liable to such deterioration. Hence it is principally used in weaving cheap materials such as sacks, rugs, ropes, twines, etc. San hemp fibre is better than jute in its textile strength, specially when it is liable to exposure.

Comparative strengths for various cordage fibres noted below have been taken from Royle's work on the

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Fibrous Plants of India. These tests were made in ropes of the same size and of 1·2 metres in length.

	Dry Kilos.	Wet Kilos.
San hemp ...	... 51	72
Jute (<i>C. capsularis</i>) ...	... 65	66
Do. (<i>C. olitorius</i>) ...	... 51	56
<i>Hibiscus cannabinus</i> ...	... 52	60
(Ambari hemp, Amlapat, Chana or Mestha)		
Rozelle (<i>Hibiscus</i> <i>Sabdariffa</i>) ...	... 41	53
Ramie ...	... 110	126

Ramie fibre or Rhea or Kankura of North Bengal is the strongest of all the bast fibres.

Chemical analyses of jute and San hemp show that there is about 65 per cent. of cellulose in jute and about 80 per cent. of cellulose in San hemp.

		Jute.*	San.
Water (Hygroscopic) ...	... ..	9·93	9·60
Aqueous extract ...	... ..	1·03	2·82
Fat and wax ...	... ..	0·39	0·55
Ash ...	... ..	0·68	0·61
Incrusting and pigment matters ...	... ..	24·41	6·41
Cellulose ...	... ..	64·24	80·0

In connection with the Chemistry of the jute fibre, something may be said about the stalk of the plant, a by-product, left after the fibre is removed from the stems.

It is not less than a ton and a half per acre which is either wasted in the pools in which the fibre is extracted or used for fuel purposes. The following results of the chemical examination conducted by us will show that the

* The composition of jute may be represented by the empirical formula $C_{12} H_{18} O_9$, *i. e.*, Carbon 47, Hydrogen 6 and Oxygen 47 parts in every 100 parts of the fibre. It contains no Nitrogen.

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stalk, the bye-product of the jute fibre, contains about 60 per cent. of woody fibre and little ashes. This woody fibre, which may abundantly be available at nominal prices, will probably form a most suitable material for paper manufacture.

Results of chemical examination of jute stalk (bye-product of jute):—

Water (Hygroscopic)	...	...	5·85 %
Protein	...	...	1·40 ..
Ash	...	...	0·92 ..
Carbohydrate	...	...	31·33 ..
Fibre	...	...	60·50 ..

The fibre was estimated in the usual way of Sulphuric Acid and Sodium Hydrate treatments.

CHAPTER III

RACES OF JUTE



JUTE is an annual herbaceous plant of the natural order *Tiliaceæ*. It grows all over Bengal, with exception to the laterite tracts of West Bengal and North Bengal. In Bihar and Orissa the cultivation is confined to Purnea, parts of North Bihar and some parts in Orissa. It is extending in some districts in Assam. In the plains of Nepal, towards Purnea district, it is also growing.

There are two cultivated species of jute, *e. g.*, *Corchorus capsularis* and *Corchorus olitorius*. *C. capsularis* is easily distinguished by its rounded capsules, while *C. olitorius* bears long cylindrical pods. The seeds are very small, of pyramidal shape, with three edges and two apices on both ends, one being conspicuous. The seed of *C. capsularis* is three-tenths of a millimetre in length and two-tenths of a millimetre in breadth and deep brown in colour, while that of *C. olitorius* is two-tenths of a millimetre both in length and breadth, of blue colour. The races of *C. capsularis* are more numerous than those of *C. olitorius*. A jute plant grows ordinarily to a height between 10 and 12 feet. It attains a height of about 16 feet when cultivated carefully with suitable manures.

Jute is commonly called *pat* in Western and Central Bengal, *pat* or *koshta* in Eastern Bengal, and *pata* in the Northern districts of Bengal and Assam. In Orissa it is called *nalita* or *jhouta* and in Bihar *patua*. The local names of the different races of each species vary in different localities. There is no common vernacular name for either of the two species. For convenience sake *C. capsularis* may be called *Guti pat* from the rounded shape of the fruit of this species, and *C. olitorius* may be called *Shuti pat* from the pod-like shape of its fruit. The leaves of

C. capsularis taste bitter, while those of *C. olitorius* are not so. Hence in some places, the former is called *teeta* (bitter) *pat* and the latter *mithha* (sweet) *pat*.

C. olitorius is principally cultivated in the districts of Hoogly and the 24-Parganas. The Northern jute is exclusively *C. capsularis*. In Eastern Bengal, *C. olitorius* is cultivated to a very limited extent.

The fibre of *C. olitorius* separates more readily from its stalk than that of *C. capsularis*, hence this species is preferred in some quarters, specially in West Bengal.

C. capsularis, when it is about 5 feet high, can withstand water submersion up to its middle. *C. olitorius* cannot stand water-logging at all, until it is ready for cutting. On the whole, *C. capsularis* is better capable of withstanding adverse climatic conditions, such as drought or excessive rains or high temperature.

In colour and fineness, the fibre of *C. capsularis* is much superior to that of *C. olitorius*, but it is commonly somewhat shorter in length. The colour of the fibre of *C. olitorius* is silky yellowish, which is very much liked by the sack-weavers in Eastern Bengal. From this peculiar colour, the fibre of this species can easily be distinguished from that of *C. capsularis*, although the colour of the fibre depends chiefly on the cleanness of the water in which it is steeped and washed.

The fibre of *C. olitorius* is more brittle. Roxburgh found, in his comparative tests of the fibres of India, that a "dry line" of *C. capsularis* broke with a weight of 164 lbs. and a "wet line" with the same weight; whereas *C. olitorius* gave way with 113 and 125 lbs. respectively, the wet line gaining 12 lbs. in weight. This fact of the superiority of the fibre of *C. capsularis* over that of *C. olitorius* is well known. Under the same test a "dry" and a "wet" line of *san hemp* broke with

160 lbs. and 209 lbs. respectively. The best fibre of *C. capsularis* is sold at a higher price than the best fibre of *C. olitorius*.

The colour of living plants of *C. capsularis* varies from light green to purple, while that of *C. olitorius* from light green to pink. In some green-stemmed races, the colour of the stem differs from that of its petioles and fruits. It does not appear that purple or pink colour of the stems of the plants has anything to do, in particular, with the colour of the fibre. Generally speaking, green-stemmed races of *C. capsularis* are more liked by the jute cultivators, excepting those living in some parts of North Bengal, who prefer purple-stemmed races, which are said to be more prolific than the paler races. But in Eastern Bengal, the green-stemmed races are considered to be heavier yielders. Our experience corroborates the statement of the raiyats of Eastern Bengal. The bark of the green-stemmed races is thicker than that of the purple-stemmed races. The purple-stemmed races are, however, less branchy.

The same race of jute would yield fibres of different qualities if grown in different places, under different conditions. The low land jute is always inferior to the high land jute. The low land jute which is grown in water is always "mossy" at the bottom and harsh. This portion of the fibre is cut off, before it is spun, and is kept apart for batching purposes. The best sorts of jute available at the Serajgunj and the Naraingunj markets are the products of high lands. The *Dowrah* jute of Madaripur which is sold at the lowest price, was almost equal to the best Mymensingh jute, when grown side by side, at the Burdwan Experimental Farm during 1904. The following table shows the experts' valuation report on the samples of jute submitted to the Calcutta Baled Jute Association for appraisalment:—

RACES OF JUTE

Commercial name of the jute.	Local name of the race.	Value per maund. Rs. As.
Dowrah ...	{ (1) Sut pat	7 2
	{ (2) Udhap pat	8 2
Naraingunj ...	Dhalsundar	7 12
Serajgunj ...	Baran	8 2
Northern or Uttarya	{ (1) Ausa (early)	8 5
	{ (2) Hewti (late)	8 6

The cultivators never select the seeds according to the colours of the plants. In the same field and under the same name different races of different colours are grown. The only selection they make is whether it is early or late, irrespective of colours of the plants, as when washed the fibres of different races, of course of the same species (*C. capsularis* or *C. olitorius*), are identical. In *C. capsularis*, the races as cultivated by the raiyats are awfully mixed, while in *C. olitorius* the mixture of plants of different races are not so terrible.

According to the colour of the stems, leaf-stalks and fruits, the races of jute, as separated by the author, may principally be divided as follows:—

(A) *Corchorus capsularis*

(1) Light green:—Kakya Bombai and Barapat of Serajgunj, Baron or Barapat of Mymensingh, Dhaleswar of Dacca, Hewti (white) of North Bengal.

(2) Light green when young, afterwards purplish:—Amonea of Faridpur, Deswal of Serajgunj.

(3) Purple:—Meghnal or Nalpat of Faridpur, Agni-swar of Dacca.

(B) *Corchorus olitorius*

(1) Light green:—Bangi or Dewnallya of Dacca, Sattalla, Bangi or Bomi or Bagi of Faridpur.

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(2) Pinkish :—Nileta or Tallah of Mymensingh, Tosha of Serajgunj.

(3) Pink :—Desi Lalpat of Hoogly, Nal Bagi of Faridpur.

Both the species have early and late races. The late races yield generally a heavier outturn than the early ones. Both of these races are however useful. The low lands, subject to floods, should always be cultivated with the early races. Those who wish to cultivate jute on a large scale should sow both early and late races, so that the different races may be harvested at different times. It would not be possible to harvest the crop of all the fields at the same time. Under favourable conditions, jute is a very quick-growing plant. It is particularly important that the soil should be rich, and that during the early stages of its growth the crop should receive proper treatment. Otherwise the plants get stunned, flower early and give a poor outturn. The following are the selected races of jute showing whether they are early or late. :—

Early

C. capsularis :—

Ausa of Mymensingh	(green)
Ditto	(purple)
Bhadya of Rangpur and Jalpaiguri	(green)
Ditto	(purple)

C. olitorius :—

Bangi of Dacca	(green)
Satnalla of Faridpur	(green)
Tosha of Serajgunj	(pinkish)

CORCHORUS CAPSULARIS

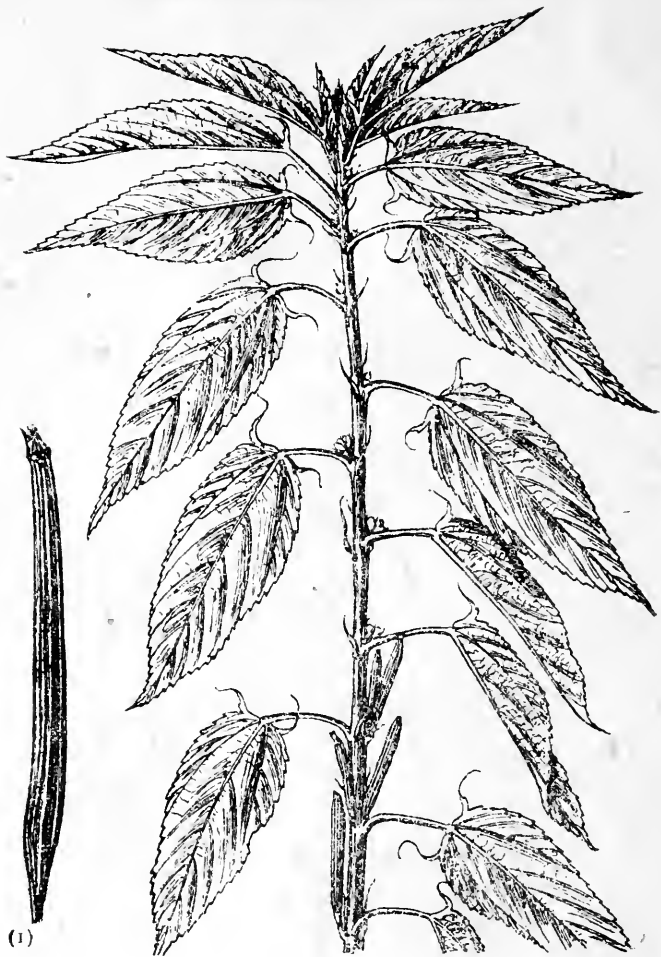


(1) ^v Reduced to one-half.
(2) Full size.

(1)

(2)

CORCHORUS OLITORIUS



(1)

(2)

(1) Full size.

(2) Reduced to one-half.

RACES OF JUTE

Late

C. capsularis :—

Baron or Barapat of Mymensingh	(green)
Kakya Bombai of Serajgunj	(green)
Deswal of Serajgunj	(mixed)
Amonea of Faridpur	(mixed)
Kamarjani of Faridpur	(green)
Hewti of Rangpur	(green)
Ditto	(purple)
Nalpat of Faridpur	(purple)
Kajla of Dacca	(purple)

C. olitorius :—

Desi Lalpat of Hoogly	(pink)
Dewnallya of Dacca	(green)
Halbelati of Tipperah	(green)
Nailta of Mymensingh	(green)

Comparative statements of the outturns of the races of jute grown experimentally at the Burdwan Farm from 1903 to 1906 are given below. From these it will appear that there is hardly any particular variety or race which is the heaviest yielder all along. Dewnallya of Dacca topped the list in 1903, but it was placed much lower down the list in the following year. So again, the race which gave the highest outturn in the second year, came down in the next year. The Burdwan Farm seed, which was possibly the same as the Deswal of Serajgunj, has occupied the first place during the last two successive years. This is one of the best races we have. It was particularly mentioned in my report on the Jute Experiments at the Burdwan Farm during 1902, the first experiment

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carried out at Burdwan, at the instance of the Inspector-General of Agriculture in India. The Burdwan Farm seed seems to have improved by careful selection. Kakya Bombai is a tall jute with few branches. It came out as one of the best. The present selected seed has been pronounced to be the best of all the races cultivated in Bengal. When Kakya Bombai was first found out by us at a place in Serajgunj, the cultivators who had just begun to cultivate it, spoke very highly about its yield and other qualities. They considered it to be the best of all the races of jute grown in the Serajgunj Sub-Division. The seed of Kakya Bombai race was originally indented by some seed dealers from Goalpara district in Assam. Any jute seed imported from Assam is still called by the name of Kakya Bombai. They maintained that the seed of this *jat* of jute produced at Serajgunj was not such a good yielder as that obtained from Assam. Interchange of seeds was highly recommended by the experienced cultivators of Serajgunj.

VARIETY EXPERIMENTS WITH JUTE

1903

At Burdwan

	Name of Jute.	Outturn per acre.
(1)	Dewnallya (<i>C. olitorius</i>) of Dacca	2,661 lbs.
(2)	Kajla (<i>C. capsularis</i>) " "	2,581 "

1904

At Burdwan

(1)	Hewti, white (<i>C. capsularis</i>), of Rangpur	2,310 lbs.
(2)	Kakya Bombai (<i>C. capsularis</i>) of Serajgunj	1,935 "

RACES OF JUTE

At Faridpur

Name of Jute.	Outturn per acre.
(1) Barapat (<i>C. capsularis</i>) of Mymensingh	2,996 lbs.
(2) Amonea (<i>C. capsularis</i>) of Faridpur	2,991 „

At Rangpur

(1) Kamarjani (<i>C. capsularis</i>) of Faridpur	2,644 lbs.
(2) Hewti, white (<i>C. capsularis</i>), local	2,310 „

At Jalpaiguri

(1) Baron (<i>C. capsularis</i>) of Mymensingh	1,110 lbs.
(2) Nalpat (<i>C. capsularis</i>) of Faridpur	1,049 „

1905

At Burdwan

(1) Farm seed (<i>C. capsularis</i>)	2,600 lbs.
(2) Nailta (<i>C. olitorius</i>) of Mymensingh	2,400 „

1906

At Burdwan

(1) Farm seed	2,600 lbs.
(2) Halbilati (<i>C. olitorius</i>) of Tipperah	2,480 „

CHAPTER IV

CLIMATE



JUTE is a rainy-season crop. Damp heat is the most favourable for its growth. Excessive rain, saturating the soil with moisture, delays both sowing of the seed and the after-treatments.

From one to three inches of rain distributed in a month, during sowing period, may be considered sufficient. Occasional showers of rain, varying from one to two inches, at intervals of about a week, are most beneficial for the growth of the plants.

The temperature of atmosphere on the tracts where jute is grown hardly exceeds, during the growing season, 100° F. and falls below 60° F. Humidity varies from 65 to 91. It is not possible to grow jute anywhere in Bengal during the cold weather.

The table below shows the normal minimum and maximum temperature of the air, the mean humidity and the normal rainfalls recorded at some typical stations in the jute-growing areas :—

Month.	Weather Conditions.	Calcutta.	Mymensingh.	Dinajpur.	Gaubati.	Silchar.
1	2	3	4	5	6	7
March ...	Minimum Temperature ...	58	53	49	54	56
	Maximum " ...	103	99	104	94	99
	Humidity ...	80	82	65	75	80
	Rainfall ...	1	2	1	2	8
April ...	Minimum Temperature ...	70	67	65	68	62
	Maximum " ...	103	100	101	91	92
	Humidity ...	79	81	81	84	87
	Rainfall ...	2	5	2	6	15

CLIMATE

Month.	Weather Conditions.	Calcutta.	Mymensingh.	Dinajpur.	Gaulhati.	Silchar.
1	2	3	4	5	6	7
May	Minimum Temperature ...	70	71	66	65	66
	Maximum " ...	105	97	108	95	96
	Humidity 	81	82	72	81	85
	Rainfall 	6	13	7	9	15
June	Minimum Temperature ...	75	72	70	73	73
	Maximum " ...	96	94	95	95	98
	Humidity 	87	90	88	82	88
	Rainfall 	11	18	18	15	22
July	Minimum Temperature ...	76	75	72	74	74
	Maximum " ...	92	89	92	92	92
	Humidity 	89	89	91	83	91
	Rainfall 	13	16	15	10	19
August...	Minimum Temperature ...	75	76	75	76	73
	Maximum " ...	91	92	93	95	98
	Humidity 	89	91	91	86	91
	Rainfall 	12	15	13	9	20
Sept.	Minimum Temperature ...	75	75	75	75	73
	Maximum " ...	92	92	93	93	94
	Humidity 	90	91	89	83	90
	Rainfall 	10	14	12	6	13

The minimum temperature of water in which jute is steeped should be about 80° F.

The rainfalls appear to be too heavy in Silchar for the jute crop.

CHAPTER V

SOILS



IN Bengal there are old and new alluvial soils which are called *lal mati* or *khlar* and *pali mati* respectively, the same as *bhangar* and *khadar* in Bihar. The new alluvium is generally found near large rivers, especially in their deltas, and is commonly called alluvial soil *par excellence*. The soils of parts of Orissa, South Bihar and Burdwan Division belong to old alluvium. The whole of North Bihar, Eastern Bengal and North Bengal consists of new alluvium, with the exception of the Madhupur Jungle in Dacca and Mymensingh and the *khlar* in North Bengal. Jute grows on new alluvium, but not on the old. A striking example of this fact may be cited:—In Bogra there is a narrow river called *Karotoya*. Over 50 per cent. of the cultivated *pali* lands lying to the east of this river is, every year, sown with jute, while the cultivated *khlar* lands to the west of the *Karotoya* contain jute not exceeding 5 per cent. None should select this *lal* or *khlar* soil for jute, unless the character of this soil is thoroughly changed by heavy application of cattle manure or by green manuring for three or four years successively. *Khlar* land becomes very hard in a drought and prevents the spread of the roots of the jute plant. This seems to be the chief reason why it is so unsuitable for this crop.

Jute grows to perfection on loamy soils. The rain water sinks quickly into loamy soil; hence loamy soil is preferred to stiff clay, which can neither absorb nor part with its water as readily as loam or sandy loam does. On clayey soil it yields a fibre which is "sticky" more or less, while a coarse fibre is obtained from sandy

lands. Jute is very badly affected by water-logging when it is young.

It is said that jute will grow in the *salt-impregnated soils* of the Sundarbans. I am, however, not prepared to accept this view as true. I was at Frasergunj in the Sundarbans, on the coast of the Bay of Bengal, for nearly a year during 1907-08, when many experiments on jute were conducted on various parts of the estate. Jute was successfully grown on high lands about 4 feet above the flood level. The soil (surface soil) of this land contained '20 to '25 per cent. of common salt. It failed on the soils containing more salts. But paddy was successful on the soils which had from '50 to '100 per cent. of common salt. It may be noted that a considerable quantity of the salt of the paddy lands must have been washed off during the paddy season, that is, the rainy season. The soils referred to above were collected for analysis during the month of November, that is, after the cessation of the rains. Of course, in some tracts of the Sundarbans, jute has been successfully cultivated. Perhaps most parts of the salts contained in the lands had been removed by drainage before jute was grown. It would be best to proceed cautiously and see whether jute will grow on soils from which the salts have not been so thoroughly removed. It is very well known that when a soil contains soluble salts in quantities above a certain amount, it is unfit for any crops. Even saltpetre, if present in the soil water in a too concentrated form, acts as poison for plants. Dr. Voelcker's experiments show that no crops grow on soils (surface soil) which contain '2 per cent. of soda, '4 per cent. of common salt, or '7 per cent. of sodium-sulphate.

Although chemical test is not a guide to select a site for the cultivation of jute, the following table, showing the proportions of the chemical properties of a typical

INTRODUCTORY

soil, would be useful for selection of new sites for the crop:—

Insoluble silicates	...	...	77'0	per cent.
Soluble	..	...	0'25	"
Ferric oxide	...	...	6'00	"
Alumina	...	...	3'60	"
Lime	...	...	2'00	"
Manganese	...	...	0'10	"
Magnesia	...	...	0'10	"
Potash	...	...	0'50	"
Soda	...	...	0'25	"
Phosphoric acid	...	...	0'20	"
Carbonic acid	...	...	2'00	"
Organic matter and combined water*			8'00	"
			100'00	"

Jute grows on the high lands as well as on the low lands, which are not liable to submersion before the middle of June. Floods cannot do much harm to the plants once they are sufficiently strong, that is, when they will shortly run to flower. Of course, highland jute is always superior to lowland jute, in quality.

* Nitrogen '1 per cent.

CHAPTER VI

INJURIES



CONTINUED drought is detrimental to the jute crop. The greatest damage is caused to the crop by the heavy rain which may fall just after the seed has been sown or when the plants are still young. Stagnant water during this period is still worse. Floods would not harm some races of jute grown in Eastern Bengal when the plants come into flower-bud.

There are several insect pests which cause considerable damage to the plants when they are young. The worst are three kinds of caterpillars. They are known by the following names:—

(1) Indigo Caterpillar (*Lophygma exigua*); in vernacular Gore, Kathri, Horihari, etc.

(2) Jute Semi-Looper (*Cosmophilu sabulifera*); in vernacular Ghorapoka, Chhitapoka, etc.

(3) Hairy Caterpillar (*Diacrisia obliqua*); in vernacular Suapoka, Biccha, Bhua, Sambara, etc.

Indigo Caterpillar

The Indigo Caterpillar feeds on the young leaves of plants. In bad cases they defoliate the plants completely, leaving only the bare stems on the ground.

The moth comes out after dark. The female moth lays about 250 eggs in clusters on young leaves; each cluster containing 50 to 200 eggs. The eggs hatch in two or three days, and the small green caterpillars begin to feed on the epidermis of the young leaves. After this, they spread and feed on the leaves, generally in the morning and afternoon, taking shelter during the hottest part of the day.

INDIGO CATERPILLAR



(After Lefroy)

Fig. 1 —Egg cluster of indigo caterpillar Fig. 2 —The caterpillar

Fig. 3.—The moth.

If disturbed, they will curl and drop down from the plant. In a fortnight they become full grown, measuring about an inch, and pupate in the ground under leaves, coming out as moths in a week.

Jute Semi-Looper.

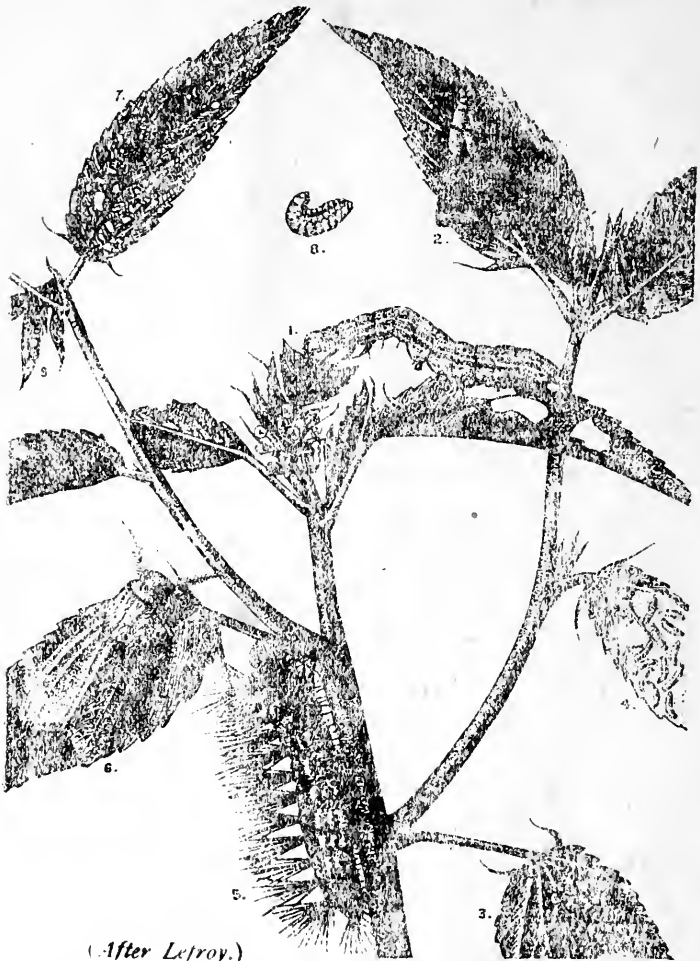
Jute Semi-Looper or Ghorapoka (a horse-like caterpillar), a serious jute pest, feeds on the apical buds and top shoots of jute plants. It damages the crop from June to August till the plants are in flowers. The moth remains concealed during the day and comes out at dusk. At night the female moth lays about 150 to 200 eggs singly on the small top leaves. They hatch in about two days, and the little green caterpillars emerge, feeding on young leaves and buds. A full-grown caterpillar, about one and a half inches in length, walks in a semi-looping motion, forming an arch on the back. If disturbed, it jumps off from the plant and crawls up the plant again afterwards. In 15 days it becomes full grown and comes down to the ground to pupate. The moth comes out from the pupæ stage in six to nine days. It generally passes the winter as a pupa in the soil.

Hairy Caterpillar.

The Hairy Caterpillar feeds on the leaves of jute, san-hemp and many other field crops. In case of a bad attack, the whole crop is defoliated. Continued rains are favourable for the activity of this insect.

The female moth lays from 400 to 1,000 eggs at night on the lower surface of leaves. They hatch in three or four days, and the young caterpillars begin to feed on the lower epidermis of leaves. After a few days, they disperse in different directions and spread over the whole area. In two or three weeks the caterpillars become full grown, measuring one and a half inch. The whole body is covered with hairs. The fully grown caterpillar sheds its hairs

JUTE SEMI-LOOPER AND JUTE APION.



(After LeRoy.)

Fig. 1.—Jute semi-looping caterpillar. Fig. 2.—The moth sitting on a leaf. Fig. 3.—Egg cluster of hairy caterpillar. Fig. 4.—Young caterpillars on a leaf. Fig. 5.—Full-grown caterpillar. Fig. 6.—Moth sitting on a leaf. Fig. 7.—Jute Apion. Fig. 8.—Its grub. Fig. 9.—Top shoot withering on account of its injury.

INJURIES

and pupates in the soil inside a rough cocoon of hairs. After about ten days it comes out as a moth.

Jute Apion.

There is also a small black weevil called Jute Apion. It does not appear to cause any appreciable damage to the crop.

This insect breeds in the stems of jute. The grub is found to make small tunnels in the young stems near the axils of the leaves and the tops droop down.

The first two caterpillars appear generally in very dry seasons. Continued rains, on the other hand, are favourable to the Hairy Caterpillar. Plants affected by these insects become branchy, and the fibre obtained from them is specky and harsh. Kerosene emulsion,* which may be applied with Eclair Vaporiser or any fine syringe, is a sure remedy against all these insects. During 1904 the experimental jute crop on about 5 acres of land at Faridpur was very badly attacked by the *chhitapoka*. I was deputed by Mr. Maddox to try some remedies there. Kerosene emulsion was applied by me which saved the crop, while the neighbouring fields suffered a loss by about 50 per cent. The outturn of the experimental fields has already been given in Chapter III.

Fungoid Disease.

Diplodia corchori is a fungoid disease of jute known by the name of Black Band disease. It has been reported from some parts of Eastern Bengal. Fortunately it causes little damage to the crop at present. The Department of Agriculture reports that *C. olitorius* and the red-stemmed races of jute are immune from its attack. The Agricultural Department suggests that the seed of the affected area should be treated with copper-sulphate solution to get rid of the disease.

* For detailed instruction for preparing kerosene emulsion please see Part V, Chapter IV

CHAPTER VII

THE EXTENT OF CULTIVATION



THE cultivation of jute had been rapidly extending owing to the high prices of this fibre during recent years. But it received a sudden blow from the effects of the great European War. Although peace has, at last, been declared, and the restrictions withdrawn, there are still diminished exports due to a shortage in tonnage. As a result the outturn of jute is still less by about 20 per cent. and the Jute market has been in a state of paralysed condition. It is hoped that the normal condition will soon prevail. The demand for the fibre will again increase steadily. In spite of all these difficulties, new markets are continually being opened out. There is little doubt that the cultivation of jute will, in the near future, extend in Bengal and Assam. At present, jute is extensively cultivated in the districts of Mymensingh, Dacca, Tipperah, Faridpur, Rangpur, Purnea and Pabna. In Mymensingh nearly one-fourth of the total cultivated land (630,000 acres) is under jute, which yields about one-fourth of the whole production of jute of these provinces. The other six districts account for about 47 per cent. (1,300,000 acres) of total area under jute in Bengal, Bihar and Orissa, and Assam. Thus three-fourths of the total outturn of jute is obtained from these seven districts. The total area under jute at the present time (1919) is about 10 per cent. of the total cultivated land of the Province of Bengal in which jute is grown. Taking the whole cultivated area of these provinces of Bengal, Bihar and Orissa, and Assam into consideration, the percentage of area under jute was at *5 in 1919. The total cultivated area in these provinces is 56,807,500

* It was 5.5 per cent. in 1906.

THE EXTENT OF CULTIVATION

acres, including 543,500 acres in Cooch Bihar State, of which 2,821,500 acres were cultivated with jute during 1919.

In Assam jute occupies 2·5 per cent. of the total area cropped, while nearly 1 per cent. in Bihar and Orissa.

The following table shows the percentage of area under jute in the nett area cropped in the jute-growing provinces in India during the year 1919 :—

PROVINCE.	Total area cropped. Acres	Total area under jute. Acres.	Percentage of the area under jute.
Bengal	24,524,000	2,458,900	10·0
Bihar and Orissa	25,881,000	203,400	0·8
Assam	5,859,000	120,000	2·5
Cooch Bihar	543,500	39,200	7·2
	56,807,500	2,821,500	

The experimental cultivation of jute in several indigo estates in North Bihar has been successful. It is expected that it will shortly take its place among the regular crops in that tract. In Assam proper there was very little jute ten years ago. Goalpara was the only district where jute was cultivated to some extent (28,000 acres) in 1906. The cultivation of jute is extending in the Assam Valley where the soil and climate are suitable.

JUTE IN BENGAL

PART II—CULTIVATION

CHAPTER I

PREPARATION OF THE SOIL



AND for sowing jute is generally prepared just after the first shower of rain during the latter part of February or March. Intelligent cultivators should never lose the opportunity of early rain. If there be no cold weather crop in the field, the ploughing should begin early in the cold season. Deep ploughing is essential for this crop. It has long roots which go down about one foot below the surface of the soil. Soil should be thoroughly pulverised until a fine tilth is obtained. Clods in the clay soil are to be broken by means of a *harrozu* or *kodali* or a wooden mallet. No treatment should be given to the land when it is too moist. Five to eight ploughings and four or five ladderings will be often found sufficient. Clay soil may require as much as ten ploughings. The corners of the fields which are not properly broken by ploughs should be grubbed by *kodali* before the last ploughing is given. The harrow and grubber would be useful implements for crushing clods and collecting weeds. These implements are little known in these provinces where jute is grown. After sowing, there should be no ploughing, unless the soil is very light, but simply laddering to cover the seeds, and to press the land in order to bring up the moisture to the surface of the soil, which helps germination of the seed.

CHAPTER II

MANURES AND MANURING



JUTE does not appear to be an exhaustive crop. Theoretically speaking, the crop itself, that is the fibre, removes no valuable plant foods, such as nitrogen, phosphoric acid and potash. Analysis of the entire jute plant was made by us and the results of the chemical test have been noted in the chapter on "Chemistry of Jute." The stalk of jute contains only .03 per cent. of phosphate. The total ash contents amounted to less than 1 per cent. It may definitely be said that the soil would not lose much if the leaves and unnecessary tops of the jute plants be returned to the fields.

Low lands which receive silts every year from floods require hardly any artificial manures. Jute does particularly well if it follows peas or *khesari* grown specially for feeding cattle on the field. Pulses have special capacity for enriching the soil.

Green manuring with *san* is strongly recommended for jute. It is to be sown in November or December and ploughed down early in February. Green manure is specially useful when the character of the soil is required to be changed. By green manuring stiff clay becomes lighter and the light sandy soil becomes retentive of moisture. Organic manures contained in soils retain moisture and ammonia and keep the land warm. Excellent effects of organic manures are specially noticed on light soils.

The manure experiments with jute at the Burdwan Experimental Farm have shown that cowdung is the best of all manures for jute. Cowdung is followed by castor-oil-cake. Seventy-five maunds of cowdung or six maunds of castor cake per acre, each containing about 30 lbs.* of

*Mr. Mollison, the Inspector-General of Agriculture in India, recommended 30 lbs. of nitrogen per acre for the Burdwan Experimental Farm.

CULTIVATION

nitrogen, may be applied when the land is finally prepared. The following statements on the results of the manure experiments at the Burdwan Farm may be read with interest :—

Old Experiments

MANURE.	QUANTITY OF MANURE PER ACRE. (80 LBS. = 1 MAUND.)	OUTTURN OF FIBRE PER ACRE, AVERAGE OF 11 YEARS.
	Mds. Srs.	lbs.
Cowdung ...	150 0	1,821
Castor cake ...	6 0	1,448
Super-phosphate ...	1 20	1,358
Saltpetre ...	0 30	
Bone meal ...	3 0	1,252
No manure ...	.....	648

The experiments at the Burdwan Station conclusively prove the superiority of farm-yard manure (cowdung) to any other. Next comes the castor-oil-cake.

New Experiments

MANURE.	QUANTITY OF NITROGEN PER ACRE.*	OUTTURN PER ACRE IN LBS.		
	lbs.	1904.	1905.	1906.
Cowdung ...	30	1,985	1,805	1,880
Castor cake ...	30	1,635	1,570	1,860
Bone meal and Saltpetre ...	15	1,605	1,590	1,600
Bone meal ...	15			
Bone meal ...	30	1,085	1,580	1,560
No manure ...	.....	1,230	1,545	1,560

* Cowdung contains on the average 5 per cent., castor cake 5 per cent., bone meal 3 per cent., and saltpetre 10 per cent. of nitrogen.

MANURES AND MANURING

All the above manures, excepting super and saltpetre, should be applied to the fields during the preparation of the soil. Super may be used with sowing of the seed, and saltpetre as a top-dressing, when the plants are about one foot high. The latter should always be put on the land on which there is a growing crop, as it is readily soluble in water and liable to be washed off.

From both the old and new experiments conducted at the Burdwan Experimental Station, it will appear that cowdung and castor cake containing much organic matters are the best for jute. Organic matters are of special value as manures. They add to the soil the power of retaining moisture—a factor essential for successful cultivation of jute.

CHAPTER III


SOWING



OWING season extends from about the middle of February to the end of May. On the low lands, which are liable to be swamped by floods, sowing is finished by the middle of March. When the land is thoroughly prepared, seed is broadcasted and covered by laddering. The seed is sown at the rate of 10 lbs. of *C. capsularis* or 8 lbs. of *C. olitorius* per acre. To ensure an even distribution of the seed, sowing should be carried out cross-wise, that is, the field should be gone over by the sower, in the act of sowing, once from north to south, and a second time, from east to west. A harrow or a ladder or a *henga* (log) should follow immediately to cover the seed properly. Germination takes place within three or four days after sowing, if the soil contains sufficient moisture.

CHAPTER IV

ROTATION

N some quarters jute is grown on the same land year after year. This is an exhaustive system. This system should never be resorted to unless sufficient manures are used. Of course, the lands which are submerged during the rains and thus receive silts, do not generally require any manuring. Fibre deteriorates, if jute is cultivated on the same land, year after year, without following a system of rotation.

In the principal jute districts where jute is cultivated on high lands, paddy is transplanted immediately after cutting jute. Thus two crops are obtained in the same season. This is undoubtedly a most exhaustive method, if this land is not heavily manured. It may be noted that jute does particularly well if it follows peas or *khesari* grown specially for grazing.

The following rotation schemes are recommended :—

Two-Year Scheme No. 1

First Year

- (i) Jute ;
- (ii) Rape or mustard.

Second Year

- (i) Paddy ;
- (ii) Peas or *khesari*.

Two-Year Scheme No. 2

(If jute is immediately followed by paddy)

First Year

- (i) Jute ;
- (ii) Paddy ;
- (iii) Peas or *khesari* (grown for feeding cattle).

Second Year

- (i) *Aus* paddy ;
- (ii) Potatoes, or rape, or mustard, or *san*-hemp as a green manure if no other manure is used for the next jute crop.

One-Year Scheme No. 1

- (i) Jute ;
- (ii) Rape or mustard or peas or *khesari* or potatoes.

One-Year Scheme No. 2

(If jute is immediately followed by paddy).

- (i) Jute ;
- (ii) Paddy ;
- (iii) Peas or *khesari* (grown for feeding cattle).

The reason as to why *rabi* crops are not generally allowed to precede jute, is that in the Eastern districts jute has to be sown early to prevent its being swamped by floods. Here the *rabi* crops interfere with the preparation of the soil sufficiently early. But mustard is soon off the ground. Peas, etc., for fodder also do not interfere with the early preparation of the soil intended for jute.

CHAPTER V

AFTER-TREATMENT



WHEN the plants are about six inches high, a *bida* (something like a rake), called *ashra* or *nangla* in North Bengal, is drawn over the land twice or thrice at short intervals, till the plants attain a height of nearly one foot, for thinning the plants and loosening the earth. After this, the crop is twice weeded or hand-hoed, the operation being accompanied by thinning at the same time. The outturn of fibre depends much on this operation of weeding and thinning. Jute fields should be well-cleaned of weeds. Sometimes three weedings or hoeings are given. The plants should be so thinned as to leave a space of about 6 inches between the plants in the case of *C. capsularis*, and 8 inches in the case of *C. olitorius*. *C. capsularis* will bring forth numerous branches if the plants are thinned out over-much. On the other hand, thickly crowded plants will grow too thin to give a good outturn of fibre. Just before the rainy season sets in, the thin and weak plants are finally uprooted. These plants * should be thrown into the manure-pit. No operation should be given when the fields are too wet, that is, when the earth sticks to the implements. It is very essential that every operation is given just in proper time. It will harm the crop very much, if any operation is delayed even for a few days only. Every treatment of the plants should receive the cultivator's utmost care. Well-treated plants will often grow 10 to 12 feet high—sometimes, as long as 16 feet.

* Nowadays fibre is generally extracted from these rejected plants and sold as "bach pat" (rejected jute).

CHAPTER VI

CUTTING



JUTE is cut from the beginning of July to the end of October. It is hardly ever cut before the flowering stage of the plants. It may be cut any time before it is dead ripe. The time of cutting may be divided into three stages as follows:—

First stage—cutting in flower ;

Second stage—cutting when fruits set ;

Third stage—cutting when fruits fully develop.

Four weeks are taken by the plants to pass through these stages. Sometimes the cutting is delayed by a raiyat for want of sufficient labour. But if the plants are allowed to get dead ripe, the fibre becomes coarse in texture and dirty reddish in colour. The heaviest yield of fibre of good quality is obtained when the plants are cut at the third stage. Those who would wish to undertake the cultivation of jute on a large scale, must begin cutting from the first stage, so that they may be able to skilfully distribute the work of harvesting over a long period. It would not be possible for them, for want of labour and other difficulties, to cut the whole crop at the stage which may be the fittest of all.

Plants are cut with a sickle close to the ground. Plants growing in deep water are pulled up. After cutting or pulling, the plants are tied in bundles and steeped in water.

CHAPTER VII

STEEPING



JUTE fibre is contained in the bark of the plant. In the natural state, the fibre is associated with a kind of gum which must be first softened by fermentation and then removed by washing. The fermentation takes place when the plants are cut and kept under water. This is called *steeping* or *retting*.

When the crop is grown on high land above inundation level, the bundles are stacked on the field for two days, before they are removed to a ditch for steeping. This is a good practice, as the leaves of the plants may shed and thus be kept on the soil which has produced them. It also reduces the weight of the bundles which are to be carried away a long or short distance. Calculating on the basis that the fibre is 4·5 per cent. of the green weight, 16 maunds of fibre per acre means a crop with a green weight of 355 maunds or 29,000 lbs. The bundles of a stack should be covered with straw or palmyra leaves. If the plants are directly exposed to the sun, the fibre becomes more or less 'specky'. The bundles are then removed to the nearest pool and immersed. In Western Bengal, where deep water is not generally available for steeping, from one to two layers of bundles are bound together with rejected plants and placed in water. Sods of earth are used there for weighting down the stack. This practice is condemned as it tends to discolour the fibre. This may partly explain why the *daisee* jute is much inferior in colour to Eastern Bengal jute. Logs of wood may always be preferred for weights.

In Eastern Bengal, where jute is cut in water, the steeping begins at once with the leaves on. Several layers of bundles are placed one over another. The

second layer covers the first layer completely, leaving only the top 9 inches, and so on. Finally the last layer is covered with weeds. After five or six days the leaves of the plants shed. At this time the whole heap is completely covered with weeds. This system hardly requires any artificial weight—the bundles immerse by their own weight. Sometimes cultivators erect bamboo posts on either side of the heap to keep it from floating away.

The plants take 10 to 20 days to ret. When the plants are cut in the latter period of the season, it may take even a month for retting—the period depending upon the maturity of the plants, the temperature and other conditions of the water in which the plants are steeped. The temperature of water should be over 80°F. After a week or so the plants should be examined to ascertain how far the retting has advanced. The examination should be repeated from time to time, till it is found that the fibre separates easily from the stalk. If under-retted, the gum remains more or less and the fibres stick together. On the other hand, over-retting makes the fibre weak and dull.

The water in which jute is steeped has considerable effect on the quality of the fibre. The fibre of jute steeped in clear water called *kala jal* (black water) gives it a white colour, while the colour of the jute steeped in muddy water called *baga jal* (*baga*=white, truly speaking grey; *jal*=water) is blackish grey. The stagnant *baga* water gives the jute a better colour, because it is not so muddy as the running *baga* water. In the case of "black water" whether running or stagnant, the colour of the fibre is not affected, as this water does not contain any dirty matters. The steeping of jute in running water takes longer to ret it than in stagnant water. In running water the inside bundles of a heap rot earlier than the outside bundles, producing fibre of uneven quality. Thus when

STEEPING

the retting of the bundles within is complete, the outside bundles are not yet ready. On the other hand, when the outside bundles are fit for stripping, the inside bundles will be overdone. It is required, therefore, to break the stack and take away the inside bundles when they are ready for stripping, leaving the outside bundles in the steep for two or three days longer. Stagnant water is to be preferred to running water. Deep water is also to be preferred to shallow water in which the lowermost bundles touch the ground, to the detriment of the colour of the fibre.

The crop is so bulky when it is cut that it is not always possible to carry it a long way off, to get clean water for steeping.

CHAPTER VIII

STRIPPING AND WASHING



SEPARATING the fibre from the stem must be finished within a couple of days after retting process is complete. The principal methods of extracting fibre from the stem are as follows:—

First method.—Each plant is separately stripped so that the fibre remains free and without any entanglement, commanding a higher price. The stripper, generally a woman, does the work in her own home, instead of standing in the steeping water as in the other processes. She holds the lower part of the stem of each plant with her right hand and deftly pulls the fibre off with her left hand—the fibre passing between the fore and middle fingers of the right hand in which the stem is held. A skilled woman can extract even three plants at a time, passing three bunches of fibre of three different plants through the three spaces made with the four fingers of her right hand which hold the stems. A woman ordinarily strips about half a maund of dry fibre, working 8 hours a day. But there are skilled women in East Bengal who can strip more than that quantity. The woman is either a member of the raiyat's own family, or one of the family of a friend of his, who charges nothing for the work; but she gets the stalks or piths only which are used as fuel.

Dacca, Faridpur and Barisal are the only three districts where jute is separated in this method.

Second method.—When the stems are ready for stripping, the raiyat stands by the heap and takes up a handful of the plants called *muthha*, which are beaten at the bottom by means of a wooden hand and afterwards broken at the distance of one foot from the bottom. The broken pieces

STRIPPING AND WASHING

of wood are then thrown away. He now takes hold of the separated fibre by both the hands, and jerks the stems forward and backward on the surface of the water. After half a dozen jerks, the fibre is cleared off the stalks. A cultivator generally strips 20 seers of dry fibre per diem working from 8 a. m. to 2 p. m. But, if he is not accustomed to this work, he would not be able to extract more than half that quantity.

This method is in vogue in almost all the jute districts in Bengal.

Third method.—When retting is complete, a handful of stems is taken hold of by both the hands of the stripper, and dashed against the water, swinging round his head. This is a process which may correctly be called washing rather than stripping. After the stems are washed in this way, they are dried in the sun. At last the piths or stalks are broken at several places and removed from the fibre. Jute is stripped in this method in Orissa. The fibre which is washed in this method deteriorates in its value.

The first process of stripping jute fibre may further be improved by substituting a bamboo or wooden frame for the hand, with more pegs for fingers than a woman commands in one of her hands. This frame may be constructed in the following way:—

Take a piece of bamboo or wood about 24 inches long. Attach some 8 or 10 finger-like thick round wooden or bamboo pegs 8 or 9 inches long to the wood or bamboo frame, at intervals of about 3 inches from one another. This frame, with its pegs up, may be tied to two posts, about 3 feet above the ground, so that a man can work standing.

Now, first, the fibre at the bottom of a plant is to be loosened and put on the frame for work. Each peg should go between the separated portion of the fibre and the pith

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of a plant ; thus when all the pegs are ready, the worker should take hold of the fibre by both the hands and drag it out. It would be more advantageous if two men be employed to work together with one frame. It would undoubtedly be found a simpler process than any. Two men would be able to strip about two maunds of dry fibre in a day.

The separated fibre should always be washed in clean water if available. It would be much better if running water is available for washing, as in that case the separated dirt is removed by the current, without affecting the next bundle of fibre.

The washing is generally done by taking a handful of fibre which is pulled right and left in the water and sometimes dashed against it. After washing, the fibre is dried in the sun over a bamboo frame for two or three days and then tied into bundles for market.

The best sort of jute is obtained when it is steeped in deep, clean and stagnant water, properly retted, and washed in clean running water ; provided the plants are well grown on high lands not liable to be submerged by floods before cutting.

CHAPTER IX

OUTTURN



THE official estimate of the average normal outturn of jute per acre is 16 maunds. On well cultivated and manured land, an outturn of even 30 maunds per acre may be expected—24 maunds per acre are commonly obtained.

The bye-product of the jute-plant is the stalk which is obtained after the fibre is removed from it. It is called *pankati* in Bengal. Enormous quantity of this stuff is wasted—partially it is used as a fuel or as a fencing material by the poorer classes. A very small quantity of it is also utilised in the manufacture of fire-works. An outturn of about 50 maunds of this bye-product may be expected from an acre of land.

CHAPTER X

SEED



VERY little attention is paid by the raiyats to the selection and preservation of jute seed. A raiyat ordinarily preserves neglected plants on the border of a field for the purpose of obtaining seed from them. This is a pity.

Vigorous individual plants, which are not branchy, should be set aside for the purpose. They never select the seeds of different races separately. In the same field and under the same name different races of jute are grown and the seeds are similarly harvested together.

An acre of land may yield as much as 6 maunds of seed. After harvesting, seed should be preserved in an earthen jar (*jala*) mixed with some ashes, and carefully covered with an earthen stopper, preventing the access of insects to the seed. The *jala* should be painted inside with coal tar and dried beforehand. Before sowing, 100 seeds from a lot should be tested between two pieces of wet blotting paper. Good seeds will germinate in a couple of days. The seed may be considered good, if the seeds germinate at the rate not less than 90 per cent. Considering the present value of jute, it would be suicidal to neglect the quality of the seed. The cultivators of East Bengal, where land is inundated, should always indent good seed from elsewhere. On the other hand, the quality of the fibre may deteriorate if the same seed is sown on the same land for a number of years. Interchange of seeds is therefore recommended.

The jute seed is rich in oil. In a crude way of extracting oil, five seers of seed yield one seer of oil. The oil is said to be a specific in skin diseases. In the Hill Tipperah State oil is obtained in the following mode. The

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seed is at first pounded and then moistened with water. This paste is put into a vessel with perforated bottom. Another vessel is placed beneath it to collect the oil dropped down. A third vessel or earthen pot with ignited charcoal within is kept over the first vessel containing the paste. The heat is continued until the oil is fully extracted.

CHAPTER XI

COST OF CULTIVATION AND PROFIT



THE cost of cultivation and preparation of the fibre of jute varies with the conditions of the localities in which it is grown. In North Bihar and Orissa, labour is available at the rate not exceeding 4 annas per diem, while in Bengal the rate of the labour, during the jute season, varies from 8 to 12 annas per diem. The following table will show, in detail, the necessary costs required for cultivating an acre of land, in an East Bengal district, where labour is dear. Extra cost would be necessary if the fibre is to be tied in drums intended for despatch to Calcutta.

8 ploughings (1 ploughing requires 3 ploughs	Rs. A.
@ Re. 1 a plough)	24 0
5 seers (10 lbs.) of seed @ 8 annas a seer	2 8
2 rakings with <i>bida</i>	2 0
First weeding—24 men—at 8 annas per head	12 0
Second weeding—12 men " " "	6 0
1 thinning—6 men " " "	3 0
Cutting and steeping—24 men " " "	12 0
Stripping at the rate of Re. 1-8 per maund	
(16 maunds)	24 0
Collecting fibre and tying—2 men	1 0
Rent	6 0
Total Rs.	92 8

against Rs. 58 estimated in 1908.

Additional costs for manuring:—

(i) 100 maunds of cowdung @ 1 anna per	Rs. A.
maund	6 4
Application of manure requiring 4 men	2 0
Total Rs.	8 4

against Rs. 6-4-0 estimated in 1908.

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(ii) When required quantity of cowdung is not available :—

	Rs. A.
Cowdung 50 maunds	3 2
Application of manure	1 0
Castor cake 3 maunds @ Rs. 4 per maund ...	12 0
Crushing castor cake	1 0
Total Rs. ...	17 2

against Rs. 9-14-0 as noted in the former edition.

(iii) When cowdung is not available :—

	Rs. A.
6 maunds of castor-oil-cake @ Rs. 4 per maund	24 0
Cost for crushing castor cake	2 0
Total Rs. ...	26 0

against Rs. 13-8-0 as stated in 1908.

The cost of cultivation in Bengal would amount to about Rs. 92, that is, at the rate of about Rs. 5-12-0 per maund of fibre produced, against Rs. 3-10-0 estimated in 1908. An additional expenditure of between Rs. 8 and Rs. 26 is required, if the land is manured. If the yield be taken at 16 maunds per acre, when the land is not manured, the value of the outturn may be estimated at Rs. 128 at the rate of Rs. 8 per maund, leaving a net profit of about Rs. 36 per acre, against Rs. 72 in 1908. It may however be noted that the raiyats spend little for the cultivation, as it is generally carried out by a system of co-operation called *bodla* in East Bengal and *gathia* in North Bengal. A group of cultivators work together in their fields by turns, for which they provide their comrades on the working days with a breakfast on the fields in the morning and a dinner at about 3 P.M. after a day's

work comes to an end. It is a gross misrepresentation to say that the value of thrift is not known to our cultivators.

As jute responds readily to manuring, it is always advisable to incur an extra expenditure for this purpose. It may be expected that manuring would increase the outturn at least by 6 maunds per acre, adding Rs. 48 to the gross value, at the cost of, say, Rs. 17 in the case of cowdung being supplemented by castor cake, when the required quantity of the former is not available.

JUTE IN BENGAL

PART III—RESEARCH WORK

CHAPTER I

DETERIORATION OF JUTE



URING the year 1898, an attempt was made by me to classify the races of jute grown in Bengal. Accordingly when I was on tour in Backergunj, fibres and botanical specimens of different races of jute were collected. These specimens, and my descriptions of the races, were forwarded to the Reporter on Economic Products to the Government of India, for his examination. The Reporter, in reply, expressed his satisfaction on the work done, and desired that similar survey work might be carried on in all other districts. Thereupon I was deputed specially on the survey work during 1899 and 1900, in Faridpur, Pabna, Mymensingh, Dacca, Tippera, Rangpur and Jalpaiguri, the most important jute districts in Bengal. Along with the botanical work, an enquiry was also made with regard to the alleged commercial deterioration in the qualities of jute of different places.

The best fibre is obtained on loamy soil. Plants of clayey soil do not ret uniformly. Sandy soils produce coarse fibres.

Finer quality of jute is always produced on the high lands above the inundation level. The plants grown on low lands (*i. e.*, swamps) give forth adventitious roots freely, producing defective fibre. We can remedy it, however, to some extent, by introducing a variety which is called *Kakya Bombai* in Serajgunj. It does not produce much

adventitious roots. It is said by the raiyats of Serajgunj that this special quality of this variety may most likely be lost if the seed be not changed at regular intervals (*i. e.*, two or three years). In fact, the Serajgunj cultivators get fresh supplies of this seed from Goalpara, Assam. There are many seed-dealers who indent the seed from Assam and sell it at Serajgunj, under the specific name of *Bombai* or *Kakva Bombai*.*

Corchorus capsularis is not sown thin. The plants should be 4 to 6 inches apart from one another. This species has a natural tendency to produce more branches than the *Corchorus olitorius*. Irregular branching shortens the length of fibre. Moreover, it is more difficult to extract fibre from the branchy plants. *Corchorus olitorius* is sown thin, that is, a space of 9 inches is allowed around each plant. *Corchorus olitorius* does not produce much branches. It is asserted that this variety becomes also branchy by long cultivation in the same field. There are some varieties, such as *Kakva Bombai*, *Baran*, &c., in *Corchorus capsularis*, too, which do not produce much branches. *Corchorus olitorius* does not grow in swamps.

The fibre of *Corchorus olitorius* is coarse, and therefore it is always sold cheaper than the fibre of *Corchorus capsularis*. The raiyats of Eastern Bengal, therefore, do not like to cultivate *Corchorus olitorius*. The fibre of *Corchorus olitorius* is liked only by the Kapalies, the sack-weavers of Bengal. It has a peculiar yellowish colour. It is never as white, glossy, and fine as that of *Corchorus capsularis*.

It is said that the late varieties, which flower very late (some flower in September), give finer and stronger fibre than the early varieties, which flower generally early in July. Raiyats are not however unanimous on this point. With the late varieties the raiyats

*For botanical description, *vide* Chapter V of Part III—Races of Jute in Palna.

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get however sufficient time for harvesting. In order to suppress the flowering period of the plants, it was suggested by the Imperial Institute authorities to nip off the flower-buds of the plants. It is not practicable, and at the same time not necessary for the late varieties, if lateness has at all any influence on quality.

The time for the cutting of the plants for the production of fine and glossy fibre is considered by the raiyats to be when the plants will shortly run to flower,* and it has been proved to be quite true† by the Imperial Institute authorities both by chemical and practical examinations. In fact, the raiyats of Pabna and Mymensingh begin cutting, sometimes, about a month before the plants would run to flower, *i. e.*, after the plants have grown at least for a period of three months. But generally raiyats like to wait some time longer, in order to get heavier yield of fibre. The later it is cut, the heavier outturn is believed to be obtained by the raiyats. But Mr. T. N. Mukerjee's experiment† at Rahuta shows that the heaviest yield is obtainable from the plants cut just after budding. Mr. Mukerjee's results do not corroborate those of ours. The Ledger referred to does not show which variety was experimented with by Mr. Mukerjee. However, the raiyats of Eastern Bengal finish cutting before the fruits are ripe, in order to get the best result.

The influence of steeping water on the colour of the fibre is great. Clear stagnant water is the best for this purpose. Retting does not proceed uniformly in running water. Muddy water imparts black colour to the fibre.

It is considered that the blackish colour of jute in some parts of the jute growing districts is due to iron contained in steeping water. With a view to ascertain the quantity of iron, if any, in the steeping water of the

* This jute is called *ful pat*.

† *Vide* Agricultural Ledger No. 37 of 1896.

Burdwan Farm, samples of water were forwarded in 1902 to Dr. J. W. Leather, Ph.D., Agricultural Chemist to the Government of India, for analysis.

After making examination of the samples of water, Dr. Leather made the following observations:—

“ I have determined very carefully the quantity of iron present in the waters which have been received from Bardwan, and, as the statement shows, some of the samples contain a small quantity of dissolved ferric oxide. None of them contained any ferrous oxide. The amount of iron present is very small. 1 pt. per 100,000 is equivalent to .07 grain per gallon. Whether such small quantity can affect the colour of the fibre is a question which I cannot answer.

“ I have left out of consideration all iron which may be present in the silt of such waters. All such silt naturally contains iron, but in an insoluble state. It is true that in the process of steeping some part of this might conceivably become dissolved and then affect the fibre; but when one bears in mind that most, if not all, of the water used throughout Bengal for this purpose contains silt, it is highly improbable that the iron of such silt affects the fibre.

“ Other constituents of the waters have not been determined. There seems to be no evidence that the salts, which are natural to such waters, can affect the fibre. There is no chemical reason for such an assumption that I am aware of, and, secondly, if the steeping water were affecting the fibre, there should be evidence that damage occurs in specific localities. I see no mention of this in the papers which have been forwarded to my office.”

Dr. Leather is of opinion that a very small quantity of iron (ferric oxide), .07 grain per gallon as present in the water of the Burdwan Farm, can hardly affect the colour of

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jute. But from our personal experience of the discoloured fibre of North Bengal and other places where jute is steeped in muddy water, we can say that the quantity of iron, although very small, has something to do to discolour the fibre of jute. The jute areas in Bengal are principally inundated annually by the rivers Ganges and Brahmaputra. The water of the Ganges is muddy, while that of the Brahmaputra is clear. The fact is that the jute of the Ganges area flooded over by muddy water is more or less dark, while that of the Brahmaputra area flooded over by clear water is white.

The chief cause of deterioration in length of the jute fibre is due to the continued cultivation of the crop, year after year, on the same field. It has been observed that the best quality of the fibre is obtained from the fields which are newly broken up, or the fields on which jute is rotated with some other crops. But the raiyats cannot generally wait.

Where it is convenient and available, cowdung is used as a manure for jute. But in many cases there are no means to carry off the bulky manure to distant fields. The quantity of the dung when supplied is generally too small for the purpose, for the stock of cattle of a raiyat is but limited. It is well known to the raiyats that even the seed of the best variety sown on poor soils produces short staple. On the poor soils the plants flower much earlier, to the detriment in the length of fibre. Farm-yard manure will not be available in sufficient quantity, and in many cases, as already reported, it is not practicable to use it. Some chemical manures are therefore necessary. Saltpetre* (nitrate of potash) and oil-cakes may prove most useful. Experi-

* Unfortunately the results of the experiments with jute at the Burdwan Farm show that saltpetre, super or bonemeal are not suitable manures for jute. Next to cowdung castor-oil-cake has been proved to be the best.

ments in each typical locality are necessary to ascertain the suitable manures and their quantities to be applied most economically.

The chief cause of the deterioration of the fibre as regards its strength and colour, is due to dishonesty of the *farias* (petty dealers), who purchase the fibre at higher prices and sell it at lower rates. They sprinkle water into the fibre in order to get its weight heavier. In extreme cases the fibre is altogether destroyed, and a great loss is sustained by merchants. I have found some jute containing over 30 per cent. of moisture.* This sort of unfair dealings must be stopped, and it lies principally in the hands of the merchants themselves. They may offer a higher price for a good dry fibre, and reject that which is wet.

To sum up my suggestions for the improvement in the quality of jute :—

- (1) Rotation.
- (2) Judicious manuring.
- (3) Interchange of seeds.
- (4) Cultivation of selected varieties or races of jute.
- (5) Fairness in the trade.

* This I mean above the normal moisture, about 10 per cent., contained by the fibre in the atmosphere of the season which is, of course, very wet.

CHAPTER II

JUTE EXPERIMENTS IN BENGAL.

1902 TO 1905



THE author was in charge of the jute experiments at the Burdwan Farm and other places (Jalpaiguri, Rangpur and Faridpur) in Bengal conducted from 1902 to 1905. The objects of the experiments were to isolate or select true types of the so-called varieties of jute cultivated in Bengal; secondly, to find out the races most suitable for particular areas; and thirdly, to test the effects of different manures on jute.

In 1901 and 1902 the seeds of jute were collected from the districts by the officers of the Agricultural Department for experimental cultivation at different centres. The seeds were hopelessly mixed with different races, as the raiyats would grow races of jute together provided they matured approximately at the same time. During the first two years of the experiments at the Burdwan Farm it was with great difficulty the individual races were isolated, and the same names were given to the races as were adopted by the author when he collected specimens for Dr. Watt during 1898 to 1900. Among the isolated races there was also the *Kakya Bombai* jute which was hardly known to the public, but it is now recognised to be the best of all the races of *C. capsularis*. This race was discovered by the author in 1899 in a village in the Serajgunj Sub-division in Pabna. It was not a pure race, as a pure race of jute is never cultivated by the cultivators. The author selected a race out of the mixed races of the *Kakya Bombai* plants cultivated in a field which appeared to him to be the most prominent and sent botanical specimens, under the popular name of the locality from which it was collected, to the Reporter on Economic

Products to the Government of India. All the subsequent research work on the races of jute was based on the selection of races of jute made by the author on the Burdwan Experimental Station.

The eminent authorities on Botany, Mr. I. H. Burkill, M.A., Reporter on Economic Products to the Government of India, and Dr. D. Prain, M.A., M.D., F.R.S., Superintendent of the Botanic Garden, Sibpur, were pleased to visit the experiments at the Burdwan Farm on several occasions. Their notes and remarks about the experiments are reproduced below, which will be of interest to the readers.

Mr. Burkill on Jute Experiments at Burdwan

Section 1—Corchorus capsularis.—I was quite convinced in my mind after my visit to the Burdwan Experimental Farm in August 1902, and subsequent study of the specimens preserved in my office, that *Corchorus capsularis* breaks up into no botanical varieties, but that it has many races, perhaps more or less conspicuously wanting in permanency. The very multiplicity of vernacular names for different forms rather indicates this, and the jute merchants have never done more in the direction of distinguishing kinds than use place-names.

Last year at Burdwan I noticed how freely insects (particularly the wild bees of the genus *Apis*) visit the flowers and fly from plant to plant. This year I confirmed the observation; and I find that from about 7-30 A. M., when jute flowers open, until late in the day, when they wither, they are constantly visited by a variety of bees. The flowers last but the one day.

Cross and self-pollination are both effected by the visitors. It would be so contrary to the law of nature for a plant to be unsusceptible of cross-fertilisation that I have not tried to prove that cross-fertilisation occurs. I did, on

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the other hand, experiment with regard to self-fertilisation by wrapping up buds in fine linen, and though I only obtained eight fully-ripened capsules out of the 31 flowers which were wrapped up, the possibility of self-fertilisation was proved; I prefer to think that, to the rain, which soaked the wrappings almost as soon as I had put them on, was due the failure to set seed of the other flowers and not to self-sterility.

The reverse would, however, strengthen the argument which follows. The bees going from flower to flower are consequently doing much to frustrate the endeavours of those who have charge of the Experimental Farm to keep their races pure; thus, for instance, the race *Barapat* has twice been grown between plots of the races *Baran* and *Kakra Bombai* and is exposed to the possibility of fertilisation from both as well as from more remote plots.

The abundant opportunities for cross-fertilisation, which occur where the different kinds are grown close together, accounts for the variation which was seen before the plots were thinned in the second experimental sowing made in 1903 at Burdwan. The opportunity which thinning afforded was used by Babu N. C. Chaudhuri, who has been in charge of the experiments, to get rid of plants not true to type, and to that only is due the nearly general uniformity of each plot.

As he has undoubtedly set his ideals nearer to him than the cultivator does, his plots are more uniform than the crops will be found to be in the country.

There are hardly any naked-eye features that one can seize on whereby to distinguish the races of jute except the colour of the stems and leaf-stalks, the time of flowering, and the height that the plant attains. The only one of these characters serviceable at thinning time is the first; and on it as a test the weeding of the crops at Burdwan has been done. Consequently it follows that the

race *Barapat* grown between a race with red petioles and another, having, like it, green petioles but beginning to flower a little later, will have weeded out from it the mongrels showing a strain of the red-petioled *Kakya Bombai*, but not those which are the offspring of it and *Baran*.

It is to be expected, therefore, that if on the closely approximated experimental plots at Burdwan such an experiment as the present one be prolonged for several years, the individuality of the races will be gradually reduced. There will, however, be a tendency to break them up into two classes, *viz.*, red-stemmed and green-stemmed, according to the selection practised in thinning the plots.

Do the raiyats actually use the colours red and green in any way to weed out undesirable plants? I note that the Rangpur races are particularly red-stemmed and that the Faridpur races all have red petioles on green stems.

In the country, plots are larger and less approximated; the liability to the production of mongrels is therefore much diminished. It will be at once asked how the races come to be retained. I believe chiefly because each district grows early, mid, and late flowering races, and it seems to me that such an idea should form a good working hypothesis upon which to gather information. A common period is, however, not kept by the races in different districts, but the tendency is evidently for the plant in the northern districts to become quicker-growing than in the southern districts. Facts are wanting which might show any connection between the general lateness of the local races of jutes and the degree of submersion to which the district is liable. The Burdwan experiments have shown that the Jalpaiguri and Jamalpur races are particularly early-flowering.

The experiment suggested by this observation is that the behaviour and value of the best Jalpaiguri races should be tested in the neighbourhood of Serajgunj, or in Tippera, Faridpur, and Dacca, which are districts sending the latest kinds to Burdwan; and the reverse should also be tried. It may perhaps be found that imported seed is an acquisition in one or the other place.

I observed at Burdwan that two plots of plants produced flowers paler than usual. These two were "*Tosha red*"* from Serajgunj (why named red, I do not understand) and *Fulleswari* from Tippera. The only difference between the two, as far as I have observed, is that *Fulleswari* was found to be a little later a little shorter at the dates of my visits. The Burdwan Farm received another kind of jute from Tippera named *Dewdholi*. *Dewdholi* and *Fulleswari* were the only two Tippera jutes. My notes tell me that *Dewdholi* had exactly the same relation to *Kakya Bombai* from Serajgunj that *Tosha red* had to *Fulleswari*.

It is by no means improbable that seed of *Kakya Bombai* and *Tosha red* from Serajgunj and sown in Tippera would in a few generations become *Dewdholi* and *Fulleswari*; brought back again, in a few more generations they would return to *Kakya Bombai* and *Tosha*. The Burdwan Farm received under the name of *Parbatea* seed from two sources, viz., Jamalpur and Dacca. The Jamalpur plot flowered a little earlier than the Dacca plot; in other respects they were the same.

If I am right in thinking that the locality does, in a few generations, tend to delay or hasten the growth as suggested above, then this influence will act together with the cross-fertilisation in levelling the Burdwan crops, if they should be grown through a fairly long series of years.

* It must have been a mistake on the part of the collector of the seeds of Serajgunj. *Tosha* is an olitorius jute.—AUTHOR.

I unhesitatingly state that—

“*Tosha red*” (Serajgunj) = *Fulleswari* (Tippera) made a little later.

Kakra Bombai (Serajgunj) = *Dewdholi* (Tippera) made a little later.

Parbatea (Jamalpur) = *Parbatea* (Dacca) made a little later.

Barapat (Jagannathganj) = *Barapat* (Serajgunj).

I suspect that without difficulty other cases could be established; but to do so would mean an intimate study of the plant in the field. Information in this direction could be collected by the travelling Overseer of the Department of Land Records and Agriculture, Bengal.

The Jute valuation made last year by Messrs. Millar, Duffus, and Dott of the samples from the small experimental plots told us only one thing really, *viz.*, that of all the races grown together none was distinctly better or worse than the average of the lot; while of the plots grown elsewhere on the farm, the jute fibre from many was better than from the selected races. This year instead of 11 small experimental plots there have been 36. I am very anxious to know if there is to be the same uniformity in the value of the produce that there was last year. What will be most instructive perhaps from out of the whole series will be the value of the produce of plot No. 16 “Farm seed.”

Much depends upon that, and I could wish that a plot of “Farm seed” had been sown, say, between every five of the long series, the ground given to which seemed to me to be poorer at one end (towards No. 45) than at the other end.

Section 2—Corchorus olitorius.—I tried the same experiments with *Corchorus olitorius* as with *Corchorus capsularis* and obtained the same result. I had 28 capsules wrapped in linen and obtained 9 pods. The seeds

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from these pods sown on a damp tile in my office are now germinating very freely.' The flowers of *C. olitorius* are larger than those of *C. capsularis* and are visited by the same insects. Their duration is one day, and pollen is shed around an apparently mature stigma at the moment of the opening of the flower. There is, therefore, the same chance of cross and self-fertilisation in this species as in the other. However, the races are much fewer. I classify them—

- No. 1, early green-stemmed, called *Satnala* in the Faridpur district and *Bangi* in Dacca ;
- No. 2, late green-stemmed, which came as *Nailta* from Jagannathganj, *Deswal* white from Serajgunj and *Paknallya* from Jamalpur ;
- No. 3, very late green-stemmed, which came as *Dewnallya* from Dacca ;
- No. 4, late red-stemmed, received as *Tosha* from Serajgunj and as *Desi lalpat* from Hoogly ; also probably here is to be added *Halbelati* from Tippera.

It is remarkable with regard to the valuation of fibre made last year by Messrs. Millar, Duffus and Dott that they remark of both *Tosha* and *Desi lalpat* that they had stood too long in the field—a remark that they do not make of the early *Satnala* and *Bangi*. They also remark of both the latter that they had soft ends—remarks which confirm my classification by appearance of the plant.

Altogether the problem of improving the races of *C. olitorius* is infinitely less complex than that of *C. capsularis*.

Dr. D. Prain on Jute Experiments at Burdwan

After visiting the Burdwan Farm and carefully examining the sample experimental plots, I am of opinion that the experiment has been carefully thought out

and is being carefully conducted. It is too soon to say yet this season what the full deductions from the experiments are to be. My visit, which was paid at the request of Mr. Maddox and not primarily in connection with the present reference from the Government of India, was paid in company with Mr. Burkill, who was, I understand, independently under an obligation to pay a visit to the experimental farm. I hope to pay another visit, and further hope that I may be able to pay it along with Mr. Burkill.

As regards the experiments themselves, I have but one minor criticism to offer. A point to bring out clearly is the extent to which the plants in these plots are subject to cross-fertilisation owing to their being grown in proximity, and consequently to what extent the plots of a second year show, as compared with those of the year before, an increased proportion of plants of mixed type. I should expect this to be considerable. On examining the actual second-season plots at Burdwan, it struck me as wonderfully small. I was, however, informed that when the plants were small and the various plots were being weeded, plants of obviously mixed type were, as far as possible, eliminated. So far as one phase of the experiment is concerned, I realize that this was essential. But I should have liked to see, and had I been consulted earlier, would have recommended, that a small section, say a piece as long as each plot is wide, be left rigorously alone—weeded to be sure, but with all jute plants of whatever type it might contain, left to grow. The plants would probably have been too thick to serve any other useful purpose, but they would have served to indicate the extent to which the crossing of races takes place. So far I can find no sign that there are any varieties either in *Corchorus capsularis* or *Corchorus olitorius*, though there is apparently a considerable tendency to racial modification, especially in the former species.

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As to the general question of deterioration, it is not clear that this occurs. It is asserted : there is no attempt at proof. I have a vivid recollection of Experimental Jute-growing on the Sibpur Government Farm some ten years ago, and the similarity between the plants seen by me at Burdwan this year and at Sibpur then is most striking. If there be anything in the complaint, the whole tendency of the statements before us is to show that the deterioration lies in more careless retting, not in a demoralised plant. If so, the remedy should be with the trade.

The report submitted by the fibre experts is the most disconcerting document of the whole series to my mind. It has been evidently drawn up with the greatest care, yet it proves nothing and affords little real assistance to Government. There are several possible explanations of the results of this report, none of them entirely satisfactory to my mind. It seems unnecessary at this stage to discuss them exhaustively. I will, however, indicate the two that appear to me to be most plausible, yet these two being more or less alternatives, do not help us much—(1) It may be safely assumed that the whole of the plots were last year grown, harvested, and retted with equal care. It is certain that the plants in all the plots grew under quite comparable conditions. Yet the results, which may be termed good as regards Deswal jute raised from farm seed, were indifferent to fair only with the most of the other kinds. The suggestion, then, is that seed of a strain natural to, or naturalized in, a particular district gives better results in that district than any freshly imported seed. If this be the case, the experiments at Burdwan, however prolonged, will not lead to the results that Government and the jute industry wish to obtain. They will have to be repeated in every *likely* jute-producing tract.

(2) It may, however, be supposed that the jutes from other districts grown at Burdwan were really quite as good as these same strains are capable of being in their own districts. It may even be anticipated that in some cases the change of venue really benefited them. If this is the case, it is not impossible that those in charge of the retting and extraction of fibre at Burdwan being most familiar with the jute that had become so to speak naturalized at the Burdwan farm, get better results from it than was possible from *identical* treatment of the other strains of jute. If this possibility could be proved, the remedy would be to get men from the districts where these particular jutes are naturally grown to go to Burdwan and treat, as they annually treat them, the jutes they are accustomed to. This particular method of overcoming a difficulty is known to and practised on a large scale in certain places by the native raiyats themselves. The following instance, which is a familiar one, illustrates the point. In the beginning of the nineteenth century hemp was grown in the Jessore district for the purpose of producing *round ganja* for the Calcutta market. In North Bengal, hemp was only grown for the purpose of producing *flat ganja*. When the Board of Revenue, Lower Provinces, concentrated the cultivation of hemp for the purpose of producing *ganja* in the present *ganja* mahals round Nowgong and in the adjacent parts of Rajshahi, Dinajpur, and Bogra, obviously *round ganja* for the Calcutta market could only be manufactured in the restricted area. But the people about Nowgong did not know how to make *round ganja* for the Calcutta market: they therefore introduced at the harvesting season Jessore coolies to make it for them. Now though three-quarters of a century have elapsed since any hemp was grown for *ganja* making in Jessore, the Nowgong people to this day import Jessore coolies to make their *round ganja* for the Calcutta market, making the *flat* themselves as they have always done.

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What the raiyats of a particular area can do every year for the special purpose, it is possible that Government might do for one or two years for a parallel purpose—the preparation of a fibre such as is known to suit the Calcutta jute-buyer.

THE RESULTS OF THE EXPERIMENTS.

The objects of the experiments at the Burdwan Farm were to answer the following questions :—

- I. Whether the qualities of the fibres of different races differ.
- II. At what stage of growth of plants, a crop should be harvested to give the best fibre and heaviest outturn.
- III. Whether a well grown crop resulting from suitable manuring would give a better fibre than an inferior crop.
- IV. To what extent the quality and outturn of fibre are affected by different degrees of spacing.
- V. Whether the retting process can be improved under conditions as ordinarily prevail.

I.—The results of the experiments proved that the qualities of the fibres of different races depend chiefly on the soils and other conditions under which they are grown. The fibres of the same race of jute grown on different fields of the same farm were valued at different prices, while values of the known inferior races of jute were similar to those of the known superior races when cultivated at the same place. The same race of jute yields different qualities of fibres when grown on low lands against high lands, taking that the retting and washing is

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done rightly in the same water. Jute is a very quick growing plant. If the plants of a race of different plots at the same place are not weeded and thinned out timely, there would be differences in the fibres.

The following table gives the results of valuation made during 1903 and 1904 by some jute merchants* of reputation nominated by the Bengal Chamber of Commerce. The plots at the Burdwan Farm were sown with the same seed at the same time but harvested on different dates at the same stage of maturity of the plants, that is, as the pods set after flowering. The crops of different plots appear to be quite different both in yield and value.

Plot No.	Date of sowing.	Date of harvesting.	Outturn of fibre per acre.	Price per maund.
			lbs.	Rs. As.
10	May 18	September 12	1,845	8 12
13	"	" 3	1,665	8 3
20	"	" 3	1,815	8 12
30	"	August 18	1,230	8 10
40	"	" 29	1,500	8 1
47	"	September 27	1,680	8 0

The above plots were manured with 5 tons of cowdung per acre.

At Faridpur, on the other hand, all the plots of the same race were sown and harvested at the same time. No fertilisers were applied to the plots during the year under reference, though they were manured with bonemeal similarly during the preceding year. The table below

* Messrs. D. L. Millar, J. C. Duffus and A. S. Dott.

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shows that there were much differences in the yields of the different plots :—

Plot No.	3	12	26	30	34	38	Outturn of fibre per acre.
	2,610 lbs.
	2,520 ,,
	2,025 ,,
	1,755 ,,
	1,665 ,,
	1,710 ,,

Both at Burdwan and Faridpur the weeding and thinning operations were in some cases delayed owing to rainfalls.

The following valuation statement of the fibres of the supposed superior and inferior races of jute cultivated at the Burdwan Farm under the same conditions, proves that there are commercially little differences in the different races of jute grown in different parts of these Provinces. The qualities of the fibres differ owing to their cultivation in different localities, in different soils and lands and produced under different conditions.

Name of the race.	Commercial Name.	Value per maund
		Rs. As.
1. Udhap pat	Dowrah, quality of commerce, Inferior.	8 2
2. Dhal Sundar	Naraingunj, Superior quality in commerce.	7 12
3. Baran	Serajgunj, commercially Superior.	8 2
4. Ausa	Northern, quality Inferior to No. 2.	8 5

In spite of the facts recorded above we are not prepared to minimise the superiority in some respects of

some races such as *Kakya Bombai*, *Hewti*, *Barapat*, *Baran*, *Amania*, *Kajla*, *Kamarjani*, etc., of the species *C. capsularis*, and *Dewnallva*, *Nailta*, *Halbelati*, *Tosha*, *Desi*, etc., of *C. olitorius*. The races mentioned above have been found to be heavy yielders (*vide* Chapters on the Races of Jute). There are some other races which are specially suitable for particular lands. As for example the *Sutpat* of Faridpur can admirably thrive on the lands under deep water where other races would be considered useless. *Kakya Bombai* jute is good on the high lands as well as on the lower lands.

II.—The time of cutting was divided into four periods, *viz.* :—

- 1st Stage.—Plants were cut when in flowers.
- 2nd Stage.—Cutting when fruits set in.
- 3rd Stage.—Cutting when fruits fully developed.
- 4th Stage.—Cutting when the fruits were dead ripe.

The results of the experiments at the Burdwan Farm are noted below :—

1st Stage	...	1,312 lbs. of fibre per acre.
2nd	„	1,375 lbs. „ „
3rd	„	1,671 lbs. „ „
4th	„	1,694 lbs. „ „

The value of the fibre harvested at the fourth stage was less than that offered for the fibres harvested earlier. It was also more difficult to extract fibre of the plants harvested at the fourth stage. Considering all points, the experiments proved conclusively that the best time for harvesting of jute is the third stage, that is, the cutting when the fruits fully develop, but not yet matured.

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There is an interval of about 10 days between succeeding stages.

III.—It will be seen that the best grown plants give the best quality of fibre irrespective of differences in characters of different races. Of course it is due to length only. The outturn and price go hand in hand. The following table gives the results of the plots manured with different manures applied in quantity on analysis to supply 30 lbs. of nitrogen per acre:—

Manure applied per acre.	Outturn per acre.	COST PER ACRE.			Gross value of outturn.	Profit per acre.	Rate per maund at Calcutta.
		For manure.	For cultivation.	Total.			
Mds.	lbs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs. A.
Cowdung... 75	1,985	4	78	82	214	132	8 10
Castor-cake 7	1,635	15	74	89	171	82	8 6
Bonemeal 10½	1,085	21	74	95	113	17	8 5
Ditto ... 5¼	1,605	32	74	106	167	61	8 5
Saltpetre ... 4¼							
No manure ...	1,230	...	72	72	129	57	8 6

IV.—To what extent the quality and outturn of fibre is affected by different degrees of spacing? To this question, although it is difficult to give any definite answer, yet the Burdwan experiments proved that a spacing of about 6", in case of *C. capsularis*, is most economical. The crop was grown in four plots, and an attempt was made to keep the plants 4", 6", 8" and 10" apart from

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each other in the four plots, respectively. The 8" and 10" plots were particularly poor and the fibres were inferior.

Degree of spacing.	Outturn of fibre per acre.	Price per maund.	Date of cutting.	Date of washing.
4"	lbs. 2,079	Rs. A. 9 4	September 15	October 3
6"	1,476	8 8	Sept. 16 & 17	,, 9
8"	882	7 14	,, 19 & 20	,, 12
10"	1,183	7 14	,, 20 & 21	,, 13

Taking the first two plots only, which alone were fairly comparable, an attempt was made in 1903 to ascertain approximately the actual spacing in these two plots, as also the number of plants and their green weight at the time of harvesting. The following table gives the result:—

Supposed spacing.	Room allowed per plant (<i>i.e.</i> , average spacing).		Number of plants per acre.		Outturn of fibre per acre.	
	1903. Sq. in	1904. Sq. in	1903.	1904.	1903. lbs.	1904. lbs.
4"	43	39	150,000	160,000	1,590	2,079
6"	65	63	100,000	92,000	1,050	1,476

It will be seen in both the years the real spacing was more like 6" and 8" than 4" and 6", respectively.

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V—Jute is such a bulky and heavy crop that it is difficult to carry the bundles of green plants any distance, and the raiyats are obliged to use whatever water they find handy. Calculating on the basis that the fibre is 4.5 to 5.5 per cent. of the green weight, we see that 15 maunds of fibre per acre means a crop with a green weight of something like 300 to 350 maunds. The conditions at Burdwan did not admit of retting the plants in running water. The steeping process was similar to that of Eastern Bengal. We did not approve of the local system of covering the heaps of jute plants under retting with sods of earth which certainly discolours the fibre to a certain extent. It is required to give weight to the heaps for sinking. In Eastern Bengal several layers of bundles of jute are placed one over another, which does not require any artificial weight, while in Hoogly and its neighbouring districts only two layers of bundles are heaped together, as the water available for steeping is generally shallow.

The harvesting operation extended over three months from early August to the end of October.

The temperature of heaps during the retting process was taken; 80° F. was the minimum, which gradually rose to 95° F., the maximum. The temperature fell considerably (70° minimum, 83° maximum) towards the end of October, when the heaps took about ten days more for retting. At the time of raining the temperature in all the bundles was constant.

The steeping water of the farm was not favourable to get a first class fibre, as is obtained in Mymensingh. The water contained a negligible quantity of iron as shown by the Agricultural Chemist, but other colouring matters from the decomposition of vegetable substances were also present.

Time required for retting varied from 15 to 30 days. The smaller heaps took generally a longer time in retting than the larger ones, although steeped on the same day.

CHAPTER III

FRAUDULENT WATERING OF JUTE



FRAUDULENT watering of jute is in practice more or less in almost all the jute growing districts. This notorious practice is well known to all buyers. It is done by the unscrupulous dealers known by the name of *bepari* or *faria*. The buyers have to depend on them for the supply. The buyers can hardly check them, specially when the market is on the rise. The dull market prevailing during the last five years has had a considerably good effect in checking this malpractice. Hence the qualities of jute of the markets of the Madaripur, Serajgunj and other districts which were notorious for fraudulent watering have greatly improved. The common way of watering jute is to spread out the loose jute purchased by the *farias* on the banks of a river layer after layer and sprinkle water, and sometimes along with sand, on each layer as it is spread out. Then it is redrummed and taken to the markets for sale. They always get a few drums of dry jute in front for inspection of the intending buyers.

There is an interesting report on this subject written by Mr. D. N. Mukerjee, M.A., M.R.A.C., formerly of the Bengal Agricultural Department. The following is a summing up of Mr. Mukerjee's report :—

(1) The fine particles of sand stick to the fibre so long as it continues wet, but can be easily shaken off when it gets dry. But the watering is a very much more serious thing. If wet jute is baled or stacked for a few days, the fibre loses its lustre and becomes discoloured and weak—sometimes so weak and brittle that it may be reduced to a fine *powder* by merely pressing it between the thumb and the finger.

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(2) Some firms dry the jute before baling, but others are perfectly reckless about what they bale. Large firms have arrangements for the examination of every drum that is purchased and for drying it properly if found wet before baling it. The firms have to keep up quite an army of assorters for this purpose, who are scattered all over the mart, a length of over two miles. It would be very convenient if the *mahajans* allowed the jute boats to come to the *ghat* close to the European firms; but though the Bengali *mahajans* are agreeable, the Marwaris refuse to give in. The consequence is that it becomes practically impossible to properly supervise the work of the assorters. They are men on a small pay, and are constantly passing wet jute as dry on receiving a small bribe from the *beparis*. Thus in spite of strenuous efforts, several of the most respectable firms are powerless entirely to prevent the baling of wet jute. But there are other firms that make no bones of the superfluous moisture. They send the jute over to their godowns in Calcutta, where it is sold to the mills or to the shippers. The examination of the jute by the buyers in Calcutta is not so thorough as at Serajgunj, and various means are resorted to for avoiding the detection of any excess of water.

(3) Between the raiyats at one end and the home market at the other, there are the following middlemen: *beparis* or dealers, *mahojans* or *aratdars*, buyers, balers, and shippers. Sometimes the last three functions are combined by the same firm that bale and ship off at Calcutta what their agents buy in the country. But the business at Serajgunj may be said to be practically in the hands of the *mahajans* or brokers. They are well-to-do people, being mostly Marwaris. They advance money to the *beparis* or sellers, the condition being that the latter must bring to the *mahajans* all the jute they can get from the raiyats. The money is not realised from season to season, but is allowed to be in the hands of the *beparis*,

one *bepari* sometimes having an advance of Rs. 5,000 or Rs. 10,000, and occasionally no less than Rs. 20,000. When the jute is brought to the *mahajan*, he settles the price with the buyer secretly, the *bepari* having nothing to do with it and often not knowing at all what his jute sells for. He has only a general idea of the state of the market from the price other *beparis* receive for their jute. The *mahajan* gets a brokerage of 2 to 4 annas per maund, but over and above this we may be sure he leaves a margin between what he pays the *bepari* and what he himself gets from the buyers. Plainly he is entitled to some discount for the ready cash he pays in advance, but the rate might be definitely settled, and the transaction might be above-board. The price of jute is subject to violent fluctuations. Probably there is no other article the price of which varies so much in the course of a few days in the same season. Both the buyers and the *mahajans* have daily wires from all the important jute marts telling them of the state of the market, but the information is carefully kept to themselves. It might be an advantage to have some agency for making it public. At some places there are no *mahajans*, but the *beparis* deal directly with the buyers. The raiyats also to some extent sell their own jute to the purchasing firms without the intervention even of the *beparis*.

(4) Even what is generally held in the trade as dry jute is not as dry as it might be. It is not "bone dry" as it is called. If such jute is exposed to the sun, it quickly loses 8 to 10 per cent. of its weight. This amount (which of course represents moisture) does not affect the quality of the fibre in the bale or in the stack. The mills also accept this amount of moisture (10 per cent. up to November and December and 8 per cent. later), but any quantity above this is held as objectionable. The mills now generally insert a clause in their contracts to the effect that deductions will be made for moisture in excess of the aforesaid quantities. It is not at all

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uncommon to deduct as much as 12 per cent. on the weight delivered of Madaripur jute. Some of the mills have their own agents who would not object to buy wet jute, as it need not be baled or stacked, but used in the mills as soon as it arrives.

(5) Mr. Mukerjee obtained some samples of well-dried jute from different markets which were redried and reweighed by him.

In each case 2 lbs. weight of the fibre was dried in the sun for two days and then reweighed with the following results :—

Name of sample.	Original weight.			Weight after two days' drying in the sun.			Percentage of loss (moisture on drying).
	lbs.	oz.	dr.	lbs.	oz.	dr.	
(1) Fine Mymensingh	2	0	0	1	12	7	9'10
(2) Fine Bilasipara (Assam)	...	2	0	1	12	7½	9'57
(3) Chandpur	...	2	0	1	13	1	8'98
Average	...	.....		.....			9'45

(6) Similarly some samples of wet jute were received from two *beparis* of Serajgunj. Like the samples of dry jute, these were also exposed to the sun for two days and then reweighed with the following results :—

Name of sample.	Original weight.			Weight after two days' drying in the sun.			Percentage of loss on drying (moisture).
	lbs.	oz.	dr.	lbs.	oz.	dr.	
(1) { <i>a</i> Serajgunj	2	0	0	1	8	2½	24'22
{ <i>b</i> „ ...	2	0	0	1	8	1½	
(2) { <i>a</i> „ ...	2	0	0	1	8	6	22'95
{ <i>b</i> „ ...	2	0	0	1	8	4½	
(3) { <i>a</i> „ ...	2	0	0	1	8	4½	21'97
{ <i>b</i> „ ...	2	0	0	1	9	3	
(4) Chandpur	...	2	0	1	9	0	21'88
Average			22'75

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In both the above series the dry weight was taken about 3-30 P.M. As will be seen later on, all these samples reabsorbed some two per cent. of moisture by the next morning and one or two per cent. more by being stowed away for a few weeks from atmospheric humidity.

(7) The third sample in the wet series was examined at short intervals to see how quickly the moisture left the fibre. It was weighed out about 2 P.M. into two parcels of 2 lbs. each. Both the parcels were reweighed at 3-30 P.M. and again at 4-30 P.M. with the following result:—

	Weight at 2 P.M.	Weight at 3-30 P.M.	Weight at 4-30 P.M.
	lbs.oz.dr.	lbs.oz.dr.	lbs.oz.dr.
Sample 3 (Wet jute)	$\left\{ \begin{array}{l} a \dots 2 \ 0 \ 0 \\ b \dots 2 \ 0 \ 0 \end{array} \right.$	$\left\{ \begin{array}{l} 1 \ 10 \ 2\frac{1}{2} \\ 1 \ 10 \ 7 \end{array} \right.$	$\left\{ \begin{array}{l} 1 \ 9 \ 6 \\ 1 \ 10 \ 0 \end{array} \right.$

Taking the average of the two samples, it will be seen that the loss of weight at the end of 2½ hours amounted respectively to 16·89 per cent. and 19·14 per cent. Seeing that the sample contained no less than 21·97 per cent. of moisture and that out of this as much as 10 per cent. was acceptable to the mills and balers, an hour's drying would probably have quite sufficed to make it unexceptionable. In other words, jute parts with moisture so quickly that the plea of difficulty in drying to explain the presence of too much water can never stand.

(8) The three samples of dry jute mentioned in paragraph (4) were stored away in a dry but shady place

FRAUDULENT WATERING OF JUTE

for a few weeks, after which they were examined with the following results :—

Names of samples.	17th De- cember, 10 A.M.	17th De- cember, 2 P.M. (after 4 hours' drying.)	18th De- cember, 8 A.M.	23rd De- cember, 8 A.M
	lbs. oz. dr.	lbs. oz. dr.	lbs. oz. dr.	lbs. oz. dr.
(1) Dry Mymensingh	1 14 1	1 13 2	1 4 1	1 14 1
(2) Do. Bilasipara ..	1 14 1	1 13 1	1 4 0	1 14 1½
(3) Do. Chandpur ...	1 14 5	1 13 5½	1 4 2	... ..
(4) Wet do. ...	1 10 2	1 9 4	1 0 5	1 10 3

It will be seen that none of the samples returned to their original weight by reabsorption of moisture after they had once been thoroughly dried in the sun. The "bone dry" fibre does gain a little (between 3 to 4 per cent.) in weight with the fall of temperature and a consequent rise in the humidity of the atmosphere, but not more, however long the fibre may stand. The permanent loss in weight by bone drying in the case of the dry samples was about 6 per cent., and in the case of the badly watered samples as much as 18 to 20 per cent.

9. Nor is it any excuse to say that jute gets damp by exposure to night dew. Three experiments were made with bone-dry jute by (1) spreading out two samples to the dew at night, (2) by leaving by their side two other samples in bundles exposed to the dew, and (3) by leaving yet two other samples in bundles under a thatch. A

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fourth sample was kept inside a room. The following results were obtained in the morning :—

Nature of treatment.	Gain in weight by absorption of moisture.
	Per cent.
(1) Opened out to night dew ..	18·52
(2) Left in bundles exposed to dew ...	6·40
(3) Ditto under a thatch ..	2·93
(4) Ditto inside a room ...	2·42

The third experiment shows that a simple thatch would be a very good protection and keep the jute thoroughly dry. Jute therefore cannot only be very easily dried, but can also be as simply kept dry. Excessive moisture almost in every case points to deliberate fraud.

10. A sample of dry Mymensingh jute that had already lost 5·85 per cent. was dried in a steam chamber. It was found that it lost 8·14 per cent. of its weight. So this sample contained almost exactly 14 per cent. of moisture. On the other hand, the absolute quantity of moisture in a bad sample of fraudulently-watered jute seems to be no less than 28 or 29 per cent. The absolute quantity of moisture in any sample of jute, however, is not a thing of much practical value, as the arrangements and apparatus, as also the skill required for its determination, are not at the command of practical men. But the relative amounts of moisture in a well-dried and a fraudulently-watered sample may be always ascertained very easily by almost anybody.

CHAPTER IV

JUTE IN BACKERGUNGE

(Written in 1898)



JUTE is cultivated throughout the district, except the tracts swamped by salt water where it is grown on a very small scale in homestead lands only for the home consumption of the raiyats. According to the last jute forecast report, published in 1897 by the Agricultural Department, the normal area under jute in Backergunge is 6,400 acres only (37,623 acres in 1920).

Classification and Description

There are several races of jute, three or four races being commonly cultivated together under a common name. The names are confusing even in the same village. However, the following names adopted by me signify particular races :—

- (1) *Corchorus capsularis* :—
 - (a) *Bagi* = *Bangi* = *Cowpla*.
 - (b) *Raktabagi* = *Nileta*.
 - (c) *Sutpat* = *Pechi*.
- (2) *Corchorus olitorius* :—
 - (d) *Bagi* = *Bangi* = *Nileta*.

The races may be distinguished by the colour of the stems and petioles of the plants, and the time of flowering and the normal height attained by the plants of a particular race. The colour of the plants (a) and (d) is light green. The plants of (b) are purple in colour, and the colour of (c) plants is reddish. I found there are two

kinds of plants in each of (a) and (d). The petioles and the ribs of the leaves of the plants (a) and (d) are as green as the stems. But there are a few plants in (a) having their petioles and ribs of the leaves reddish,* and in (d) they are reddish or pinkish in the colour of the stalks, petioles and ribs.

The two principal species (i.e., *Corchorus capsularis* and *Corchorus olitorius*) differ from one another in fruits. *Corchorus capsularis* has round pods, while the pods of *Corchorus olitorius* are long. They also differ in the ways of cultivation. *Corchorus capsularis* can thrive more or less in water to the depth of about 2 to 3 cubits, while *Corchorus olitorius* does not do so. Consequently *Corchorus capsularis* is very largely cultivated in Eastern Bengal, where the cultivation of *Corchorus olitorius* is but limited. It is also peculiar that *Corchorus olitorius* cannot strike the soil on which it is cultivated so firmly as *Corchorus capsularis* does.

The *Sutpat* is decidedly inferior to other varieties in the length of the fibre, but the cluster of fibre around the pith of *Sutpat* (i.e., the bark) is thicker than that of the other three varieties. Therefore in yields of fibres all the varieties are nearly equal.

The fibres of the two species of *Bagi* are bright in lustre, hence they are called *Bagi* or *Bangi* (perhaps from *banga*, which is a provincial word for cotton, meaning white), which seems to have been derived from *bak* (stork), pronounced as *bag* in Eastern Bengal. Where both the species of *Bagi* are under cultivation *Corchorus capsularis*

*It has been observed that some of the races, having stems light-green and petioles reddish, change the colour of the stems to pinkish when old (as mostly *Amonia* of Faridpur, Deswal of Serajgunj); but there are some (*Dhupri* of Faridpur, *Bhadoya*-white of Jalpaiguri, Deswal of Serajgunj) which are not so. In *C. olitorius* no such plants having reddish petioles on green stems are found. The same colour is contained by a plant.

JUTE IN BACKERGUNGE

is called *Cowpla*, which might have been derived from *capor* (cloth), (*cowpla*=having the quality of *capor*, i.e., as white as *capor*).

Rakta Bagi means red *Bagi*. The plants are purple, but produce white fibre. *Nileta*, from *nal* (red), is derived from the correct word *lal*.

I am unable to give reasons for the name of *Sutpat*. *Sut* means thread. Does it mean the *pat* (jute) which yields thread (*sut*)? *Pechi*, meaning deformed, is attributed to plants which do not grow tall. There is no doubt that this variety was under cultivation in Eastern Bengal before all other varieties were introduced. I am also unable to give satisfactory reasons as to why *Bagi* of *Corchorus olitorius* is called in some places *Nileta*. With the exception of a few, the plants are not red (*nal*) in colour. It is probable that this name was given only to separate it from another species of the same name, i.e., *Bagi*, under *Corchorus capsularis*, which was first introduced. Where *Corchorus olitorius* was introduced before *Corchorus capsularis*, the latter is not called there *Bagi*, but *Cowpla* as described above.

The opinion of the raiyats regarding the qualities of the varieties is not unanimous. The fibre of *Corchorus olitorius* is said by the majority of them to be the stronger, but coarser. The colour of the fibre of this species is a little yellow, which is very much liked by the *Kapali* class of Eastern Bengal who weave gunny bags. The bags of *Corchorus olitorius* bring a higher price. The fibres of *Corchorus capsularis* are sometimes kept wet for two or three days after washing to give them this peculiar colour. This process would also give yellowish sparkling colour to the fibre of *Corchorus olitorius*.

Hibiscus cannabinus (*Mestha* or *Mesot*, i.e., *Deccan* or *Ambari* hemp) is also included in jute in the market.

It was largely cultivated on low lands a few years ago, when *mahajans* offered a higher price for it. Now the price for *Mestha* has much fallen off because the fibre is coarse. *Mestha* is generally more lengthy than *Corchorus* and easily stripped and washed.

The cause of inferiority

Now I come to the main point of my enquiry. The inferiority of the Backergunge jute is partly due to the mode of preparation of the fibre, but mainly to the conditions not being favourable for the crop.

Jute is chiefly steeped in four kinds of water; namely :—

- | | | |
|----------------------------------|--|---------------------------------|
| (a) Stagnant <i>bheel</i> water. | \| | (c) Running <i>bheel</i> water. |
| (b) Stagnant river water. | \| | (d) Running river water. |

The *bheel* water is called *kala jal* (black water) and the river water *baga jal* (white water). *Kala jal* is so called because it looks black (*kala*) on account of the absence of silt. *Bheel* water is always clear and looks black. *Baga jal* seems to have been derived from *bag* (stork), which is white in colour. In fact, *baga jal* is light grey, on account of a large admixture of clay carried off by the rivers of the district which are the branches of the Ganges (Padma). It is so called because the raiyats do not generally make any difference between white and light grey colours.

The fibre of the jute steeped in the "black water" gives it a glossy white colour, while the colour of the jute steeped in *baga jal* is grey. The cause is this, as explained above, the *baga jal* contains silts which deposit in the fibre of jute at the time of retting. This silt colours the fibre grey. The stagnant *baga* water, of course, gives jute a better colour because it does not contain much silt. In the case of "black water," whether running or stagnant, the colour of the jute is not affected. The steeping of jute

in running water takes a longer time in retting than in stagnant water. The constant washing of the bundles by running water prevents an earlier decomposition. It is also inconvenient in another point, namely, the bundles within (several bundles are heaped together) ret earlier than the outside bundles. Thus if the retting of the bundles within is complete, the bundles around will remain underretted ; and if the outside bundles are properly retted, the inside bundles will be overdone. Raiyats generally take the heap away when the bundles within are considered to be fit for stripping. The fibre of the bundles around will be sticky and of bad quality. The washing of the fibre after stripping should be made in running water instead of stagnant water, so that the refuse left after washing could be carried off immediately, leaving clean water for washing the remaining fibre.

The jute steeped in clean stagnant water, properly retted and washed in clean running water, is the best. The places having all these advantages are best suited to jute cultivation. The cause of the stickiness in jute in Backergunge and in other districts is mainly due to insufficient retting. Insufficient retting does not clear the gummy matter of the coat of the fibre. Raiyats sometimes prefer insufficient retting where the prices for the superior and inferior qualities are not much different. Sufficient retting causes some loss of the fibre at the top of a plant and washing of the fibre clears every refuse, making the fibre lighter in weight. I have seen in some places in Bhola that the raiyats do not wash the fibre at all in order to make the fibre heavier.

Superior quality of jute is obtained in the *bheel* lands in the Gournadi Police-station, and the medium quality is procurable in the *chars* where jute is steeped in ditch water which is stagnant, although the ditch water becomes sometimes filthy and brownish in colour with decayed

vegetation. The bad quality is seen in all places by the sides of rivers where it is steeped in running *baga jal*. It does not appear to me that brackish water has anything to do with the inferiority of the Backergunge jute ; in fact there is no brackish water during the rains in the jute-growing tracts of Backergunge.

CHAPTER V

RACES OF JUTE IN PABNA

(Written in 1899)



It was observed that there are some particular races which yield fibres of very good quality. Structure of soils and situation of lands have a great deal to do with the quality. The same variety yields fibres of different qualities in different places. Sandy loam is more adapted for the crop than either clay or sandy soil as far as the quality is concerned. Clay soil is said to produce the heaviest outturn. Flood also affects the quality of the fibre. The colour of the fibre depends chiefly on the cleanness of the water of steeping and washing.

The time of flowering has not been mentioned in case of each race. Early races commonly run to flower in August, while the late races in September. The same race flowers at different times at different places, even at the same place if grown under different conditions.

The following races of jute were separated by the author from the mixed plants of several races as cultivated together by the raiyats. The specimens of selected plants of particular races were collected by him during 1899 for the Reporter on Economic Products to the Government of India. They are described as follows :—

No. 1.

Locality.—Serajgunj, Pabna.

Species.—*Corchorus capsularis*; locally called *Desal* (country).

Description.—Stem and leaf-stalk reddish (purplish or pinkish). It flowers in August.

Outturn.—Five maunds per bigha (3 bighas = 1 acre).

No. 2.

Locality.—Serajgunj.

Species.—*Corchorus capsularis*. Called *Desal*, separated from the same field as noted under No. 1.

Description.—Stem light green; leaf-stalk and fruits reddish.

These races of *Desal*, as described under Nos. 1, 2 and 3, are always cultivated together.

No. 3.

Locality.—Serajgunj.

Species.—*Corchorus capsularis*. It is also called *Desal*.

Description.—Stem and leaf-stalk are light green.

No. 4.

Locality.—Serajgunj.

Species.—*Corchorus capsularis*. Locally called *Kakya* or *Bombai* or *Kakya Bombai*. *Bombai* is perhaps so called as this variety is taller than others. The word *Bombai* (Bombay) is used in some places in Lower Bengal to denote some agricultural products which are larger in size. I could not ascertain what they meant by *Kakya*. Probably the name is derived from the word *Kayia*, vulgarly applied, in Bengal, to the Marwaries, who are well-known painstaking traders. Probably the *Kayia* traders introduced this jute into Serajgunj.

Description.—Stems, leaf-stalks and fruits are light green. It flowers about one month later than the *Desal*. It yields, I learnt, more than *Desal* by about 50 per

cent. It also resists water-logging better than the *Desal*. It can grow in water to the depth of 5 or 6 feet, but the *Desal* does not grow in water more than 3 or 4 feet in depth. Its bark is thicker. Fibre is more glossy than that of *Desal*, but the fibre of *Desal* is finer. Raiyats like this variety most, because its fibre is sold at higher prices. Seed of this variety is yearly indented from Assam. It is less branchy than any other race of *C. capsularis*. The raiyats of the village from where the specimens were collected did not like to waste fibre of such quality by allowing the plants to seed. In future the Agricultural Department should indent the seed of this variety from Serajgunj for distribution specially in flooded districts.

Two other races were found in the same field cultivated with the *Kakya Bombai* jute. One of them had reddish stem, while the other had light green stem with reddish petioles. It is later than the *Desal* races; otherwise the mixed *Kakya Bombai* as cultivated would have been the same as *Desal* of the locality. Taking all points into consideration, it resembles the green-stemmed plants of *Hewti* jute of North Bengal.

The difference between *Desal* and *Kakya Bombai* is in the following respects:—

- (a) *Kakya Bombai* thrives better.
- (b) The outturn of *Kakya Bombai* in Serajgunj is 9 maunds, that of the *Desal* is 8 maunds. *Niltea* race (No. 5) yields 7 maunds per bigha when they are all well grown.
- (c) The *Desals* yield much more rooty fibres (adventitious roots) than the *Kakya Bombai*.
- (d) The seed of the *Kakya Bombai* is a little smaller than that of the *Desals*.

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No. 5.

Locality.—Serajgunj.

Species.—*Corchorus capsularis*. Locally called *Nileta*.

Description.—Stems and leaf-stalks are of purple colour. It flowers about a fortnight later than the *Desals*. It grows well on dry land, but can thrive also in water three feet deep. Bark is thinner than that of *Desal*. The colour of the fibre is more glossy than the colours of *Desals* and *Kakya Bombai*; hence it brings higher prices than the others.

No. 6.

Locality.—Serajgunj.

Species.—*Corchorus olitorius*. Locally called *Tosha*.

Description.—Stem, branch and leaf-stalk are of pink colour. It grows taller than the *Desals*. Fibre is coarser and more yellowish; hence it is sold at a lower price. It does not grow in water. It flowers about two months later than the *Desal*. Two seers of the seed of the *Desal* jute are sown per bigha, while *Tosha* seed is sown at the rate of one seer per bigha. The yield of fibre of the *Tosha* jute is somewhat heavier than that of the *Desal*, that is, if the *Desal* produces 8 maunds per bigha, the *Tosha* will produce 10 maunds. It may be however noted that *Tosha* is always cultivated on better soils.

No. 7.

Locality.—Serajgunj.

Species.—*Corchorus olitorius*. Locally called *Bar-pata*, which means long (*bara*), jute (*pata* or *pat*).

RACES OF JUTE IN PABNA

Description.—Stem and leaf-stalk are light green. It flowers about a fortnight earlier than the *Tosha*. The colour of the fibre is yellowish—less yellow than that of *Tosha*. In outturn Nos. 6 and 7 are similar.

No. 8.

Locality.—Serajgunj.

Species.—*Corchorus olitorius*. It is called *Tosha*.

Description.—Stem and leaf-stalk are slightly reddish. These specimens were collected from the field No. 6.

CHAPTER VI

RACES OF JUTE IN MYMENSINGH

(Written in 1899)



MYMENSINGH quality of jute tops all other qualities in the market. Its superiority is chiefly due to the facts that the crops of Mymensingh are extensively cultivated on high lands and steeped and washed in clean water of the old Brahmaputra, but not to any particular race or races cultivated in the district. The following are the descriptions of the typical races separated and collected by us :—

No. 1.

Locality.—Jagannathganj.

Species.—*Corchorus capsularis*. Locally called *Chhoran*, derived from the word *chhota* (small). It is a dwarf and early variety.

Description.—Stem, leaf-stalk and fruits of the typical plants collected are green. It flowers in *Ashar*, and the fruits ripen in *Bhadra* and *Aswin*.

No. 2.

Locality.—Jagannathganj.

Species.—*Corchorus capsularis*. Locally called *Baran*, which means big (*baro*).

Description.—Stem, leaf-stalk and fruits of the typical race are of light green colour. It grows taller than the *Chhoran* variety, hence it is called *Baran*. Flowering and fruiting seasons begin later than the former variety. It

RACES OF JUTE IN MYMENSINGH

produces fewer branches than the other. The outturn of the fibre of this variety is also heavier than that of the *Chhoran* variety.

No. 3.

Locality.—Jagannathganj.

Species.—*Corchorus capsularis*. It is locally called *Kuchmadan* or *Nalpat* (red jute).

Description.—Stem, leaf-stalk and fruits are reddish. The fibres of the former two kinds are said to be better than the fibre of this variety, both in colour and quality. Flowering and fruiting time is the same as that of the *Baran* jute.

No. 4.

Locality.—Jagannathganj.

Species.—*Corchorus capsularis*. Called *Kamarjani*.

Kamarjani is a jute mart in Rangpur. The seed of this variety was perhaps first got from *Kamarjani*, hence it is called *Kamarjani*.

Description.—Stem, leaf-stalk and fruits of the typical plants are light green. It is less branchy and somewhat taller than *Baran*.

It also produces heavier outturn than the typical *Baran* race. It grows very well on dry land. This is one of the best varieties which I recommend for introduction into other districts. Flowering and fruiting seasons commence about one month later.

No. 5.

Locality.—Jagannathganj.

Species.—*Corchorus olitorius*.

Locally it is called by the names of *Nalita*, *Talla*, *Barpata*, *Baran*. All these words mean the same thing, which is tall. *Nalita* from *Nal* (reed). *Talla* derived

perhaps from a kind of bamboo which is called *Talla bans*. Originally this word (*talla*) might have been derived from the word *Taral* (*Tarala*), a Sanskrit word which means liquid (light). This bamboo is much lighter than other bamboos.

Description.—Stem, leaf-stalk and fruits of the typical plants collected are light green. Fruits get ripened in *Kartik* and *Aghran*. Outturn is said to be heavier than that of the former races.

No. 6.

Locality.—Jagannathganj.

Species.—*Corchorus olitorius*.

Local names.—*Nileta*, *Talla*.

Description.—Stem and leaf-stalk of the typical plants are pinkish. It is identical with the former in other respects.

CHAPTER VII

RACES OF JUTE IN DACCA

(Written in 1899)



DACCA is one of the most important jute districts in Bengal. The quality of the Dacca crop, which is produced in the area watered by the old Brahmaputra, is identical with the high grade Mymensingh jute. Specimens of the races of jute which were separated and collected by me for Dr. Watt are described below :—

No. 1.

Locality.—Narsingdi.

Species.—*Corchorus capsularis*.

Local names.—*Dhaleswari*, *Dhalsundar*. Both the words denote white plants.

Description.—Stem, leaf-stalk and fruits are light green. It flowers in July, and fruits ripen in September and October. It is the variety most commonly cultivated in this subdivision (Narayanganj). It is a good variety.

No. 2.

Locality.—Narsingdi.

Species.—*Corchorus capsularis*.

Local name.—*Parbatya*. This name might have been derived from the word *parbat*, a hill. The seed might have first been obtained from some hilly place of Tipperah.

Description.—Stem, leaf-stalk and fruits pinkish; growth luxuriant; outturn heavier than that of the *Dhaleswari*. Fibre is also said to be better in quality and colour.

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No. 3.

Locality.—Narsingdi.

Species.—*Corchorus capsularis*.

Local name.—*Agniswar*, from *agni*=fire. Here it means that it has the colour like fire.

Description.—Stem, branches and fruits all along pink ; leaf-stalk pinkish. Fibre is as good as *Parbatya*. Cultivation has been recently introduced.

No. 4.

Locality.—Narsingdi.

Species.—*Corchorus capsularis*.

Local names.—*Desi*, *Desal*.

Description.—The colour of the stem, branches and leaf-stalk pinkish, like the colour of *Parbatya*. But in growth it is shorter and it ripens somewhat earlier. It is now rarely cultivated.

No. 5.

Locality.—Narsingdi, Dacca.

Species.—*Corchorus olitorius*.

Local name.—*Dewnallya*. Here *Nallya* denotes *Corchorus olitorius*. *Nallya* derived from *nal*, a reed.

Description.—The colour of the stem, leaf-stalk and fruits is light green. It flowers in September. Other particulars are the same as described of *Corchorus olitorius* in other districts.

RACES OF JUTE IN DACCA

No. 6

Locality.—Narsingdi.

Species.—*Corchorus olitorius*.

Local names.—*Bangi, Nallya*.

Description.—Stem pink or light red; branches and leaf-stalk are pinkish. It flowers in September. Fibre more yellow than that of the former.

CHAPTER VIII

RACES OF JUTE IN TIPPERA

(Written in 1899)



TIPPERA comes next to Dacca as a district of high-class jute. *C. olitorius* is hardly cultivated in the district. Typical races of jute of the district are described below :—

No. 1.

Locality.—Chandpur.

Species.—*Corchorus capsularis*.

Local name.—*Bidyasundar*.

Description.—Stem and leaf-stalk are purple. Fruits purplish. It yields the finest and most glossy fibre of this place. Outturn 8 maunds per bigha (standard).

No. 2.

Locality.—Chandpur.

Species.—*Corchorus capsularis*.

Local name.—*Dew Dholi*. *Dew* from *Dev*=a god, and *Dholi*=white. *Dew Dholi* means white like a god.

Description.—Stem, leaf-stalk and fruits light green. It is second to the former as regards quality. But the outturn is somewhat heavier, *i. e.* 10 maunds per standard bigha.

No. 3.

Locality.—Chandpur.

Species.—*Corchorus capsularis*.

RACES OF JUTE IN TIPPERA

Local name.—*Dhalsundar*, meaning white, which is beautiful (*sundar*).

Description.—Main stem light green ; branches and fruits pinkish ; yields heaviest outturn, *i.e.*, 11 maunds per standard bigha. Fibre coarser than that of the *Deew Dholi*.

CHAPTER IX

JUTE IN FARIDPUR

(Written in 1900)



CORCHORUS OLITORIUS is always cultivated in high lands where there will be no flood water. In some places I have found them growing in water only to the depth of a few inches at about the time of harvest. It is sown in *Bysak* (middle of April to the middle of May). The yield per bigha is here about 7 maunds (sometimes 8 maunds). The raiyats are of the opinion that the fibre of *Corchorus olitorius* is stronger than the fibre of *Corchorus capsularis*. The bark of *Corchorus olitorius* is said to be thicker than that of *Corchorus capsularis*. The best fibre is obtained when the plants are just in flower in both the cases. The heaviest yield is obtainable when the fruits of the plants are mature. The *Bagipat* is not generally harvested before it bears fruit. Harvesting begins in *Sravan* (middle of July to middle of August), and continues up to the middle of *Aswin* (the end of September).

There are two methods in stripping jute fibre. They are as follows :—

(1) After the retting is complete, the plants are carried home. A plant is got hold of by the right hand of the stripper, who is generally a woman member of the family. She then pulls off the fibre by her left hand, and the stalk (wood) slides easily away. During this operation of the pulling off the fibre, she keeps her point finger between the fibre and the wood. One skilled woman can strip about 15 seers of dry fibre per diem.

(2) When the plants have retted, the raiyat stands by the retted heap of the plants. He takes up a handful

of the plants which are broken at the distance of about 18 inches from the bottom. The broken pieces of stalks are then thrown away. He now takes hold of the separated fibre at the bottom by both the hands, and pushes the plants up and down. After five or six pushes the fibre is cleared off. By this method one hard-working man can strip about 20 seers of fibre per diem.

In Faridpur both the methods are in vogue. In Madaripur and Sadar subdivisions, jute is stripped in the method (1) and in Goalundo in the method (2).

Deep, clear and stagnant water is preferred for steeping jute. They do not like to steep in running water, where it takes a longer time for retting.

Note on Commercial Specimens of Madaripur Jute

At the Madaripur market there are four kinds of jute, *viz.*—

- | | | |
|---------------------|--|------------------------|
| (1) <i>Charua</i>, | \| | (3) <i>Bilan</i> , and |
| (2) <i>Bagi</i>, | \| | (4) <i>Puban</i> . |

(1) *Charua* belongs to the species *Corchorus capsularis*. It is grown on *char* lands on the sides of the rivers Padma and Arealkhan. Water to the depth of about two cubits accumulates on such lands during the months of *Sravan* and *Bhadra*.

The soil of these places may be described as a loam inclined to be sandy. These parts produce the best jute grown in the Subdivision. It is steeped in deep stagnant river water. It is available in the market from *Sravan* to *Bhadra*. It was sold at the time of my visit at Rs. 4-8 per maund. This good quality of the fibre is said to be due to the soils where it is grown.

(2) *Bagipat* (*Corchorus olitorius*).—It is grown on high lands and steeped in stagnant *bheel* water. Available in the market from *Bhadra* to *Aswin*. It is well known to the merchants that it is coarser than *Corchorus capsularis*,

but its rope is said to be stronger than that made of the latter. Price was at Rs. 4-7 per maund. Soil on which it is grown is generally sandy loam. Out of the total quantity of jute available at the market of Madaripur, *Bagipat* shares only about 12 per cent.

(3) *Bilan* (belonging to *bheel*) belongs to the species *Corchorus capsularis*. Grown in *bheel* lands where water accumulates to the depth of about three cubits. All the varieties that are cultivated on low lands do not thrive much after inundation. It is steeped in stagnant *bheel* water. This quality of jute is available in the market from *Ashar* to *Aswin*. Price Rs. 4-4 per maund. Soil on which it is grown is clayey.

(4) *Puban (eastern)*.—It is grown on *char* lands. Soil is similar to that on which *charua* is grown. It is steeped in shallow running river water (depth only $2\frac{1}{2}$ cubits). The mud of the river water deposits on the fibre during the time of retting which spoils the colour of the fibre. It was sold at Rs. 3-12 only per maund. It is available in the market from *Sravan* to *Bhadra*.

Note on Commercial Specimens of Pangsa Jute

The following sorts of jute are sold at the Pangsa market :—

- | | | |
|------------------------|--|--------------------------|
| (1) <i>Pangsa</i>, | \| | (3) <i>Padma paira</i> , |
| (2) <i>Charua</i>, | \| | (4) <i>Dakhina</i> , and |
| (5) <i>Faridpuri</i> . | | |

(1) The *Pangsa* quality of jute is brought for sale to Pangsa from surrounding places. It is sold in the market from the middle of *Sravan* to *Kartik*. This sort of jute is cultivated on high lands which are composed of loamy soil. Steeped in clear water. The price was Rs. 3-5 per maund (1 seer=60 tolas). There is not less

than 10 per cent. moisture, generally 30 per cent., in the fibres which are sold at this market. It belongs mostly to the species *Corchorus capsularis*.

(2) *Charua* is grown on *char* lands composed of a loam inclined to sands. It is steeped in stagnant river water slightly muddy. Available in the market from the middle of *Sravan* to *Kartik*. Price was Rs. 3-6 per maund. Generally the *Pangsa* and *Charua* are mixed together and sent to Calcutta for sale.

(3) *Padma paira* is a sort of jute which comes from the other side of the river Padma (*e. g.*, Pabna). It is grown on *bheel* lands composed of clayey soil. It is more or less sticky and reddish. It is available in the market from *Bhadra* to *Kartik*. Price Rs. 3-4 per maund.

(4) *Dakhina*.—This sort of jute comes from the Balliakandi police-station. It is grown on *bheel* lands composed of clayey soil. It is steeped in stagnant clear water. Fibre is sticky. Available in the market from *Bhadra* to *Kartik*. Price Rs. 3-4 per maund.

(5) *Faridpuri* sort of jute is brought from places in the police-stations of Ainpur and Bhanga. It is grown on *bheel* lands composed of heavy clay. The water in which it is steeped is more or less clear. Fibre is very sticky. Available in the market from *Sravan* to *Aswin*. Price Rs. 3 per maund.

Sometimes the localities where jute of good quality is obtained produce bad quality owing to the following reasons :—

Jute is sown from *Chaitra* to *Jaistha*. During the period of growth occasional showers of rain at intervals of about eight days are required for producing good quality, but heavy rains during this period (when the plants are young) are injurious. Hairy larvæ, locally

called *salkit*, also attack the plants if there be heavy rains; the plants become more branchy than usual, and yield sticky harsh fibre.

Best fibre is obtained from the plants which are harvested just in flowers. Early flood is therefore wanted by raiyats for harvesting (*e. g.*, steeping) just in time.

Samples from Nos. 1 to 8 were separated and collected in Madaripur, on the 11th and the 12th September, 1900.

Races in Madaripur.

No. 1.

Species.—*Corchorus capsularis*.

Local name.—*Sutpat*.

Description.—Colour of the stem and leaf-stalk is pinkish. It flowers in the latter part of July. This variety is commonly cultivated in this part of the district because it can thrive well in deep water (not exceeding 3 cubits in depth). Fibre is generally sticky at the bottom. About 5 maunds of fibre is obtained from one bigha of land. It grows in deep water.

No. 2.

Locality.—Habiganj, Madaripur.

Species.—*Corchorus capsularis*.

Local names.—*Desal* (country), *Peti* (small).

Description.—Stem light green when young. Branches, leaf-stalk and fruits are of reddish colour similar to No. 1. It is being cultivated here for a long time. It is more branchy than other varieties. Grows in water to the depth of 5 feet. Yields 6 or 7 maunds per local bigha (.60 × 60 yards).

JUTE IN FARIDPUR

No. 3.

Locality.—Habiganj, Madaripur.

Species.—*Corchorus capsularis*.

Local name.—*Udhop* (meaning perhaps white = *dhop*).

Description.—Stem, leaf-stalk and fruits light green. Fruits larger than those of the *Desals*. Outturn 7 maunds per bigha (local).

No. 4.

Species.—*Corchorus capsularis*.

Local name.—*Cowpla pat*.

Description.—All parts of the plant are light green in colour. It flowers in the latter part of July. It is grown on both high and low lands. Outturn is about 5 maunds per bigha, but the quality of the fibre is said to be better than that of *Sutpat*.

No. 5.

Species.—*Corchorus capsularis*.

Local name.—*Lali* or *Ranga pat*.

Description.—The colour of the stem and the leaf-stalk is purple. Grown in both high and low lands. It flowers about a fortnight earlier than the races 3 and 4 mentioned above. Fibre is said to be finer but less in quantity.

No. 6.

Species.—*Corchorus capsularis*.

Local name.—*Belgachi*.

This race has been newly introduced.

Description.—Stem, leaf-stalk and fruits are pinkish or reddish. It flowers in the latter part of July. Fibre is better than that of the *Sutpat*, both in quality and quantity.

Retting is finished in much shorter time. In June it takes only 10 days for retting, while *Desal* or *Sutpat* takes 15 days. In September it takes 15 days.

No. 7.

Species.—*Corchorus olitorius*.

Local name.—*Bagi*.

Description.—All parts of the plant are light green in colour. Generally sown in May. Outturn 8 maunds per local bigha (one bigha = 120×120 cubits = $\frac{3}{4}$ acre).

No. 8.

Species.—*Corchorus olitorius*.

Local names.—*Lal*, *Nal* or *Rangabagi*.

Description.—All parts of the plant are pink in colour. No distinction is made between these two races of *Corchorus olitorius*. Regarding the cultivation, yield and quality, they are identical.

The following 9 races were collected from Pangsa, the principal jute market in the Goalundo subdivision in Faridpur, on the 15th and 16th September :—

Races in Gualundo.

No. 9.

Species.—*Corchorus olitorius*.

Local names.—*Satnala*, *Barpata*, *Dhamraj*.

Description.—Stem, leaves and pods are all light green in colour. Sown in *Chaitra* and *Bysak* on high lands.

JUTE IN FARIDPUR

Seed sown, 1 seer (60 tolas) per *pakhi*. Flowers in *Bhadra*. Outturn per *pakhi* is 6 maunds to 7 maunds (1 *pakhi* = 10×12 *nals*, and 1 *nal* = $6\frac{1}{2}$ cubits = .8 standard Bengal bigha). Harvested in *Bhadra*. It takes 12 days for retting.

No. 10.

Species.—*Corchorus olitorius*.

Local name.—*Meghnal*. It is also called *Bar pata* in some places.

Description.—Stems and leaf-stalks are of pink colour. Sown in *Chaitra* and *Bysak* at the rate of 1 seer (60 tolas) per *pakhi*. Flowers in the latter part of *Sraavan*. Outturn per *pakhi* is about 6 maunds. The plants are a little shorter than the former. Harvested in *Bhadra*. It takes 12 days for retting. *Corchorus olitorius* grows always taller than *Corchorus capsularis*.

No. 11.

Species.—*Corchorus capsularis*.

Local name.—*Dhaleswari*.

Description.—Stem, leaf-stalk and fruits are reddish in colour when old. It is sown in *Chaitra* and *Bysak* at the rate of 2 seers of seed per *pakhi*. Flowers early in *Sraavan*. The bark is thinner than that of *Corchorus olitorius*. It may be grown on both high and low lands. Water accumulated on the low lands should not be more than $1\frac{1}{2}$ cubits in depth. It takes about 15 days for retting.

Outturn.—Four to $4\frac{1}{2}$ maunds per *pakhi*.

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No. 12.

Species.—*Corchorus capsularis*.

Local name.—*Amunia*.

Description.—Stem, leaf-stalk and pods are light green in colour, and it does not branch much. Sown on high lands in *Chaitra* and *Bysak*. Two seers of seed are required for one *pakhi*. Flowers in the latter part of *Bhadra*.

Outturn.—Six maunds per *pakhi*.

It takes about 12 days for retting. The fibre of this variety is the finest of all grown in this part of the district.

No. 13.

Species.—*Corchorus capsularis*.

Local name.—*Shani*; also called *Desal*, *Sodu* and *Kuch mardan*.

Description.—Stem, leaf-stalk and pods are reddish. Sown in *Chaitra* and *Bysak* on both high and low lands. Water on the lands here stands to the depth of about 3 to 3½ cubits. Seed 2 seers (1 seer = 60 tolas) per *pakhi*. Flowers early in *Ashar*.

Outturn.—Three to 3½ maunds of fibre per *pakhi*.

It takes about one month for retting.

This race is being cultivated in this place for a long time. Fibre is always sticky at the bottom. Plants are very strong and much branchy. Stripping is very difficult. Its cultivation is dying out.

JUTE IN FARIDPUR

No. 14.

Species.—*Corchorus capsularis*.

Local name.—*Dhapa*.

Description.—Stem, leaf-stalk and pods are reddish, identical with the former, but flowers in *Bhadra*.

No. 15.

Species.—*Corchorus capsularis*.

Local name.—*Meghnal* (see No. 10).

Description.—Stem and leaf-stalk are of purple colour. Sown generally on low lands where water accumulates to the depth of about 2 cubits. One and three-quarters of a seer (60 tolas = 1 seer) of seed required for one *pakhi*. Flowers in early *Bhadra*. It takes about 15 days for retting.

Outturn.—About 5 maunds per *pakhi*.

No. 16.

Species.—*Corchorus capsularis*.

Local name.—*Kamarjani* (1). It is also called *Parbatya*.

Description.—Stem, leaf-stalk and pods are light green in colour. Sown generally on low lands in *Chaitra* and *Bysak*. Water may accumulate there to the depth of about $2\frac{1}{2}$ cubits. Two seers of seed (60 tolas = 1 seer) are sown per *pakhi*. Flowers in the latter part of *Sravan*. It takes about 20 days for retting.

Outturn.—Five maunds per *pakhi*.

Leaves of this race are used here as a favourite pot-herb.

RESEARCH WORK

No. 17.

Species.—*Corchorus capsularis*.

Local name.—*Kamarjani* (2).

Description.—Stem and leaf-stalk are reddish. Sown together with No. 16.

Seed.—2 seers per *pakhi*. Flowers in the latter part of *Sravan*.

No. 18.

Locality.—Goalundo.

Species.—*Corchorus capsularis*.

Local name.—*Ghagri*. Could not trace why it is called *Ghagri*.

Description.—The colour of the stem, leaf-stalk and fruits is light green. Flowers in July; fruits ripen in September.

No. 19.

Locality.—Goalundo.

Species.—*Corchorus capsularis*.

Local names.—*Ghagri*, *Desal*.

Description.—The colour of the stem is light green, and that of the branches, leaf-stalk and fruits is reddish. Fruits a little smaller than those of the *Ghagri*, No. 18.

No. 20.

Locality.—Goalundo.

Species.—*Corchorus capsularis*.

JUTE IN FARIDPUR

Local names.—*Lalpat* (red jute), *Kajla* (black), *Meghnal* (*Megh*=cloud, and *Nal*=red, *i.e.*, a colour mixed of blue and red).

Description.—Stem, branches and leaf-stalk are pink; a tinge of violet colour on the fruits. Flowering season commences about 15 days later than that of *Ghagri*. It is less branchy than the two *Ghagris*. As a pot-herb the leaves of this race are said to be better than the leaves of the other races.

No. 21.

Locality.—Goalundo.

Species.—*Corchorus olitorius*.

Local name.—*Bomi* (from *Bangi* or *Bagi*).

Description.—The colour of the stem and leaf-stalk is light green. It flowers in July. It does not grow as tall as *Satnala*, which is also a light green variety flowering later.

No. 22.

Locality.—Goalundo.

Species.—*Corchorus capsularis*.

Local name.—*Kamarjani*.

Description.—Stem, leaf-stalk and fruits are similar to No. 17. Fibre is more glossy than that of the *Ghagris*. It is one of the best varieties, recommended for introduction into other districts where it is not cultivated.

No. 23.

Locality.—Goalundo.

Species.—*Corchorus capsularis*.

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Local name.—*Dhupri* (perhaps from Dhubri in Assam). A new race just introduced.

Description.—Stem light green. Leaf-stalk and fruits are slightly reddish. Growth is more vigorous than that of other varieties of *Corchorus capsularis*. Flowering time begins some 15 days later than that of *Ghagri*.

CHAPTER X

RACES OF JUTE IN RANGPUR

(Written in 1900)



RANGPUR is the most important jute district in North Bengal. *C. capsularis* is commonly cultivated, hence it is called *Jati-pat*, meaning true jute. *C. olitorius* is scarcely met with in the district. North Bengal jute is fine in texture, as it is the product of high lands, but the general practice of over-steeping harms the quality to a certain extent.

Numerous names of jute by which the same races are denoted in different parts in East Bengal—nay in the same villages—are conspicuously diminished in the northern districts. The races are divided into two classes, *vis.*, *Ausa* or *Bhadoya* (early) and *Hewta* (late). Each of the classes comprises of various races. The *Ausa* and *Hewta* races are, of course, cultivated separately. The *Ausa* races are preferred.

The following are the typical races of jute grown in Rangpur :—

No. 1.

Species.—*Corchorus olitorius*.

Local name.—*Parbati Madai*.

Description.—Stem and leaf-stalk are reddish in colour. There is another race under the same name of *Parbati pat*, the stem and leaf-stalk of which are light green. They are grown together.

Corchorus olitorius is sown during the months from *Falgun* to *Bysak*. In some places it is sown only in *Bysak*.

RESEARCH WORK

It grows on high lands only. One seer (1 seer = 90 tolas) of seed is required for 1 *done* (1 *done* = 13 standard cottâhs).

Soil.—Sandy loam.

Outturn.—Four maunds to five maunds fibre per *done*.

Flowering season.—Latter part of *Aswin*.

It is harvested when the plants are in flowers. In the case of urgency, it is harvested just before the flowering time, but the yield per *done* would be only 3 maunds instead of 4 maunds.

Ten to 15 days are required for retting.

It is said to be stronger but coarser than *Corchorus capsularis* jute.

It is only cultivated for home consumption, which may be roughly estimated at 3.5 per cent.

The price of the fibre of *Corchorus olitorius* is about 50 per cent. less than that of *Corchorus capsularis*.

No. 2.

Species.—*Corchorus capsularis*. (*Capsularis* is commonly called here *Jati-pat*.)

Local name.—*Ausa* (white). *Ausa* is a crop which is harvested earlier than the *Hewta* jute, from the word *Hementa*, the autumn season.

Description.—Stem is light green, but branches and leaf-stalk are reddish. Sown from *Falgun* to *Bysak*. Seed—one seer per *done*.

Soil.—Both high and low lands; they prefer clayey soil, which is nothing but a loam.

Flowering season.—Latter part of *Sravan*.

Harvested in flowers and also in fruits.

Outturn.—Four maunds per *done*.

RACES OF JUTE IN RANGPUR

No. 3.

Species.—*Corchorus capsularis*.

Local name.—*Ausa* (red). Also called in some places *Meghnal*.

Description.—Stem, leaf-stalk and fruits are purple in colour. In other respects than its yield of fibre, which is said to be a little less, *e. g.*, about $3\frac{1}{2}$ maunds per *done* instead of 4 maunds, it is similar to No. 2.

No. 4.

Species.—*Corchorus capsularis*.

Local name.—*Hewta* (red), in some places *Meghnal*.

Description.—The colour of stem, etc., is reddish.

Sowing time.—*Falgun* to *Bysak*.

Flowering time.—Latter part of *Bhadra*.

Regarding the outturn, the opinion of some raiyats is that the *Hewta* variety yields heavier than the *Ausa* variety (about half a maund heavier per *done*); but others are of the opinion that the yields of the *Ausa* and the *Hewta* varieties are nearly equal. Some raiyats stated that the fibre of the *Hewta* races is more glossy than that of *Ausa*.

Regarding soil, cultivation, etc., it is similar to those of *Ausa* races.

No. 5.

Species.—*Corchorus capsularis*

Local name — *Hewta* (white).

Description.—Stem and leaf-stalk are light green in colour. In other respects it is similar to the variety No. 4.

Hewta (red). But it is stated that a white-stemmed variety yields a little heavier outturn than any of the red-stemmed races. The red-stemmed races are however said to produce finer fibre.

In Rangpur the raiyats prefer running water for steeping jute, because this water carries away all dirty substances from the heap of plants, although they are aware that it takes a longer time for retting. Best colour of the fibre is said to be produced if retted in such water. Jute is stripped in this district in the method No. 2 described in Chapter IX, under this Part of the Book.

CHAPTER XI

RACES OF JUTE IN JALPAIGUR!

(Written in 1900)



JUTE is grown on high lands containing sandy loam.

Two seers of seed are sown per *done* (1 *done* is nearly equal to 1 standard bigha).

It is sown from the 15th of *Chaitra* to the 15th of *Bysak* (i.e., April) and harvested when the plants are in flowers or in fruits. The raiyats are of the opinion that the harvesting operation of the plants in flowers is easier and less expensive, while the plants harvested in fruits produce a little heavier outturn of fibre. In stagnant water retting is complete within a fortnight, while in running water it takes about a month. Still, running water is preferred because it gives good colour to the fibre.

Yield is said to be only 3 maunds per *done*.

No. 1.

Locality.—Alipur Duars.

Species.—*Corchorus capsularis*.

Local name.—*Betre* (white).

Description.—All parts of the plant are light green in colour. It flowers early in *Sraavan*.

No. 2.

Locality.—Alipur Duars.

Species.—*Corchorus capsularis*

Local name.—*Betre*.

RESEARCH WORK

Description.—Stem is of light green colour, but branches and leaf-stalks are slightly reddish.

No. 3.

Locality.—Alipur Duars.

Species.—*Corchorus capsularis*.

Local name.—*Betre* (red). It is also called *Parbatya*.

Description.—Stem and leaf-stalk are of purple colour. These three races under the name of *Betre* are always cultivated together in a mixture.

No. 4.

Locality.—Alipur Duars.

Species.—*Corchorus capsularis*.

Local name.—*Hewti*.

Description.—All parts are light green. It flowers in *Aswin*. Fibre is said to be finer than that of the *Betre*. Extracting of fibre of the *Hewti* races is considered to be easier because *Hewti* is less branchy than the *Betre*. In other respects it is similar to *Betre*. Under the name of *Hewti*, there are also red-stemmed races cultivated as usual in a mixture.

Corchorus olitorius is not cultivated in the Alipur Subdivision.

No. 5.

Locality.—Jalpaiguri.

Species.—*Corchorus capsularis*.

Local name.—*Bhadoya* (early).

Description.—Stem is light green, but leaf-stalk and fruits are slightly reddish. Sown in the months of *Chaitra*

RACES OF JUTE IN JALPAIGURI

and *Bysak* on both high and low lands which are composed of sandy loam. It flowers early in *Sravan* and harvested when the plants are in flowers or in fruits.

Outturn.—Four maunds per *done*.

No. 6.

Locality.—Jalpaiguri.

Species.—*Corchorus capsularis*.

Local name.—*Bhadoya* (early).

Description.—All parts are of purple colour. *Lal pata* (red jute) is said to be better in colour and quality than the *sada pata* (white jute). In other respects it is similar to variety No. 5.

No. 7.

Locality.—Jalpaiguri.

Species.—*Corchorus capsularis*.

Local name.—*Hewti* (late).

Description.—All parts of the plant are light green. It flowers early in *Bhadra*. It is a late variety. The early varieties (Nos. 4 and 5) are said to yield better and heavier fibre. The bark of the plant of this variety is said to be thinner than that of the early varieties. In other respects they are similar. Early varieties take 15 days for retting, while late varieties take 20 days.

No. 8.

Locality.—Jalpaiguri.

Species.—*Corchorus capsularis*.

Local name.—*Hewti* (late).

Description.—Stem, leaf-stalk and fruits are of purple colour.

No. 9.

Locality.—Jalpaiguri.

Species.—*Corchorus capsularis*.

Local name.—*Hewti* (late).

Description.—Stem, leaf-stalk, etc., are of slightly purple colour or reddish,

No. 10.

Locality.—Jalpaiguri.

Species.—*Corchorus olitorius*.

Local names.—*Marua pato*, *Bomochak*.

Description.—Stems and leaf-stalks are of pink colour. It flowers early in *Bhadra*. It is cultivated on a very small scale, usually for using the leaves as a pot-herb. It is stated that dried leaves of *Corchorus capsularis* are more efficacious for medicinal purposes. The leaves of *Corchorus olitorius* are not so bitter to taste as those of *C capsularis*, hence it is more palatable.

The fibre of this species is never available in the markets.

In Jalpaiguri, jute is stripped in the method No. 2 described already.

CHAPTER XII

JUTE IN PURNEA

(Published in 1917 in the Agricultural Journal of the
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Area.



PURNEA is the most important jute-growing district in the Province of Bihar and Orissa. According to the last Jute Forecast Report of 1916, the area under jute in Purnea was estimated at 197,027 acres. In 1915 the area under jute was reported to be 158,830 acres, while it was 281,220 acres in 1914. The heavy decrease in acreage in 1915 was due to the low prices obtained in 1914 after the outbreak of the great European War. On account of the rise in the price in 1915 there is an increase in the area this year, although not yet to the normal acreage. On an average the normal area under jute in Purnea is estimated at about 240,000 acres, that is, about 14 per cent. of the total cultivated area. Since 1914 the returns of the area under jute have been prepared by the Panchayats under the supervision of special Jute Officers. This area under jute includes about 6,000 or 7,000 acres under *Hibiscus Cannabinus*, called *Amla patua*, cultivated in the Sadar Subdivision.

Soil

The soil of the district, excepting a small tract of old alluvium about a mile long and a half mile wide near the Monihari Railway Station, is new alluvium, mostly of light character. Heavy clay soil is met only in the *bheel* tracts in the Sadar Subdivision. The new alluvial soils are most suitable for the cultivation of jute. The *bheel* tracts are overflowed each year just after the break

of the monsoon. Jute is sown early in these tracts and harvested in the beginning of the rainy season, before the crop is properly matured for cutting. By the middle of July about three-fourths of the crop in such tracts situated chiefly in Barsoi and Kadwa thanas are harvested. The high land jute in other parts of the district is of a superior quality. Jute is very much affected by water-logging when it is young. Although the plants of *C. capsularis* can bear water-logging admirably after they are in flowers, water-logging is always harmful to the quality of the fibre.

Rainfall

The rainfall of the district during the growing period, that is, from March to August, averages 50 inches. This is quite sufficient for the crop, but sometimes heavy abnormal falls are received in July and August which cause great damage. For sowing, from 1 to 2 inches of rain are necessary for the preparation of the soil. After a fortnight, 1 to 2 inches of rain each week would be very favourable. Rain is necessary within a fortnight after sowing, otherwise the plants will begin to wither up. Heavy falls of rain, 4 to 5 inches at a time, within two months from the date of sowing will also damage the plants, and also interfere with weeding.

Rotation

As a rule, jute is sown on the same land, year after year, by the cultivators of small holdings. Well-off cultivators would sow paddy and jute in alternate years on the same plot. They know that jute will grow very well on the land after a lapse of 2 or 3 years. Jute is followed commonly by mustard in the *Rabi* season in the same year. Sometimes wheat, barley, pulses, also *San* hemp follow jute. Transplantation of paddy in the same land just after cutting jute is a common practice in the district. This is certainly an exhausting system

of cultivation, especially where no artificial manure is applied. The value of sowing *San* hemp previous to the cultivation of jute is well known in the district. The *Rabi* crops, which are harvested late in February or in March, should never be sown on the lands intended for the jute crop, as it interferes with the preparation of the soil. An ordinary raiyat who has only a limited area will, however, cultivate jute on the same land, year after year, knowing fully that it will give him a poor outturn.

Manuring

Jute land is hardly manured in the district. The farmyard manure of a cultivator is reserved for tobacco only. It is known to the cultivator that cowdung is very good for jute, but he cannot afford to apply it to the crop after his tobacco field has been manured with it. It has been found that the field manured with about 8 or 9 cart-loads of cowdung (about 6,000 pounds) would increase the yield by about 30 per cent. The next best manure for jute is castor-oil cake, which should be applied at the rate of about 480 lbs. per acre. Castor-oil cake is as yet unknown in the district. The cost of 6,000 pounds (75 maunds) of cowdung would not be more than Rs. 4 or 5 if available for sale, while the castor cake at the rate of 480 lbs. to the acre would cost at least Rs. 12. Cowdung is therefore cheaper when obtainable.

The cultivation of the land for sowing jute begins from February after cutting mustard or paddy after a shower of rain. About six ploughings and cross-ploughings followed by *henga** are necessary to have a fine tilth of the soil. The seed will not germinate properly on a rough soil not properly cultivated. In the low-lying lands sowing is finished in March, but on the high lands it extends up to the end of May. Early sowing is safer. The jute sown

* A *henga* is a wooden beam used for crushing clods and levelling the field.

late in May, this year (1916), was greatly damaged, if not altogether lost, in most places, on account of the early break of the monsoon, on the 8th June. Sowing should be finished by the middle of May. Seed rate per acre in the district varies between 10 and 12 lbs. ; but 9 pounds of seed would be quite sufficient. The seed is sown broadcast over the cultivated field after a harrowing is given. Another harrowing covers the seed. If there is sufficient moisture in the field, the seed germinates in 3 or 4 days. After the plants grow 5 or 6 inches high, 2 *bidas* (rakings) at intervals of a week are given for stirring the soil as well as for thinning out the crowded seedlings. Afterwards the field is weeded once or twice before the rains set in. At the time of weeding the plants are again so thinned as to keep a space of about 6 inches apart by the more intelligent cultivators. Some raiyats do not pay sufficient attention to thinning, allowing a space of about 4 inches only. In such cases the plants become thin and weak, yielding a poor outturn. In some parts of the district the raiyats will not take the trouble of removing the weeds from the field, but heap them at intervals thereon. This practice causes considerable gaps in the fields and thereby the raiyats lose some fibre unnecessarily. These heaps of uprooted weeds also become a source of future trouble from insect pests.

The plants grown on well-prepared and manured fields and treated properly afterwards will often grow to as much as 12 feet in height. On the average the plants of the district are 7 to 9 feet long. The longer the plants the higher will be the outturn of the fibre. Good soil and proper cultivation are, of course, essential for the success of the jute crop.

Varieties or Races

Corchorus capsularis is principally cultivated in the district of Purnea. It is known by the names of *Bhadoya*

and *Amonia Patua*, of which *Bhadoya* (early jute) is most common, while *Amonia* (late jute) is cultivated to a very limited extent. There are principally three colours in the stems of the jute plants in both the early and late races, accordingly they are grouped as :—

- (i) Green-stemmed plant called *safed* or *ujra Patua*.
- (ii) Pinkish-stemmed plant named *Meghnal*.
- (iii) Purple-stemmed plant named also *Meghnal*.

Plants of all these three colours are found in mixture in one field. Regarding the yields some raiyats say that *safed Patua* is superior to the *Meghnal*, while others hold a contrary opinion. However, the plants of the *safed* races cultivated in the district are usually more branched than the plants of the *Meghnal* races, so it is easier to strip the fibre from the *Meghnal* jute. Anyhow, about 75 per cent. of the jute plants of Purnea belongs to the *safed* race.

Occasionally *C. olitorius*, known as *Mooniashi patua*, is cultivated in the homestead lands as a pot-herb and not usually as a fibre crop. The lands of the district are more or less subject to inundation and are not suitable for this jute. It cannot bear water-logging to any extent. Hence it is not possible to introduce this jute into this district. For the last two years the *Kakra Bombai* jute of Bengal of the *Capsularis* species has been cultivated experimentally in some places. It has done well—better than the local varieties—but it is a late-maturing race, being harvested about a month later. Most of the raiyats want to transplant paddy on the same land after cutting jute in July, so they must have an early race to sow. However, there are also high lands, which are unsuitable for transplanted paddy, suitable for this late jute. Undoubtedly *Kakra Bombai* is superior to the local races of jute in yield. Those who wish to cultivate the crop on a large scale should cultivate both early and late varieties, so

that the time of harvesting might be extended considerably. It would not be possible for them to manage the harvesting of all the fields at the same time if only the early or late races be cultivated. Such cultivators should introduce the *Kakra Bombai* jute.

The fibre of *Hibiscus cannabinus* is sold as jute in the district. This fibre is a little coarser than the jute, but it is not easy to separate this fibre from the jute if mixed together. There is a considerable area under *Hibiscus* in this district.

Cutting

Cutting of jute begins from the beginning of July and continues till the end of September. As soon as the flowers appear, the plants are considered to be fit for cutting. The raiyats have to wait, however, till the neighbouring tanks or pools are filled with the rain or flood water, in order to steep the crop within an easy reach. If steeping water is not available in the neighbourhood of the fields, the cutting is usually delayed. The jute cut in flower is considered to be the best in quality, but it is known to give a high yield if it is cut later on. Jute is hardly ever cut at the stage when the fruits of the plants are ripe, as it is very difficult to separate the fibre. In Kissenganj and elsewhere, where paddy is transplanted in the same field in the same season, the cutting is finished by the middle of August at the latest.

The plants are cut to the ground with a sickle and then stacked in rows, covering one layer with another. The object of this is to remove as many leaves as possible. If the plants are steeped immediately after cutting, the leaves are said to discolour the fibre. In low lands, where the fields are overflooded, this shedding is not done. After two or three days the leaves shed and the plants are made into bundles and carried to the nearest pools

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or ditches for steeping and retting. The ditch or pool water is commonly muddy. This discolours the fibre to some extent.

Steeping or Retting

The bundles are stacked in water one layer over another, two or three layers in a stack which is about 10 or 12 feet square in size. This stack is commonly covered over with water weeds. The plants take 10 to 20 days to ret. If the plants are cut in the latter period of the season, it may take even a month for retting. In hot temperature the retting is quick. The plants, cut in flower, take a shorter time than the plants in fruit. After a week or so, the plants of the stack should be frequently examined, in order to ascertain whether they were fit for stripping, as over-retting spoils the quality of the fibre, which gets weak, loses its gloss, and does not fetch a good price.

Stripping and Washing

Separating the fibre from the stem after the retting process is complete must be finished within a couple of days. The stripper stands in about 2 feet deep water of the ditch or pool by the side of the bundles of the stack which are taken there if they were steeped in deep water. He takes a handful (*muthha*) of the stems and beats the bottom of the stems with a wooden flat *hata*, resembling a dairy hand, about 8 inches in length and 4 inches in width, having a round holder at the bottom 4 inches long. After a few beatings with this *hata* the fibre of the stems at the bottom becomes loose. The stems are then broken off about 1 foot from the bottom. The separated fibre is then taken in by both hands and the stems are pushed forward and backward on the surface of the water. After a few jerks the fibre is cleared off the

stalks. A skilled man can strip about 20 seers (40 lbs.) of fibre in a day, working 6 hours. An untrained man, however, cannot strip more than 10 seers (20 lbs.) of fibre. After separating the fibre from the stalks the stripper washes the fibre by pulling the fibre right and left in the same water. The colour of the fibre would be greatly improved if it were washed in clean water afterwards. The cultivators, however, will seldom take the trouble of carrying the fibre to any other place for washing. The colour of the jute of this district is, in consequence, blackish, owing to steeping in muddy ditch water. After washing, the fibre is carried home and dried in the sun over bamboo poles. It becomes dry in two or three days, after which the fibre is bundled and is ready for the market.

Outturn

The average outturn of jute of the district is estimated at 15 maunds (1,230 lbs.) per acre, if weather conditions are favourable.

Trade

There are two principal classes of jute in the district, *viz.*, long and short. The jute which is over 8 feet in length is considered as long jute, while the jute shorter than 8 feet is called short jute. About two-thirds of the jute of the district are long jute and the remaining portion is short jute. It is of blackish colour. The jute of the inundated low-lying tracts of the district is barky at the bottom. The jute imported from Nepal, called *Morang* jute, is the best fibre on the market, as it is long and barkless. Between 3 and 4 lakhs of maunds of jute are imported into the district from Nepal annually.

Commonly jute is sold by the raiyats at their own places to the middlemen known as *beparies*, who take the

fibre to the markets to sell to the *goladars*. Almost every *goladar* has a hand power press, with which he presses the jute into bales. These are called the *katcha* bales of the trade and weigh 100 or 280 lbs. each. Reliable *goladars* press the long and short jute separately. The bales are sent to Calcutta. The chief jute markets in the district are Kissenganj, Forbesganj, Kasba, and Barsoi. At Kissenganj about 8 lakhs of maunds,* at Forbesganj about 6 lakhs of maunds, at Kasba or Barsoi about 3 lakhs of maunds of jute are sold, if the yield of the district is normal.

Besides the above-mentioned important markets, every railway station is also a jute market of more or less importance.

The local weights are different at different places. From 60 to 90 tolas make a seer. In most places 90 tolas are taken for a seer. One English pound is equivalent to 41 tolas, or roughly 40 tolas make a pound. Forty seers, either of 60 tolas or 90 tolas, make a maund.

Preservation of Seed

There is no one in the district who cultivates jute for the seed for sale. The cultivator usually keeps for seed a portion of a plot of jute of stunted growth which is estimated to be sufficient for his own cultivation. An acre of land produces about 9 maunds to 10 maunds of seed.

Costs

The costs for the cultivation of an acre of land under jute in Purnea, if calculated, would amount to about Rs. 65. The cultivators never keep any account to show their actual expenses for the cultivation. However, a table

* One lakh = 100,000. One standard maund = approximately 82¼ lbs.

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showing estimated costs for one acre of land is given below :—

	Rs.	As.	P.
8 ploughings (1 ploughing requires 3 ploughs) at 2 ploughs for a rupee...	12	0	0
5 seers (10 lbs.) of seed ...	1	4	0
2 <i>bidas</i> for raking and thinning ...	1	0	0
1st weeding, 24 men, at annas 6 per head ...	9	0	0
2nd weeding, 12 men, at annas 6 per head ...	4	8	0
Cutting and steeping, 24 men, at annas 6 per head ...	9	0	0
Stripping and washing at Re. 1-8 per maund, taking 15 maunds as the outturn ...	22	8	0
Rent ...	6	0	0
TOTAL ...	65	4	0

Profit

The average price of one maund of jute (82 lbs.) may be calculated at Rs. 8 per maund, and the average yield at 15 maunds per acre. Thus the price of 15 maunds of jute at Rs. 8 per maund comes to Rs. 120. Net profit, after deducting the costs of Rs. 65 for the cultivation, may be estimated at Rs. 55 per acre, or roughly at Rs. 50.

CHAPTER XIII

RACES OF JUTE CULTIVATED ON THE BURDWAN FARM.



URING the harvesting seasons in 1901 and 1902 the seeds of the races of jute cultivated in Bengal were collected by the officers of the Agricultural Department, for experimental purposes, on the Burdwan Farm. When they were grown on the Farm, it was found that the seeds were awfully mixed, as usual. The author, who was in charge of the experiments, had repeatedly to weed out the plants which were not true to a race, according to the foregoing descriptions of the races. Further particulars of some races were added to the former descriptions, after close observation on the experimental fields. They are as follows :—

No. 1.

Species.—*Corchorus capsularis*.

Race.—*Baran*, from Jagannathganj, Mymensingh.

Description.—The stem and petioles of the plants are light green in colour. On 23rd August, 1902, about 2 per cent. of the plants were found flowering. It is the latest of all the eleven races of *Corchorus capsularis* cultivated on the Farm. Not much branchy. The length of the highest plant was 12'-0".

No. 2.

Species.—*Corchorus capsularis*.

Race.—*Barapat*, from Jagannathganj, Mymensingh.

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Description.—Stem and petioles are light green. On the 20th August 30 per cent. of the plants were found flowering. Not much branchy. The length of the highest plant was 11'-5".

No. 3.

Species.—*Corchorus capsularis*.

Race.—*Kakya Bombai*, from Serajgunj, Pabna.

Description.—Stem and petioles are light green. On 26th August 10 per cent. of the plants were found flowering. Not much branchy. The length of the highest plant was 10'-9".

No. 4.

Species.—*Corchorus capsularis*.

Race.—*Desal*, from Serajgunj, Pabna.

Description.—*Desal* is a mixture of two races of plants. One race has the stem and leaf-stalk of light green colour, while the other has the stem of light green colour, but the colour of the petiole is purplish. On the 20th August 10 per cent. of the plants were found flowering. Not much branchy. The length of the highest plant was 11'-0".

No. 5.

Species.—*Corchorus capsularis*.

Race.—*Barapat*, from Serajgunj, Pabna.

Description.—The stem and petioles are of light green colour, similar to No. 3. On the 20th August 30 per cent. of the plants were found flowering. The length of the highest plant was 10'-8".

RACES CULTIVATED ON THE BURDWAN FARM

No. 6.

Species.—*Corchorus capsularis*.

Race.—*Nailta*, from Serajgunj, Pabna.

Description.—Stem and leaf-stalk are purple. On the 20th August 10 per cent. of the plants were found flowering. It is strong and not much branchy. The length of the highest plant was 9'-8".

No. 7.

Species.—*Corchorus capsularis*.

Race.—*Nal pat* or *Meghnal*, from Rajbari, Faridpur.

Description.—Stem and petioles are purple in colour. On the 20th August 20 per cent. of the plants were found flowering. It is similar to No. 6. The length of the highest plant was 9'-8".

No. 8.

Species.—*Corchorus capsularis*.

Race.—*Amonia*, from Pangsa, Faridpur.

Description.—Stems are light green when young, afterwards purplish, and petioles purplish. On the 20th August 2 per cent. of the plants were found in flowers. A late race; very strong and branchy. It appears that it is not true *Amonia* as described in my notes under Races of Jute in Faridpur. The length of the highest plant was 9'-7".

No. 9.

Species.—*Corchorus capsularis*.

Race.—*Kam irjani*, from Pangsa, Faridpur.

Description.—Stems are light green at first, but purplish when older. Petioles are purplish. On the 20th August 1 per cent. of the plants was found in flowers. A late race; not much branchy. It is similar to No. 8. The length of the highest plant was 10'-0".

No. 10.

Species.—*Corchorus capsularis*.

Race.—*Dhaleswar*, from Narsingdi, Dacca.

Description.—Stem and leaf-stalk are light green. On the 20th August 1 per cent. of the plants was found in flowers. The length of the highest plant was 10'-9". It is similar to No. 3.

No. 11.

Species.—*Corchorus capsularis*.

Race.—*Belgachi*, from Madaripur, Faridpur.

Description.—There is a tinge of purple colour in the stems and petioles. A late and strong race, branching freely at the top. The length of the highest plant was 9'-6". •

No. 12.

Species.—*Corchorus olitorius*.

Race.—*Tosha*, from Serajgunj, Pabna.

Description.—Stem and petioles of the plants are more or less pink in colour. On the 19th September 20 per cent. of the plants were found in flowers, producing only a few branches at the top. A very late race. The length of the highest plant was 11'-0".

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No. 13.

Species.—*Corchorus olitorius*.

Race.—*Satnala*, from Rajbari, Faridpur.

Description.—The stem and petioles of the plants are light green. It came into flower about 20th July. An early variety, branching irregularly at the top. The length of the highest plant was 11'-0".

No. 14.

Species.—*Corchorus olitorius*.

Race.—*Desi pat*, *Desi lalbat*, from Serampore, Hoogly.

Description.—Stem and petioles are pink in colour. On the 19th September 26 per cent. of the plants were in flowers. The length of the highest plant was 12'-0".

No. 15.

Species.—*Corchorus olitorius*.

Race.—*Bangi*, from Narsingdi, Dacca.

Description.—Stems and petioles are light green. The length of the highest plant was 10'-7". It is similar to No. 13.

CHAPTER XIV

A LIST OF THE NAMES OF JUTE

(Typical Races were grown on the Burdwan Farm)

NAME.	District where grown.	NAME.	District where grown.
<i>C. capsularis.</i>		<i>C. capsularis.</i>	
Lankagoira pat	Hoogly.	Cowpla ...	Faridpur.
Lankagoira pat	24 Parganas.	Desal ...	"
Aus ...	Mymensingh.	Dhaleswari ...	"
Baran ...	"	Dhapa ...	"
Bara pat ...	"	Dhupri ...	"
Boran ...	"	Ghagri ...	"
Chhoran ...	"	Kajla ...	"
Chhota pat ...	"	Kamarjani ...	"
Kamarjani ...	"	Kuchmardan ...	"
Kuchmardan ...	"	Lali ...	"
Nal pat ...	"	Meghnal ...	"
Parbatya ...	"	Nal pat ...	"
Agniswar ...	Dacca.	Peti ...	"
Belgachi ...	"	Ranga pat ...	"
Bidyasundar ...	"	Sut pat ...	"
Desal ...	"	Shani ...	"
Desi ...	"	Sodu ...	"
Desi Nallya ...	"	Udhap pat ...	"
Dhaleswari ...	"	Bagi ...	Backerganj.
Dhalsundar ...	"	Bangi ...	"
Kajla ...	"	Cowpla ...	"
Parbatya ...	"	Nileta ...	"
Amonia ...	Faridpur.	Pechi ...	"
Belgachi ...	"	Rakta Bagi ...	"

A LIST OF THE NAMES OF JUTE.

NAME.	District where grown.	NAME.	District where grown.
<i>C. capsularis.</i>		<i>C. capsularis.</i>	
Sut pat ...	Backerganj.	Kakya Bombai.	Pabna.
Bidya sundar ...	Tippera.	Nalita ...	"
Deo dhali ...	"	Ausa ...	Rangpur.
Dhal sundar ..	"	Bhadoya ...	"
Meghnal ...	"	Hewta ...	"
Phuleswari ...	"	Hewti ...	"
Bara pata ...	Pabna.	Betre ...	Jalpaiguri.
Bombai ...	"	Bhadoya ...	"
Deswal ...	"	Hewti ...	"
Kakya ...	"	Lalpata ...	"
<i>Corchorus olitorius.</i>			
Baran ...	Mymensingh.	Bara pata ...	Faridpur.
Bar pata ...	"	Dhala Bagi ..	"
Nileta ...	"	Dhamraj ...	"
Packnallya ..	"	Meghnal ...	"
Talla ...	"	Nal Bagi ...	"
Banghi ...	Dacca.	Ranga Bagi ..	"
Banghi nallya ..	"	Satnala ...	"
Deo nallya ...	"	Parbatimadai...	Rangpur.
Bagi ...	Faridpur.	Bomochak ...	Jalpaiguri.
Bami ...	"	Marua pata	"

JUTE IN BENGAL

PART IV—TRADE

CHAPTER I

PHYSICAL DIVISIONS OF JUTE TRACTS



SCIENTIFICALLY the jute areas may be divided into two great divisions according to the courses of the two great rivers, the Ganges and the Brahmaputra, which, with their tributaries, flow through the jute areas.

The characters of the soils of the Gangetic area on which jute is grown and the waters of this area in which the jute is steeped and washed—the two principal factors for producing jute—are quite different from those of the Brahmaputra area. The lands in the Gangetic area are for the most part lower, subjected to annual floods, while those in the Brahmaputra area are higher. The water of the Ganges is muddy, while that of the Brahmaputra is clear. These differences in the conditions of the soils and the waters of the jute areas produce effects on the qualities of the fibres which are quite distinct. An expert trader in jute will separate the fibre of one division from that of the other without any geographical knowledge of the tracts where they were produced. The fibre of the Gangetic area is strong, coarse, barky and yellowish in colour, which fades in storage, while that of the Brahmaputra area is fine, white, more glossy and elastic, as well as strong. The fibre of the Brahmaputra area can bear more tension and twisting. Of course, there are exceptions. The colour of the jute of the *bheel* lands in the Gangetic

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area, where there is clear water for washing, is in no way inferior to that of the good-coloured jute of the Brahma-putra area. On the other hand, in parts of the Brahma-putra area where clear water is not available for steeping and washing, it is done in dirty ditch water. The colour of this jute is not better than that of the jute of the Gangetic area.

There are also high lands containing loamy soils in the Gangetic area where jute of fine texture is obtained. On the other hand, coarse fibre of fading colour is produced on the low *char*-lands in the Brahma-putra area. Barring these exceptions, however, the fibres of these two divisions may be distinguished on the distinct points noted below :—

Fibres of the Gangetic Area

1. Strong.
2. Coarse or thick.
3. Short.
4. Yellowish coloured.
5. Barky.
6. Less glossy.

Fibres of the Brahma- putra Area

1. Strong.
2. Fine.
3. Long.
4. White coloured.
5. Little barky.
6. Glossy.
7. Bearing more tension and twisting.

In a word, the fibres possessing all the qualities which are desirable are available from the Brahma-putra area.

Jute grows to a very small extent (20,000 acres) in some parts of the delta formed by the rivers Mahanadi, Brahmani and Baitarani included in the districts of Cuttack and Balasore in Orissa. The quality of the fibre of this part of the country is coarse and yellowish, and also sticky, due to defective stripping.

In the Gangetic area, the jute crop is first seen in the *diarah* (*char*) lands in the Rajmahal Subdivision in the district of the Sonthal Parganas on the right bank of the river Ganges. The Ganges has taken a slower course

down from Rajmahal. The cultivation has not extended, to any extent, on the high lands in the Gangetic plains known as the old alluvium consisting of hard reddish soils.

From Rajmahal down to the Hoogly or Bhagirathi, the western branch of the Gangetic delta, the cultivation is entirely confined to the *diarab* lands. But it is extensively cultivated on the higher parts of the delta which commences about 300 miles off from the sea, excluding salt-impregnated parts in the Sundarbans. This area includes the districts of Hoogly and Murshidabad on the west, Nadia, the 24-Parganas, Jessore and Khowlna in the middle, and Faridpur and Barisal on the east. The most important branches of the delta are the Bhagirathi or Hoogly on the west, the Bhairab and the Goroï or Madhumathi in the middle, and the Arialkhan on the east. Most parts of this area are annually inundated, where silts are deposited. Special characteristics of the fibres of this tract are coarse in texture and yellowish in colour, fading in storage. The *daisi* jute is principally obtained from the banks of the Hoogly.

On the left bank of the Ganges, the jute area has, properly speaking, commenced downwards from the Kushi river, dividing the districts of Bhagalpur and Purnea. Jute is cultivated to a very limited extent further up in the Tirhut Division in North Bihar. This tract of land is watered by a net-work of tributaries of the Ganges, of which the most important are the Gogra, the Gandak and the Kushi. They over-flood the banks suddenly to a depth of water which the crop cannot resist. Otherwise, the soil which is rich and alluvial is well suited to it. After leaving the branch Bhagirathi (Hoogly), on the right, the Ganges takes the name of Padma. From the Kushi on the west to the alluvial banks of the Brahmaputra on the east, jute is very extensively cultivated. This area may be divided into three parts or divisions. The first part consists of a tract of low lands between the Kushi on one side and the Maha-

nanda on the other. The latter flows down rather slowly to the Ganges through the districts of Purnea, Dinajpur and Maldah. This part of the country may be included in the Gangetic area. Fibre of an inferior quality, in points of strength, length and colour, is produced in this part of the area. The weakness of the fibre is surely due to over-steeping. The second part of this country consists of the high lands between the Mahananda and the Karotoa rivers, including parts of the districts of Dinajpur, Jalpaiguri, Rangpur, Bogra, Rajshahi and Pabna, with the exception of a contiguous and large tract containing old alluvial soils of a structure similar to that found on the right bank of the Ganges already noticed. This section, called *khair* land, contains portions of the districts of Dinajpur, Rangpur, Bogra, Rajshahi and Maldah. The word *khair* is derived perhaps from the colour which resembles that of *khair* (*kath*). The Karotoa flows in a slow course towards south-east from Darjeeling to the main stream of the Brahmaputra called Jamuna. Another important river in this part is the Atrai. It flows through the districts of Dinajpur and Rajshahi. These two districts are almost bisected by it. The banks are hardly overflowed. Then it joins the Karotoa river in the district of Pabna. The northern class of jute comes from this part of the country. It is tall, little barky and fine, and can bear twisting very well, but it is generally yellowish in colour owing to its steeping and washing in ditch water, and it is somewhat weak for over-steeping. Otherwise this area yields a fibre of a high grade. The Brahmaputra area commences off from the river Mahananda. Now comes the third part of these jute tracts lying between the river Karotoa, a tributary to the Brahmaputra, and its main course. This part of the country is watered by the Brahmaputra and its other numerous tributaries, of which the important ones are the Subansiri and the Manes

draining the extreme northern valley of Assam, and also the Gadadhar or Sankosh and the Raidak. The tributary Raidak separates Assam from Bengal. All of them flow right from north to south. The most important of the tributaries in this division of the Brahmaputra area is the Teesta. It rises from the Himalaya and takes a south-eastern course from Darjeeling. In its course to the Brahmaputra, it drains parts of the districts of Jalpaiguri, Cooch Behar and Rangpur. The most important river on the eastern part of the Brahmaputra area is the Surma, which flows through the districts of Cachar and Sylhet into the Meghna. They form two valleys in Assam, called the Brahmaputra and the Surma Valleys. Jute is grown to a limited extent in the Surma Valley, which does not appear to be well suited to the crop, owing to heavy rainfalls from the beginning of the growing season. The Brahmaputra Valley, on the other hand, is better adapted to the crop, where it is steadily extending. The fibre of the Brahmaputra Valley and that of the banks of the Teesta are really identical and of good qualities, which should form a separate class in the trade.

The Brahmaputra, after breaking through the mountainous regions in north-eastern Assam, takes a slower course towards the west, watering the plain lands of northern Assam, called the Brahmaputra Valley, within the limits of the districts of Lakhimpur, Sibsagar, Nowgong, Darrang, Kamrup, Goalpara and the Garo Hills. On leaving the Garo Hills on the left, it turns abruptly towards the south and enters Bengal. After it receives the Teesta near Fulchari in Bogra, it flows down in a rapid course to join the Ganges at Goalundo, overflowing parts of the districts of Rangpur, Bogra and Pabna on the right bank and Mymensingh and Dacca on the left. The jute fibre of this section of the Brahmaputra area is not very good in quality, being rather coarse and yellowish in colour, and fading in storage.

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In other respects it is a long, strong and healthy class of jute.

The Brahmaputra, in another very slow course, flows down through the Mymensingh district, from the north-western corner near Bahadurabad to the south-eastern corner, and joins the Meghna. This course is now called the old Brahmaputra. Formerly the main current flowed through it. The present main stream already noticed, which meets the Ganges at Goalundo, is still called by the name of the Jamuna by the people who live on its banks. The old Brahmaputra and the Meghna supply the country with exceptionally clear water. The highest class of jute is produced on the high lands of the banks of the old Brahmaputra and Meghna. In point of excellence, no other qualities can approach it, for which fancy prices are always offered.

The Barak (Barabakra) which rises from the Lushai Hills joins the Surma near Marculi. It is the most important tributary of the Surma. Many other tributaries flowing through the eastern parts of Mymensingh and western parts of Sylhet, fall into the Surma on the right bank. These parts also form a most important jute tract. The Surma downwards Marculi is called by the name of Meghna. According to some of the eminent writers on geography of India, the Surma is said to be a tributary to the Brahmaputra. But from the fact that the Brahmaputra joins the Meghna at almost right angles, it may be suggested that the Surma or Meghna is not a tributary, which is probably older in origin than the Brahmaputra. It is not our point, however, to discuss the matter further as to the ages of these rivers.

From the junction of the rivers Brahmaputra and the Meghna, it flows towards a south-western direction, leaving the districts of Sylhet and Tippera on the left bank and Mymensingh and Dacca districts on the right, and joins the Ganges over again near Chandpur, about 70 miles off

from the Bay. They retain the name of the Meghna till they fall into the sea. A high class of jute is obtained from the banks of the Meghna up to the Chandpur Station. Downwards Chandpur the crop suddenly disappears.

Thus we see that the jute is a romantic plant. It thrives in particular soils under certain climatic conditions, but avoids some soils of the neighbouring places under the same climatic conditions. It becomes fine in some soils, but coarse in others, at the same place. It changes its colour owing to slight differences in waters, which are used for steeping and washing. It has adapted the soils of the deltas of Mahanadi and the Ganges and the soils of the banks of the Brahmaputra and the Meghna, but quietly rejected the other parts of the country. It has revolutionised the Indian trade, for which the people who deal any way in it are getting prosperous.

Taking physical conditions into consideration, the areas under jute, producing different qualities of fibres, may be divided into the following divisions, as illustrated below :—

(A) Gangetic Area

(1) Madaripore	(2) Jessore	(3) Hoogly	(4) Purnea
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(B) Brahmaputra Area

(1) Upper Brahmaputra	(2) Lower Brahmaputra	(3) Old Brahmaputra	(4) Meghna	(5) Northern
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In the Gangetic area the Hoogly division yields the *Daisi* quality.

The Old Brahmaputra division supplies the commercial quality of *Jath* jute. The District quality is principally imported from the Upper Brahmaputra, Lower Brahmaputra and Meghna divisions.

CHAPTER II

COMMERCIAL DIVISIONS OF JUTE TRACTS



JUTE growing tracts in Bengal were commercially divided into five Divisions in the former edition of this book, in 1908, *viz.* :—

- (i) Narainganj ;
- (ii) Serajganj ;
- (iii) Uttarya or Northern ;
- (iv) Dowrah ;
- (v) Daisi.

(i) “Narainganj” jute is grown on the tracts of lands which are supplied with water from the old Brahmaputra river. There is no other jute tract in Bengal where water is so clean as that of the old Brahmaputra. The colour of the jute of this tract is the best in the market. Most parts of this tract are liable to submersion by floods when the crop is still on the fields. This standing water is responsible for the “barky” and “mossy” fibres of this tract. High lands of this tract yield fibres of exceptional good quality. About 30 per cent. of the jute of this tract are “hessian.” Narainganj and Chandpur are the principal markets in this tract, which are under the jurisdiction of Mymensingh, Dacca and Tippera districts.

(ii) “Serajganj” jute is obtained from the tract of lands which are fed by the new Brahmaputra or Jamuna river. The water of this river is not equal to that of the old Brahmaputra in point of cleanliness. The principal market of this tract is Serajganj, which is supplied with jute from the western parts of Mymensingh, and

from Pabna, Bogra, Cooch Behar, Rangpur and Goalpara. About 30 per cent. of the jute of this tract fall under "hessian."

(iii) "Uttarya" or "Northern" jute is grown in the tract of high lands which are principally watered by the tributary rivers of the Brahmaputra. Only a limited part of this tract receives direct supply of water from the rivers. Jute of this tract is, therefore, steeped and washed mainly in ditch water, and as the same water is used for successive steepings, it becomes more or less coloured owing to decayed vegetable substances, as the operation is continued. The colour of the jute of this tract is therefore inferior. Thirty per cent. of this jute come under "hessian." Huldibari, Domar, Kissenganj, Kasba and Forbesganj are the principal marts in this tract, which includes the districts of Rajshahi, Bogra, Rangpur, Jalpaiguri, Dinajpur, Maldah, and Purnea.

(iv) "Dowrah" jute is grown on the lands which are swamped by the branches of the river Ganges, containing muddy water. This muddy water imparts a grey colour to the fibre of this tract. The *Dowrah* jute is very strong, but barky and harsh. It is principally used for sackings and cordage. Madaripur, Berhamganj and Angaria in the district of Faridpur are the chief markets in this tract.

(v) "Daisi" jute belongs to the species *Corchorus olitorius*. It is grown on the high lands in the neighbourhood of Calcutta. The jute of this tract is steeped in the ditch water supplied by the rains or the rivers Bhagirathi and Damoodar, also Roopnarain, which contain muddy water during the rains. Owing to the quality of the water and some objectionable method of steeping, the jute of this tract is more or less black in colour. This jute is principally used for bagging. Badyabati in Hoogly and Belgatchia in the 24-Parganas are the principal markets.

COMMERCIAL DIVISIONS OF JUTE TRACTS

The above classifications were made by the trade according to the different qualities of the fibres of certain tracts of lands, which were imported into the markets of the Division. In each Division there were certain markets where the jute of that Division or tracts of land was sold. The fibres of a Division were not certainly of uniform qualities. Now, for the convenience of the trade, systematic classifications of the jute markets have been made more or less according to the qualities of fibres sold. Thus in the same tracts, markets of different classes are found. For example, in the old Narainganj tracts, comprising parts of Mymensingh, Dacca and Tippera districts, there are two classes of markets—one class selling the best grades of fibre called "Jath" (true) jute, while in the other the fibres of inferior qualities known as "District" jute are sold.

"Jath" jute is fine, strong, long, healthy and glossy, of milky white colour, and the "District" jute is coarse and more or less barky, the colour of which fades afterwards and the healthiness is lost. In other respects, it is similar to the "Jath" *pat*.

It would not be however inconsistent with the classifications of the areas made by us, in the beginning of this chapter, if it is explained that, although the "Jath" and the "District" jutes are grown on the same tracts, yet there are differences in qualities which are due to the facts that the "Jath" jute is the product of the high lands of the Brahmaputra area, while the "District" jute is the fibre of the *char* lands of the same Brahmaputra area subjected to inundation annually. In some "District" jute markets, the fibres, both from the Gangetic and the Brahmaputra areas, are sold, which cannot be taken as general. From the tendency of the jute business, it appears that the "District" jute should consist entirely of the fibre of the *char* lands of the Brahmaputra area.

In the Brahmaputra area there is another class of jute called "Northern" jute, which is grown on the high lands. According to the present commercial classifications, it does not fall either under "Jath" or "District" owing to the facts that it becomes blackish and weak on account of steeping and washing in dirty ditch water and over-retting, respectively, losing its gloss and healthiness. Otherwise, it should have been a high-class jute of fine texture. The jute of the old Serajgunj Division falls under Northern qualities.

The jute of the defunct Dowrah Division comes now under Madaripur qualities. The fibres of the Gangetic area already described fall under this class, which is inferior to the fibres of the qualities "Jath" and "District." This class of fibres of the Madaripur Division is coarse and barky, though strong. The colour is yellowish, which fades in storage. The jute which is produced on the left side of the river Goroi or Madhumati, goes to the Madaripur quality, while that on the right is assorted as the "Jessore" quality. It is similar to that of the Madaripur class, but it is not so strong, owing to over-steeping. The Purnea jute is identical with that of the Jessore class, but it is generally shorter. A better class of fibre is imported into the Purnea markets from Nepal.

The Mahanadi Division in Orissa yields a strong and yellowish fibre, but it is more or less sticky owing to defects in stripping. In this Division jute is chiefly cultivated in the Kendrapara Subdivision in the Cuttack district.

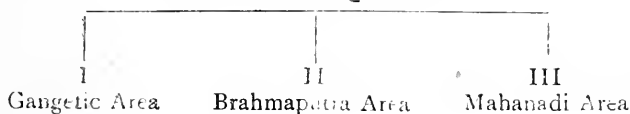
There has not been any change in the *Daisi* quality of jute. It belongs to the species *Corchorus alitorius*. *Tosha* of Serajganj, *Bogi* of Dacca or Faridpur, and *Nileta* of Mymensingh come under the same class. This jute is largely cultivated in the Burdwan Division and in the 24-Parganas in the Presidency Division in Bengal. In Eastern Bengal and Pabna, its cultivation is but limited, not exceeding 5 per cent. of the total crop

COMMERCIAL DIVISIONS OF JUTE TRACTS

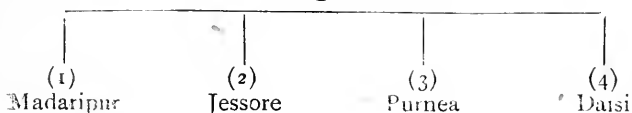
while it is little in Northern Bengal. It is never cultivated in the low lands subjected to floods. The fibre of this quality is very coarse, of brownish yellow colour, little barky, but healthy. It is very suitable for sackings. Owing to dirty water of ditches in which jute is steeped in the neighbouring districts of Calcutta, the colour of the fibres becomes blackish.

The following diagrams will show the various qualities of jute which are available in the markets for sale :—

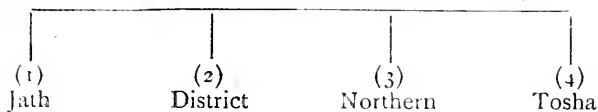
Divisions of Qualities



I. Gangetic Area



II. Brahmaputra Area



III. Mahanadi Area



It should be noted that these classifications have nothing to do with assortments of fibres in which

business is done in the market. The fibres of any particular class, such as Jath, District, Northern or Madaripur, are again assorted as 1's, 2's, 3's, 4's, etc., according to the qualities of the fibres contained in each bale as enumerated in Chapter V, Part IV. But the prices of the fibres of these assortments differ according to the classes they belong to. Thus the fibre of the assortment of 2's or 3's of the Jath class of jute is sold at a higher price than that of the assortment of 2's or 3's of the District or the Madaripur or the Northern jute. Similarly, the 2's or 3's of the District class of jute are considered to be better than the 2's or 3's of the Madaripur class. Exactly in the same way, differences are made between 2's or 3's of *Tosha* (*C. olitorius* of Eastern Bengal) and *Daisi* (*C. olitorius* of Western Bengal). A list showing the markets dealing in different classes of jute, as classified above, is duly given elsewhere.

CHAPTER III

COMMERCIAL CLASSIFICATION OF FIBRES



JUTE fibres are classified in the trade according to their different qualities, such as strength, length, colour, gloss and fineness. In fine or soft jute there is absence of barks, specks and gummy substances; while harsh jute may contain one or more of these defects. Weak or damaged jute loses its strength and also its gloss. Jute may be divided into six classes :—

- I. Hessian-warp ;
- II. Hessian-weft ;
- III. Sacking-warp ;
- IV. Sacking-weft ;
- V. Rejections ;
- VI. Cuttings.

I. Hessian-warp is a strong, long, healthy and fine jute of good gloss and silvery white colour, without any defects, such as barky, mossy, sticky or specky. This stuff is used for spinning thread, which is suitable as warp for weaving hessian cloth or other finer fabrics. This class of jute consists of the ideal finest fibre of this country. Only a limited quantity of this quality is available. It is chiefly exported to Europe.

II. Hessian-weft is inferior to Hessian-warp in length and gloss, but similar to it in other respects. This jute is used for weft in the hessian cloth referred to above.

III. Sacking-warp is a strong, long and healthy jute, irrespective of any particular colour. It is coarser than the

stuffs I and II. The thread spun out of this jute is used as warp for weaving sacks.

IV. Sacking-weft is a dull-coloured short* or weak jute used for weft in sacks.

V. Rejections are the worst stuffs, which are either damaged or barky or knotty, used in spinning thread for sacking weft. The barky jute is used in spinning after it is softened with oil and water and passed through softeners (*vide* the article on European Manufactures).

VI. Cuttings are the barky or hard portions of jute cut off from the bottom or the top. Cuttings are either used in spinning sacks as weft, after being softened with oil and water as referred to above, or in paper making.

* The fibre which is below 7 feet in length, after deducting the cuttings, is called "short" jute, the usual length of long jute being from 8 to 12 feet. In a normal year, two-thirds of jute are long and one-third short.

CHAPTER IV

BALING



UTE is pressed into bales by the dealers for convenience of transport from one place to another. The baling is done by means of hand and steam power presses. The bales which are pressed by hand press are called *katcha* bales, while those made by steam press are *pacca* bales. The *katcha* bales are re-baled into *pacca* bales by the balers, if they are intended for export out of India.

A large number of hand power presses are used in this country for pressing bales weighing $3\frac{1}{2}$ maunds (280 lbs.) each to a density of about $12\frac{1}{2}$ cubic feet. In some places, where facilities for conveyance are not sufficient, smaller presses for bales weighing $1\frac{1}{2}$ maunds (120 lbs.) each are set up. From an economic point of view the former are preferred to the latter.

There are two classes of presses sold in Bengal for the *Katcha* bales : one class is called the lever press, while the other the hydraulic press. Lever presses are simpler in construction, and it is easy to fit or set them up. It requires some mechanical training on the part of the man who would fit up a hydraulic press. The hydraulic presses can be economically worked with steam power, in which case one set of pumps, working two presses at a time gives much more outturn than that obtained from two hand-power lever presses.

Ordinarily one lever press, working 10 hours a day, turns out about 200 bales of $3\frac{1}{2}$ maunds each with 16 labourers, or about 200 bales of $1\frac{1}{2}$ maunds each with 8 labourers, at the rate of 20 bales per hour. The act of pressing is commonly done by contract system. For each bale of $3\frac{1}{2}$ maunds, about two annas, while for $1\frac{1}{2}$ -maund bales, about an anna-and-a-half per bale, are paid to the labourers. The total cost including the hire

TRADE

of the press, godown, labourers, etc., amounts to annas 8 per $3\frac{1}{2}$ -maund bale and annas 6 for each $1\frac{1}{2}$ -maund bale.

Hand-presses are sold by many firms in Calcutta. The Chain Press of Messrs. Mandal & Co. is claimed to be cheaper than any other lever presses.

For export to Europe and America bales of 400 lbs. (5 maunds) each are pressed to a density of 10.4 cubic feet, not exceeding 52 cubic feet per ton, or 5 bales.

There are three patterns of pressing machines in Calcutta, the best of which is called the Cyclone Press. It has a capacity of pressing about 60 bales of jute or 40 bales of cuttings of jute per hour. The Watson Press comes next to the Cyclone Press. About 40 bales of jute or 26 bales of cuttings may be pressed in an hour by this machine. The capacity of the Nasmyth Press is to press about 30 bales of jute or 20 bales of cuttings per hour. Rs. 2-8 is charged for pressing a bale of jute, including the costs for cordage (5 lbs.) and despatching from the Press-house. For the bales of the cuttings and *Daisi* jute, annas 2 extra is charged for a pound of additional rope required per bale. An additional amount of about annas 14 for the jute of the species *C. capsularis*, annas 10 for *Tosha*, and annas 5 for *Daisi* (which does not require the roots to be cut off) per bale, is charged for assortment and cutting the roots.

There are 29 pressing machines in Calcutta, 2 at Narainganj and 1 at Chandpur. Each machine has a capacity of working 3 or 4 presses. Altogether there were 110 presses working in Bengal during 1917 employing 24,438 labourers. The average for the 5 years ending 1917 works out to 240 men for each press. About 30 men are required for driving a machine—*Mistries*, firemen and *Khalasies*,—and an additional 20 men for each press for baling. A vast army of labourers are wanted for assortment. One man can sort fibres for $1\frac{1}{2}$ to 2 bales of *C. capsularis* (*Bilathi pat*) and 4 to 5 bales of *Daisi* jute, per diem.

CHAPTER V

LOOSE JUTE



JUTE is imported into the Calcutta Bazar, the mills and the press-houses in drums or *katcha* bales. The drums weigh 30 to 40 seers of jute each, without any particular assortment. The *katcha* bales are generally of $3\frac{1}{2}$ maunds (280 lbs.) each, assorted to a certain extent, and pressed at the places from where they are despatched. These bales are made of the following qualities:—

1's contain ... 80 to 90% Hessian-warp ;
10 to 20% Weft and cuttings.

This quality is entirely exported to Europe, if available.

2's contain ... 40 to 60% Hessian-warp ;
40 to 60% Weft and cuttings.

2's are divided into the following groups—

2's (Green) contain ... 60% Hessian-warp ;
20% Sacking-warp ;
20% Weft and cuttings.

Calcutta mills buy a very small quantity of this quality. It is mainly requisitioned for Europe.

2's (Red) contain ... 50% Hessian-warp ;
40% Sacking-warp ;
10% Weft and cuttings.

2's (Ordinary) contain ... 40% Hessian-warp ;
40% Sacking-warp ;
20% Weft and cuttings.

Red 2's are largely used by the Calcutta mills. From this stuff, the mills pick up the fibre suitable for weaving hessian cloth.

TRADE

There is another assortment under 2's called X2's which has also a large business in Calcutta.

X2's contain	...	20% Hessian-warp ; 60% Sacking-warp ; 20% Weft and cuttings.
3's contain	...	70% Sacking-warp ; 30% Weft and cuttings.
Good 3's give	...	10% Hessian-warp ; 60% Sacking-warp ; 30% Weft and cuttings.

Under 3's there is also another quality which is called in the Calcutta market as X3's.

X3's yield	...	60% Sacking-warp ; 40% Weft and cuttings.
4's contain	∴	40% Sacking-warp ; 60% Weft and cuttings.
Good 4's have	...	50% Sacking-warp ; 50% Weft and cuttings.
X4's have	...	30% Sacking-warp ; 70% Weft and cuttings.

There are too many qualities in which business is done in the Calcutta market. The result is that there are frequent disputes between the buyers and the sellers.

Rejections contain all weft for sacking. It is the worst of all the fibres sold. But a better quality of rejections yield :—

- 20% Sacking-warp ;
- 80% Weft and cuttings.

A very inferior grade of rejections is also available in the market, which contains fibre which is barky, specky

LOOSE JUTE

and hard all through, due to over-ripening of the crop and bad steeping and washing. It is called Terrible Rejections (T. R.), and used chiefly for paper manufacture.

Cuttings are the portions of jute cut from the bottoms or tops of the fibres to bring the fibres under a uniform quality. Cuttings are of different qualities as noted below :—

N. C.	=	Narainganj jute cuttings.
O. C.	=	Ordinary jute cuttings.
T. C.	=	Tosha jute cuttings.
D. C.	=	Daisi jute cuttings.
B. C.	=	Bagging cuttings.
M. C.	=	Mixing cuttings out of all jute cuttings.

Cuttings, in mixture of short jute, are used in the Calcutta mills in manufacture of sacking cloth as weft in the following proportions and passed through the softeners :—

2	parts short jute.
1	part cuttings.

The Narainganj cuttings, which are 10 to 12 inches long, are the best of all. The Bagging cuttings are used for paper making in Europe. They are very short, about 4" long, as they are obtained from the cuttings of bags. The Mixing cuttings are the worst stuffs, which cannot be used for baggings, but for paper.

The cuttings are largely used in the Indian mills for mixing purposes ; they are also baled for export to foreign countries.

The standard grade of the loose jute market is called 50/50, that is, 50 per cent. of the bales contain 2's and 50 per cent. 3's. The price of this standard grade is the basis on which the prices of other qualities are determined. Of course the price of a particular quality chiefly depends on its demand.

CHAPTER VI

BALED JUTE



JUTE is exported from Bengal to Europe and America in bales of 400 lbs. each, pressed by steam power to the measure of about $10\frac{1}{2}$ cubic feet, containing definite qualities of fibres, assorted according to definite marks of the balers, who are the members of the Calcutta Baled Jute Association.

Each specified mark represents particular quality and grade of jute duly registered by the Calcutta Baled Jute Association. No public mark that has not been included in the Official Book of Marks issued by the Calcutta Baled Jute Association on or before the first July in each year and lodged with the London and the Dundee Jute Associations, can be substituted under any grade. In the event of unavoidable circumstances preventing shipment of such mark or marks as guaranteed, the seller can substitute another mark or marks of the same grade and of equal quality at a reduction of 10s. per ton from contract price. If it prove to be inferior to guarantee, the liability of the seller to the buyer shall be on the mark or marks *specified*. No allowance can be claimed unless the inferiority shall exceed 10s. per ton, but in that case the buyer shall have the right either (1) to recover from the seller the full difference in value on the date when such inferiority shall be acknowledged or final award issued, or (2) if the inferiority shall exceed 50s. per ton, to invoice the jute back to the seller within 5 days after receipt of the award and recover from the seller in respect thereof a price per ton to be stated in the award equal to 10s. above the market value of the quality contracted for on the date when such inferiority is acknowledged or final award issued. On substituted marks the buyers shall have the

BALED JUTE

right either (1) to recover from the seller the full difference in value; or (2) if the inferiority shall exceed 20s. per ton, to invoice the jute back to the seller within 5 days after receipt of award, and recover from the seller, in respect thereof, a price per ton to be stated in the award, equal to 10s. above the market value of the quality contracted for, on the date when such inferiority is acknowledged or final award issued.

The marks are grouped as follows:—

Diamonds	Lightnings
Reds	Mangos
Firsts	Hearts
Daccas	Daisi

Jute is sold under guarantee* in Calcutta, which is to be of the average standard of the grade, free from Bombay quality and Rejections, and the roots being clean cut. This guarantee is restricted to jute of the grades higher than what is known as "Hearts," with an exception of the "Daisi" group. Formerly the standard quality was known in the baled jute market by the name of *M* group or "Cracks," baled principally out of the jute of the Serajganj Division. This group is now substituted by the "Firsts," which are made up of the selected qualities of the Northern jute.

This group as well as those below it, excepting "Daisi," is composed of the fibres in equal proportions of 2's and 3's, packed, of course, separately. In the "Firsts" 2's should yield 40 per cent. of Hessian-warp and 3's 70 per cent. of Sacking-warp, not without a large percentage of Hessian-weft in the latter. Now true Hessian-warp is hardly used for the marks of this group. This quality of fibre is specially picked up for the marks of the higher group. At present, in the "Firsts" the 2's contain 40 per cent. of warp jute resembling Hessian-warp in all respects, specially in

* For details, please see the Contract Forms issued by the London Jute Association and the Calcutta Baled Jute Association.

length and strength. Next to the "Firsts" the "Daccas," assorted similarly as the "Firsts," form a group which is most important. They are baled chiefly out of the District qualities of the Mymensingh and Dacca districts. Differences between these two groups are on the following points:—

"Firsts" consist of soft fine jute of inferior colour, while the Daccas are made of hard coarse jute of superior colour. Both are equally long.

Taking all points into consideration, there are slight differences between them. Sometimes "Daccas" are sold at a little higher price. There is always a strong demand for it.

The marks of the "Lightnings" group are made up of the medium common Northern qualities, while the "Mangos," popularly called the C. D. M. group, out of the common medium District jute. In the marks of both the groups, the residues of the higher marks are used. The fibres of these groups are largely used for sacking purposes.

Formerly, the Madaripur qualities had no place in the baled jute market, due to excessive malpractice of fraudulent watering, and also to its containing tap roots (Bombay Quality), as the plants were uprooted instead of being cut. These defects have nearly been removed. Now the Madaripur jute is eagerly purchased for the "Mangos" marks, also for the "Daccas." Some portion of it, which is produced in the *bheel* tracts, goes still higher for the "Diamonds."

It may be stated that the C. D. M. (red mark) under the "Reds" is quite different from the popular C. D. M. C. D. M. (red) is superior to the marks of the group "Firsts" or the "Daccas."

"Hearts" are composed of low grade weak jute with which gunny bags are chiefly manufactured.

As already noticed, there are some marks of fine and exceptionally good qualities with colour of true Hessian-warp.

BALED JUTE

The "Diamonds" are packed out the picked fibres of the Mymensingh and Dacca districts, while the "Reds" from the "Northern" qualities. Only a limited business is done in the fibres of these two top groups. Dundee is the principal buyer, and also France and Germany, where these fibres are utilised for mixing purposes for manufacture of woollen textiles.

It may be noted that different marks even under the same group differ considerably from one another, both in qualities and values.

Besides the foregoing marks, there are also some recognised marks of inferior qualities consisting of "Bombay" or "Dowrah" qualities, "Rejections" and the cuttings of different qualities which were already noticed in the chapter under Loose Jute.

In addition to the groups of marks described above, there is another group known as the "Daisi," composed of the jute of *C. olitorius* species. It is getting into favour with buyers both in Europe and India. The importance of this quality lies in its absence of roots, which is a thing of great economic gain to the spinners. It is sent out to Europe in three principal numbers of 1's, 2's, and 3's. The general standard is an equal percentage of 1's and 3's, for example, 10 per cent. of 1's, 80 per cent. of 2's and 10 per cent. of 3's; or 20 per cent. of 1's, 60 per cent. of 2's and 20 per cent. of 3's. These may be illustrated by the following equations:—

1's. 2's. 3's.

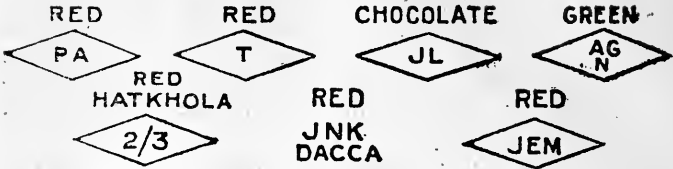
$$10 + 80 + 10 = 100 \text{ or}$$

$$20 + 60 + 20 = 100 \text{ or}$$

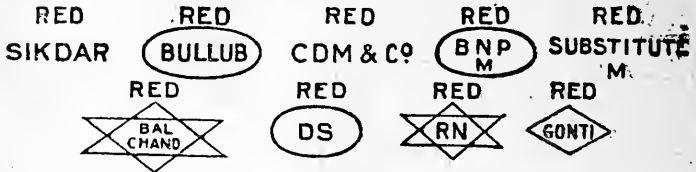
$$30 + 40 + 30 = 100$$

Some of the standard marks under the aforesaid groups recognised by the London and the Dundee Jute Associations are shewn overleaf.

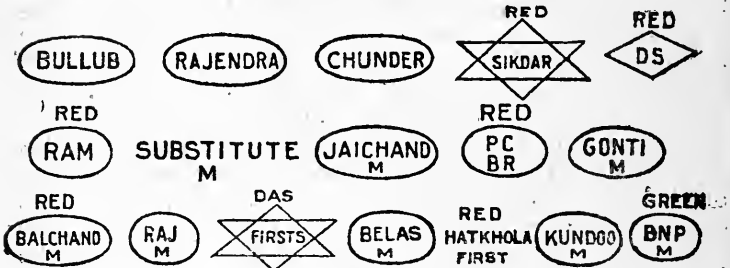
DIAMONDS



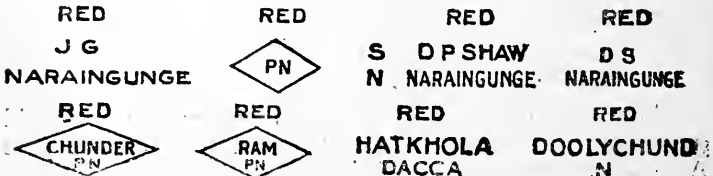
REDS



FIRSTS



DACCAS



BALED JUTE

LIGHTNINGS

GREEN



RED



GREEN



HATKHOLA LIGHTNING



GREEN



MANGOS

RED



CDM & C^o



GREEN



RSS & C^o



KUNDOO



HEARTS

BLUE

SIKDAR



CDM & C^o



BLUE

KUNDOO

BLUE



DAISEE

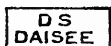
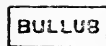
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RED SIKDAR

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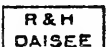
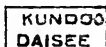
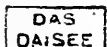


RED

RED

RED

RED



The foregoing paragraphs have been written after discussion with some of the prominent balers of Calcutta, and also after consulting their documents, according to which the baled jute business is at-present done. From this, I am afraid, none of my readers, unless he is a trader in baled jute, has been enlightened as to the qualities of jute contained in the bales of particular mark or marks registered by the Calcutta Baled Jute Association and noted in the book "Jute Marks and Assortments." Not, even the different existing groups of marks of the bales will help any one to ascertain as to the particular quality or qualities of which a group is composed. The quality of one mark differs widely from that of another mark under the same group (*vide* the Statement II—Part V.) On the other hand, it will appear that from the top to the bottom of the groups, each mark is said to contain "2" 50 per cent. and "3" 50 per cent. If so, where is the difference and why are there so many divisions or groups of marks? I put these two simple questions to many prominent balers and brokers, but they could not answer. Thus the 2's or the 3's have no significance at all. The 2's must be 2's everywhere, whether they come from Narainganj or from Serajganj. The present system of marking is so defective and confusing that even the balers have no control over the assortments made by their subordinates. The buyers too, specially those of the foreign markets other than London and Dundee, are put into great difficulties in the work of checking of the qualities of the different marks, which are increasing every year. It is not practicable to have samples of different marks before each member of the buyers' staffs through whom the transactions are carried on. Unless examining the samples of jute of a mark or marks, no jute experts would know anything about the qualities.

Mr. Antonino Neves, who came to India in 1920, as a representative of the Brazil Republic, to study the subjects

of agriculture and trade of this country, told me that they were simply helpless in the hands of the sellers regarding the qualities of jute supplied to his country. Many of the Calcutta balers with whom I had discussions on the subject, agreed with me in the various main points of defects in the marks of the Calcutta baled jute.

It may, we think, simplify the baled jute trade if the sellers and the buyers would agree to accept the classifications of the qualities adopted in the loose jute market of this country. The system of grading of "Daisi" jute seems alright. Similarly the main jute fibres may be graded. The standard quality may have 2's, 3's and 4's in the same ratio as in the "Daisi."

We have not got much to say about the classifications of the present loose jute market. Although the system of classification is more satisfactory, still there are some confusing points. It is very simple to understand what is meant by 1's, 2's, 3's and 4's of different qualities. But of late, some confusing marks, such as red 2's, green 2's, X3's, X4's, etc., are cropping up. Perhaps it will be better to extend the qualities by numerical figures without adding any adjectives to any of the simple marks noted above.

The other objectionable point to which attention is invited, is the grading of the fibres of different markets under the same markings, although differing in qualities, such as, 2's, 3's, 4's of Narainganj, 2's, 3's, 4's of Madaripur. The Madaripur 2's are not certainly equal to the 2's of Narainganj or Mymensingh. The qualities should be marked according to the relative merits of all the fibres of these Provinces combined. If the available best quality of Narainganj be marked as 2's, then the available best Madaripur quality must not be termed as such, but as 3's or 4's. It would not be very difficult to find out the relative positions of the qualities of the different jute markets.

We are sure there would be some difficulty in changing the trade methods of classification. First of all, the sellers would not be willing to call the 2's of a market as the 3's of the proposed revised grades of all the fibres of these Provinces taken together. The Indian dealers in loose jute, with whom I discussed the matter, are of the opinion that the fibres of different markets cannot, in any way, be judged together, as they are quite different. For example, they maintain that a grade of jute of Northern Division cannot be placed in any of the grades of Narainganj Division, as they are quite different in colours, strengths, etc. In some respects, some of the qualities of the groups of Narainganj may be better than those of the groups of other markets, and in some other respects inferior, still we hold that the groups can be classified, in order of merit, by examination of different qualities taken separately. In point of valuation of the present market, the 2's of Narainganj is placed on a higher class than the 2's of Northern jute. In that case, there is no harm to call the former as 2's and the latter as 3's.

Although there may be practical difficulties in re-arrangement of groups as suggested above, it will, we hope, simplify the present complications existing in the trade. In our official duties, on several occasions we had to classify the fibres of different centres, and we adopted the following system. For each quality, certain marks were allotted, and the marks were distributed to each sample for each quality. The sample securing the highest marks was placed at the top. All the samples were thus arranged serially, according to the total marks obtained. This system worked satisfactorily, and the European jute merchants, who were invited in 1903 and 1904 to make valuation of the different samples of jute of different centres, approved of this system of examination, and admitted that the examination made in this way was most accurate.

BALED JUTE

The marks may be allotted as follows :—

	Quality.		Full marks.
A	(1) Strength	...	... 20
	(2) Length	...	... 20
	(3) Colour	...	... 20
	(4) Absence of roots...	...	... 20
TOTAL			... 80
B	Fineness ...	...	... 10
	Soundness	..	... 10
TOTAL			... 20
TOTAL FULL MARKS			... 100*

Now all the qualities of jute may be classified into the following groups with the marks allotted against them :—

1's	...	...	91 to 100 marks.
2's	...	...	81 „ 90 „
3's	...	...	71 „ 80 „
4's	...	...	61 „ 70 „
5's	...	...	51 „ 60 „
6's	...	...	41 „ 50 „
7's	...	...	31 „ 40 „
8's	...	...	21 „ 30 „
Rejections	...	...	11 „ 20 „

The full marks may be awarded to a standard quality of jute, when it possesses the following :—

Strength.—The fibre should not break easily when pulled or twisted. When it breaks it gives a hissing sound.

* The fibres are supposed to be free from fraudulent watering. The dry jute of commerce contains 8 to 10 per cent. of moisture, which may be accepted as natural moisture in jute fibres during the rainy season.

Length.—Standard length of fibre for full marks may be 10 to 12 feet with roots, not below 9 feet after the roots are cut.

Colour.—Creamy white.

Soundness.—Well grown fibre free from disease is said to be sound. Such defects as specky, knotty, cropy, *ghata*, etc., should be absent.

The other two points for consideration, *viz.*, fineness and absence of roots, require no explanation. It may however be said that from 6 to 18 inches are commonly cut from the bottom of fibres for spinning. Marks may be awarded according to the length of fibre thus left after rejecting the "cuttings."

It is hoped that the difficulties of grouping of fibres, both of the loose and baled jute markets, would thus be greatly minimised. The author respectfully invites the trade to consider the foregoing suggestions for assortments.

CHAPTER VII

THE HISTORY OF THE JUTE INDUSTRY:



THE history of the jute industry in Bengal is most interesting. The subject has been thoroughly dealt with in Sir George Watt's "Dictionary of the Economic Products of India," from which some extracts are quoted.

"There can be no doubt that jute was known to the people of India from comparatively remote periods, but, as indicated under *C. capsularis* and *C. olitorius*, from the confusion which existed down to the present century in the words *sunni*, *pat* or *patta*, *bhanga* and *hemp*, etc., names applied to certain Indian fibres, it is difficult to determine, for certain, many of the fibre-yielding plants referred to by ancient writers. The probability is that *sunni-hemp* (the fibre of *Crotalaria juncea*) was better and earlier known to the ancient Hindus than jute, and that the true hemp (*Cannabis sativa*) was known to them, if not brought to India by their invading and conquering ancestors. It is almost safe to assume that in very remote times *sunni*, *patta* and *bhanga* were synonymous and generic terms for fibre and coarse cloth, without much regard to the plant from which the fibre was obtained. If so, about the beginning of the present century, the word *pat* became fixed and associated with the fibre of *Corchorus olitorius* and *C. capsularis*. Prior to that date Government returns of exports from India mention *hemp* fibre; this must have been either *sunni* or jute, since the true hemp fibre has not been cultivated for centuries at least, and modern experiments have shown that the plant is not capable of cultivation as a source of fibre in the plains of India.

“With the advance of civilization, came an increased demand for cloth, at first as a luxury, and latterly as a necessity. Jute probably met this demand and, indeed the poorer people, little more than half a century ago, were largely clad in jute cloth of home manufacture, such as, at the present day, is used by the aboriginal tribes. The increased facilities for the importation of cheap European piece-goods checked, however, the development of this indigenous industry; but with the rapid progress in every other branch of enterprise, there opened up a foreign trade in jute which the agriculturist found remunerative. The resources of the rich plains of India, Burma, and China, and latterly of America, Australia and Egypt, were, by the British mercantile fleet, made available for the supply of grain. Bags were required for this trade, and thousands of rough gunnies were greedily bought up. The high price obtained was a powerful incentive to increased activity, and thus the gunny bag trade rapidly became a recognised part of the Bengal peasant's work. By and by, however, European machinery began to compete with manual labour, and in due time it gained the day. Jute was exported to Europe for cordage, and ultimately for the manufacture of the bags required in the grain trade. The first commercial mention of the word 'jute' is in the customs returns of the exports for 1828, when 364 cwts. were sent to Europe. Soon the agriculturist found that his time would be more profitably spent in preparing an extra quantity of fibre, than in manufacturing bags to compete with steam and mechanical appliances; the preparation of fibre speedily outstripped the demand for home manufacture, and a large export trade was established in raw jute to feed the Scotch mills. Thus transferred from its original home, the gunny trade took a new start in Dundee, and down to the year 1854 little or no effort was made to improve the Indian manufacture by the

application of European machinery. In that year, however, the 'Ishera Yarn Mills Company' was established at Ishera near Serampur by Mr. George Ackland, a large owner of coffee plantations in Ceylon, and a non-official member of the Legislative Council of that Island; these mills were afterwards called the 'Ishera Company, Limited,' and are now known as the 'Wellington Mills.' Three years later -(1857) the 'Borneo Company, Limited,' a company originally established to exploit the Island of Borneo, founded the mills now known as the 'Baranagore Jute Mills.' In 1863-64 the 'Gouripur Jute Factory' came into existence. Following these, factories sprang up rapidly in every direction around Calcutta. In the Trade Returns for 1869-70 the exportation of manufactured jute was 6,441,863 gunny bags manufactured by power and hand looms, and brought into competition with the Dundee bags. This trade developed steadily, and in 1879-80, ten years later, over 55,908,000 gunnies were exported from India.

"But speaking purely of India's foreign trade in jute and jute manufactures, it would seem that even with 24 large European factories at work in India, and the hand looms which still survive, scattered over the country; her raw jute interests are four times as valuable to India as her manufactures. A comparison between the exports of Indian 'power loom' as compared with 'hand loom' manufactures will still further show the extent to which the jute manufactures have passed out of the hands of the Indian peasants, who alone, little more than 40 years ago, met the demand for gunny bags. At that time (1850-51) the value of the gunnies exported was greater than that of the raw jute—the former being £ 215,978, the latter £ 197,071. There were no European factories in India in 1850, so that the market was supplied by the Indian peasant's hand loom."

There were 43 mills at work in Bengal and one in Bombay during 1907. The number of looms working in 1887 was 7,164, which increased to 9,841 in 1895 and to 23,884 in 1905 and to 39,401 in 1917. Now 76 mills are in working order and 16 new mills under construction. Out of the 76 running mills there are three in Madras, one in the United Provinces of Agra and Oudh, and the rest in Calcutta. The capital laid out for these 76 mills up to 1918-19 amounted to Rs. 14,07,14,680 registered in India and to £2,209,716 registered in the United Kingdom, including Rs. 3,42,90,500 and £71,358 respectively in debentures. During 1919-20 fourteen mills have been registered in India with an authorised capital of Rs. 6,62,00,000. These figures show a great development of the jute industry in Bengal. The actual consumption of jute by these mills has doubled during the last 10 years; while the foreign exports of raw jute continued to increase very steadily, each year exceeding the preceding one, up to 1914, when the great European War broke out. Since then the export of raw jute has enormously decreased. After peace had been declared, the Government restrictions were withdrawn; but there still remain the shortage of mercantile tonnage and other after-effects of the great war. Consequently abnormal trade conditions exist even now.

CHAPTER VIII

INDIAN MANUFACTURES



THE manufacture of jute fabrics by hand is an old industry of Bengal. Jute cloth was used for clothing by the poorer classes some 90 years ago. Since then the cheap and good-looking European cotton goods have completely replaced its use in this country.

The principal articles of hand-loom manufacture of India were gunny bags, mattings, rugs, and sails for country boats. It is said that paper was also manufactured out of jute in several districts in North and East Bengal. The Indian weavers used to dye the fabrics in red, black and yellow colours of their own.

Prior to 1857 the exports of jute manufactures from India represented hand-loom fabrics. In 1850 these manufactures were valued at Rs. 21,59,780 (£215,978). Since 1854, the hand-loom industry of jute has rapidly declined. During 1880-81 the value of the total exports of manufactured jute amounted to Rs. 1,13,06,716, of which hand looms accounted for Rs. 2,69,553; in 1887-88 the hand-loom manufactured articles exported were valued at Rs. 89,220 only, out of the total exports to the value of Rs. 1,15,18,577. The export of hand-loom manufactured articles has since entirely ceased.

The old hand-loom industry of jute in India is now well-nigh defunct. Gunny bags are now woven in some districts to a very limited extent for the weaver's own use or for his neighbours. The only industry still left in the hands of the people of this country is the manufacture of ropes wanted for everyday home use. A Bengali family consumes, at least, half a maund of jute a year for domestic purposes.

In the factories set up in India, jute is chiefly manufactured into hessian cloth and gunnies. "Rejections" and "cuttings" of jute were formerly used by paper mills, which are now utilised by the jute mills in manufacture of sackings. Coarse and strong qualities of the fibre are used in some steam rope works for cordage.

During the year 1917, there were 76 jute mills in India, out of which 72 mills were set up in Bengal with 39,401 looms—23,426 being hessian looms and 15,975 sacking looms. They are situated within a radius of about 50 miles in the neighbourhood of Calcutta. About 16 mills are under construction. The Jute district is steadily extending northwards from Calcutta on both banks of the river Hoogly.

On an average, there are about 500 looms and 10,000 spindles in each mill employing about 3,000 labourers. Each loom requires roughly 6 hands for spinning and weaving. Each hessian loom consumes approximately $1\frac{1}{2}$ maunds of jute per diem, while a sacking loom $3\frac{1}{2}$ maunds. For rough calculation, 30 maunds of jute produce 1 ton (1 ton=27·22 maunds or 27 maunds and 9 seers; 1 maund=82 lbs. and 2 ozs.) of finished goods. During 1918-19 the value of the jute manufactures exported is estimated at about £35,101,466 against £8,480,052 for the exported raw jute.

Since the great European War broke out in 1914, the price of the raw jute has fallen considerably, while that of the manufactured goods has risen to unprecedented points. The fact is that the export of raw jute was restricted by the Government owing to war conditions. The Indian mills took advantage of this situation and offered lower prices to the sellers of raw jute; on the other hand, as an organised body, they could demand higher prices for the manufactured articles. The result was, as might be expected, that the mills made enormous profit,

INDIAN MANUFACTURES

while the growers had to sell their crops at much reduced rates.

From the statement tabulated below, it will be seen to what magnitude India suffered from the effects of war, in its income from the exports of raw production of jute. This has terribly affected the interests of the cultivators of this country.

Values of exports of raw jute and manufactures

Year.	Value of raw jute in sterling.	Value of manufactures in sterling.
1913-14	£ 20,550,929	£ 18,848,759
1914-15	,, 8,606,802	,, 17,213,440
1915-16	,, 10,428,024	,, 25,318,934
1916-17	,, 10,858,736	,, 27,781,156
1917-18	,, 4,302,559	,, 28,562,050
1918-19	,, 8,480,052	,, 35,101,466

An immense quantity of gunny bags and jute cloth was sold by the Indian mills during the war. The uses of gunny bags for war purposes proved to be invaluable. They were used not only as packages for carrying rations or other goods, but strikingly as sand-bags, both for offensive and defensive operations, resorted to, by the belligerent allies.

There has also been an enormous expansion in the trade of jute fabrics in this country. The following table shows the value of the jute manufactures consumed in India from 1913 to 1918 :—

Year.	Value of bags. Rs.	Value of cloth. Rs.
1913	2,17,07,077	30,08,432
1914	2,13,92,166	34,16,188
1915	2,30,17,550	43,39,026
1916	3,35,76,045	70,30,838
1917	3,60,06,950	75,20,072
1918	4,84,91,700	1,43,78,730

It is a pity that the unprecedented prosperity, in the industry in India, has not been in the least shared by the growers, during the last war-boom seasons.

The number of looms and spindles in the Indian mills has steadily increased during this period—from 32,632 looms (Hessian looms 18,630 and Sacking looms 14,002) and 677,500 spindles in 1912 to 39,401 looms (Hessian 23,426 and Sacking 15,975) and 824,300 spindles in 1917. On an average, about 21 spindles supply yarn required for a loom. During the year 1917-18, 1,249,775,000 yards of cloth and 870,568,000 gunny bags were manufactured in India.

CHAPTER IX

EUROPEAN MANUFACTURES



IN Europe, the Jute weaving industry was first founded at Dundee in 1838. For a long time since, Dundee was the only manufacturing town in Europe. Latterly, the jute industry has been established in many towns in Europe and America, of which Hamburg, Dunkirk, Genoa, Trieste, New York (U. S.) and Philadelphia are the most important. It appears that Japan has also turned its attention to this industry. Up to the present, Dundee maintains its leading position in Europe. But the recent labour troubles in Europe would seriously affect the interests of the jute industry in Europe, unless a satisfactory solution of the labour troubles is found out. The capitalists must have been considering these difficulties.

India's monopoly in the raw produce of jute and cheap labour suggest that further development in the manufacture of jute would before long take place in India. Fortunately, for this country, the use of this fibre is increasing every year. It is India's interest to rise to the occasion to remove any defect in the fibre, and no deterioration should come in. Complaints, although imaginary, have been frequently made of the deterioration of the fibre. Fraudulent adulteration of jute must cease, otherwise the industry is likely to suffer in the future. It may be noted that persistent efforts are being made in other countries to introduce the cultivation of jute.

In European countries and America jute is manufactured into shirtings, curtains, carpets and rugs. The great bulk of this fibre, however, is made into such commoner classes of cloths as hessian, bagging, tarpauling and sacking. Finer qualities are used for mixing with silk or for manufacturing imitation silk fabrics. It

is also mixed with wool. Rejections and cuttings of jute are made use of in the manufacture of paper, and coarse but strong stuffs in cordage. The attempts at spinning higher counts than twenty have not yet been successful.

It has been applied extensively as a substitute for hemp; for this purpose, the fibres are rendered soft and flexible by being sprinkled with water and oil, in the proportion of 20 tons of water and $2\frac{1}{2}$ tons of train oil to 100 tons of jute. The jute is then left for 24 to 48 hours. After being squeezed by rollers and dressed with a hackle, the fibres become so beautifully soft and minutely isolated that it is suited for a number of purposes unknown a few years ago.

In the year 1820, the jute was first experimented with in Europe, but the result was unfavourable, and, in consequence, brokers were required to certify that sales of hemp and other fibres, exported out of India, were not adulterated with jute. In 1832, in Dundee, experiments were again conducted with the fibre. The result was encouraging, and it was suggested that it might be used as a substitute for hemp. From that date jute gained rapidly in public favour.

Jute is one of the fibres that is capable of the most minute separation or subdivision, but only within the past few years, it has been extensively used in the finer textile industries. For a long time, the difficulty of bleaching seemed insurmountable, and the trouble experienced in dyeing the material appeared likely to nullify every effort to utilise it. All these stumbling blocks have, at last, been removed. But its perishable nature, however, is fatal to its obtaining a position much higher than it has already attained.

The results of the chemical and microscopic investigation of jute, instituted by Messrs. Cross, Beaven and King, a few years ago, were that one sample experimented

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with was made to resemble *tasar* silk so closely that some care was necessary in distinguishing these substances, and another sample looked remarkably like wool. Before long, it is hoped that it should be quite possible to utilise the jute fibre for more useful purposes, by chemically altering its properties.

CHAPTER X

INDIAN MILL HANDS



IN the mill districts in Calcutta there were over 262,000 labourers working during 1917-18. There has, of late, been labour unrest in India too. This difficulty, if it arise, should be tactfully dealt with. It must be remembered that the Indians are, in general, a sensitive people. An Indian, specially referring to the poorer classes, leads a very simple life. He lives on poor and cheap foods, sleeping in huts, even under the shade of trees if required. Owing to this and other circumstances, the capitalists would suffer more from a strike than the poor strikers. If the authorities bear in mind that any kindness shown to them would hardly be forgotten, as is characteristic to an Indian, there would be no strike. If there be a strike in a mill, to avoid future trouble, kindness should always follow the strike.

Labour scarcity may occur at any time, due to outbreak of epidemic diseases. The labourers would run away like anything without any consideration for money or comfort. The mills must therefore guard against epidemics.

Ordinarily, labour scarcity occurs in the mill districts twice in a year: firstly, from the end of April to the middle of July; and secondly, from the end of November to the beginning of February, during the sowing and harvesting seasons of paddy respectively.

In the mill districts, there are principally four classes of labourers. The most important among them are the Bengalees who are intelligent, steady and fit for any skilled work. Next come the up-country men, including both the Hindus and the Mahomedans, who are hardworking

INDIAN MILL HANDS

hands, but rough. They often indulge themselves in drink, getting intoxicated and sometimes causing disturbances in the mill localities. The Uryas are a class of men who are intelligent and docile, but timid. There is another class of workers who will not stick any where. They will work for a few days in a mill and go away to another. They are not at all reliable and cannot be depended on. At the present time, Madrassé labour is also imported, while the Bengalee workers are getting smaller and smaller, forming only about 10 per cent. of the whole labour force employed in the mills. About 30 years or so earlier, the mill hands were all Bengalees. The wages earned by a labourer in the mills are not perhaps sufficiently attractive to a Bengalee.

Wages are commonly paid to a labourer on the following scales, as given in the Industrial Commission Report, 1918 :—

Nature of Work.	Amount per mensem.	
Carders (about 6 % of the labour force)	Rs.	9
Drawers " 6 "	" "	————
Rovers " 7 "	" "	" 12
Spinners " 14 "	" "	" 15
Shifters " 14 "	" "	" 11
Winders " 11 "	" "	" 18
Beamers " 1 "	" "	" 22
Weavers " 20 "	" "	" 27
Mistries " 9 "	" "	" 30
Coolies " 12 "	" "	" 13

For want of education, Indian labourers have little sense of self-respect. They would idle their time if not properly supervised. In the contract system of work, they are all right. Both for the mill people's efficiency and morals, the mills should arrange night schools for

them and provide them with good dwelling barracks within the mill compounds. In addition to a course of primary education, a course of regular lectures on sanitation, duties, etc., should be introduced. Provision may also be made to afford occasional recreation to the workers. The mill authorities should establish co-operative stores to supply the labourers with necessary articles at cost prices, in order to save them from the clasp of unscrupulous *bantias*. A provident or bonus fund is urgently required to be opened in each mill for the welfare of the mill people. The labourers might be helped from this fund at times of unforeseen difficulties and on retirement. Thus, in short, the efficiency of the Indian labour force can greatly be improved and the possibility of a strike would be minimised.

CHAPTER XI

FAMOUS JUTE MARKETS

Narainganj



THE Narainganj market is supplied with jute, in the beginning of the season, from Bikrampur in the district of Dacca, and the adjoining *char* lands in Dacca and Tipperah which are annually inundated. This jute resembles the District quality.

As the season advances, jute from the interior of Mymensingh and Tipperah begins to come in. The high-land jute of these districts is exceptionally good in quality, and its colour and gloss do not fade for a long time in storage. The fibre of this market is strong and free from fraudulent watering. The peculiarity of this quality of Narainganj jute is that it is hard and strong, and bears more tension in spinning. The season closes here in February, when jute containing sacking-warp is only available. It is difficult to keep up the guaranteed warp of 60 per cent. during this period of the season, when a separate assortment of X₃'s is made.

The cuttings obtained from Narainganj jute are the longest, and best for use in the mills as hessian-waft. Narainganj jute is mixed with other qualities in the following proportions, in batching of fibres:—

Narainganj (strong)	...	...	2 parts
Serajganj	...	...	1 part
	or		
Narainganj (strong)	...	...	2 parts
Serajganj	...	...	1 part
Haldibari (soft)	...	...	1 ,,
	or		
Narainganj (strong)	...	...	2 parts
Madaripur (hard-strong)	...	...	1 part
Serajganj (soft)	...	...	1 ,,

Dacca

This quality of jute is obtained from parts of Dacca and Mymensingh districts. It comes into the market early in the season and is available for four months only till the end of October. After October, the Dacca purchasers get their supply from Mymensingh district both by river and rail.

The white colour of the fibre of low-lying tracts changes to reddishness after three or four months. It is a strong fibre.

From the latter part of the season, Dacca supplies the quality similar to that of Narainganj, *i. e.*, a strong and sound jute.

Serajganj

In the beginning of the season (*i. e.*, July), local jute called *Deswal* is imported here. It is a medium fibre, neither very fine nor thick, of both white and blackish colours and but little rooty. As the season advances, jute from the other side of the river Jamuna—Panibari, Sarishabari, Porabari, etc.,—comes in. This quality of jute, which is different from the local low-land jute, is very good in colour, strength and fine texture, yielding 50 to 70 per cent. hessian.

Afterwards, jute from Bogra and the Southern part of Rangpur is imported. From October, *Deswal* and Mymensingh qualities are getting rare, while the market is mainly supplied with the jute of the parts of Northern Bengal, Assam and Cooch Behar, carried by boats.

The Northern jute is generally of very good quality, although without any particular colour. It is soft and bears more twist. The jute grown by the river Teesta (a tributary to the Brahmaputra) is strong and fine. A limited quantity of *C. olitorius* called *Tosha* jute is also available at Serajganj.

FAMOUS JUTE MARKETS

For convenience of communications, jute is sold at Serajganj throughout the year. In importance as a jute market, Serajganj occupies the second position next to Narainganj. Fraudulent watering is practised in the Serajganj local qualities.

Northern Markets

The jute from Northern districts comes into the markets somewhat late in the season. Before September the supply is limited. The jute of these tracts is fine and soft, consequently the Calcutta mills use this quality for batching purposes, in mixture with other hard and strong qualities. The North Bengal jute is soft and somewhat weak.

Purnea

Purnea jute is not included in the quality of the Northern jute. It is inferior in colour, strength and length. White stuff is rare. It is grown generally on low lands. Kissenganj, Barsoi, Kasba and Forbesganj are the principal markets in this district. A better class of jute is however imported into the district from Morang in Nepal State.

Madaripur

The Madaripur jute is mainly grown in the low country washed by the Ganges. In most parts of these tracts silts are deposited annually. It is a strong and coarse fibre of inferior colour. This quality, on the whole, is considered to be the best for sacking warp. The low grade jute of the Madaripur Division, with or without tap-roots, is called *Dowrah* jute.

Madaripur market is opened early in the season. The crops of the districts of Faridpur, Backerganj, and parts of Khulna are sold here.

The practice of fraudulent watering is usually higher in this Division than anywhere else. "Heart damaged" is the common complaint against this jute. Sometimes the "Heart damaged" jute of Madaripur, when opened, would give nothing but dusts as its contents. For this reason, the greatest care is to be taken to examine the bales imported from Madaripur.

Of late, the quality of the Madaripur jute has greatly improved. The malpractice of fraudulent watering is coming to an end. Formerly the raiyats used to uproot the plants for harvesting instead of cutting at the roots. The system of cutting is now widely practised.

For the improvement of jute of this Division, the recent introduction of the system of thinning the plants in the fields, some time before the flowering stage, is commendable.

Cuttack

Cuttack quality of jute comes from Orissa. It is a coarse (thick) but strong jute, suitable for sacking warp if free from sticks (broken stalks). The fibre of the Cuttack Division was, until recently, more or less sticky. This defect is being steadily removed.

CHAPTER XII

A LIST OF JUTE MARKETS

A. Markets dealing in the "Jat" Quality of Jute

Mymensingh	Nicklidampara (Karimganj)
Kaoraid (Mymensingh)	Mymensing
Shambhuganj "	Gouripur (Mymensingh)
Jamalpur "	Deonganj "
Sherpur "	Dacca
Pearpur "	Narainganj (Dacca)
Ballipara "	Akhoura (Tipperah)

B. Markets dealing in the "District" Quality of Jute

Elashin (Mymensingh)	Sreenagar (Dacca)
Ballah "	Lohaganj "
Naga "	Ghior "
Panibari "	Kanchanpur "
Sarishabari "	Kalliganj
Nandanpur "	Baira "
Shaturia "	Shinghair "
Bahadurabad "	Chilmari (Rangpur)
Bhairab Bazar "	Chandpur (Tipperah)
Benanai "	Ashuganj "
Soya "	Pabna
Bilasipara "	Dewantala (Bogra)
Babuapara "	Fulchhari "
Kedarpur "	Pabna
Jamurki "	Nagarbari (Pabna)
Ratanganj "	Nakalia "
Mirjapur "	Berah "
Porabari "	

C. Markets dealing in the "Northern" Quality of Jute

Haldibari (Rangpur)	Shookanpukur (Bogra)
Domar "	Mahimaganj "
Nilphamari "	Santahar "
Saidpur "	Chilhati "
Rangpur "	Jaypurhat "
Kurigram "	Dinajpur "
Durwani "	Raiganj (Dinajpur)
Tulshighat "	Jaffarganj
Naldanga "	Mirganj
Alipur "	Jalpaiguri
Rajshahi	Siliguri (Jalpaiguri)
Raninagar (Rajshahi)	Cooch Behar
Atrai "	Mathabhanga (Cooch
Khansamahat (Bogra)	Behar).

D. Markets dealing in the "Madaripur" Quality of Jute

Barhamganj (Faridpur)	Panchuria (Faridpur)
Madaripur "	Goalundo "
Goalah "	Rajbari "
Rajore. "	Belgachi "
Khejurtala "	Pangsha "
Patarhat "	Osmanpur (Nadia)
Idilpur "	Kumarkhali "
Faridpur	Kushtia "
Khankhanapur "	

E. Markets dealing in "Non-Standard" Qualities of Jute

Kissenganj (Purnea)	Forbesganj (Purnea)
Barsoi "	Azimganj (Murshidabad)
Purnea	Jessore
Kasba "	Cuttack

A LIST OF JUTE MARKETS

F. Markets dealing in the "Daisee" Quality of Jute

Baidyabati	Chanditalla
Sheorafulli	Baduria
Belgachia	Chanduria
Kristaganj	Magrahat
	Kalna

The Calcutta Bazar includes the following markets where loose jute business is carried on :—

Hatkhola	Baghbazar
Ultadanga	Chitpore
Shambazar	Fulbagan

CHAPTER XIII

JUTE DEALERS



THE business of selling and buying is effected by some classes of middlemen. The first of them are those who are called *beparies* or *farias*. They visit the cultivators at their houses, settle the price, make weighing, and carry the fibre to the *mahajan*, a trader who advances money to the *beparies* for purchase of jute. The *bepari* gets a commission of about 2 annas per maund. Some *beparies* have their own small capitals. They are, for the most part, a class of illiterate men, who care little for honesty. By this class of dealers, the cultivators are cheated in weighments, the fibres are fraudulently watered and sold to the *mahajans*, or made over to them if advances were already made for the purchase. Still their services are indispensable. The *mahajan* is an Indian trader of substantial means. He must have a godown of his own, where he stocks the loose jute purchased. He makes the loose jute into drums or *katcha* bales and sends the jute either to an *aratdar* in Calcutta for disposal, or sells it to a local agent of a baler or a shipper or a mill. An *aratdar* is an important personage of the Indian trade. He must have big godowns. He sells goods sent to him by *mahajans* or *beparies*, on some occasions at his own discretion, if no other special agents are appointed by the sellers to look after their sales. For this work he gets a commission from the sellers. He is to make from time to time advances to his constituents on terms settled between the parties. Now appears a broker. Without his assistance no business can be effected effectively. He must thoroughly be conversant with the market. He should have a perfect knowledge in different qualities. He must be

a person of confidence. Both the sellers and the buyers rely on his honesty. The sale is entirely operated by his co-operation between the sellers and the buyers.

Balers are the buyers of raw jute, who bale the jute by means of the press worked with steam power, for export.

The merchants, who export jute to other countries, are called the shippers. They purchase baled jute, as well as raw jute to be baled by them, for export. Many shippers have their own presses. If they have not got presses of their own, they get the raw jute baled in the presses belonging to others, on the hire or contract system.

There are some organised associations of the Calcutta jute dealers. Each association looks after the interests of its members in the trade. The members of an association are to abide by the rules and by-laws of the association. The following are the well-known associations in Calcutta :—

Indian Jute Mills Association

This Association was established in 1884. The aim and intention of the Association is to encourage united feeling and action to protect the interests of the mills.

All persons owning and managing jute mills or holding power-of-attorney to represent them in India, are eligible to join the Association on payment of the annual subscription in advance at the rate to be fixed at each Annual General Meeting. The subscription is calculated on the number of looms or spindles owned or managed by each member. It amounts to a big sum, the rate being between annas eight and rupee one per loom per annum.

The Association is managed by a Committee consisting of a Chairman and four members, who are appointed at the

Annual General Meeting each year. The Secretary of the Bengal Chamber of Commerce is *ex-officio* Secretary of the Association.

Calcutta Baled Jute Association

The object of this Association is to regulate the Baled jute trade in Calcutta.

All firms or persons interested or desirous to engage in the baled jute trade are eligible as candidates for membership of the Association. The candidates for membership shall be proposed by one member of the Association and seconded by another. Elections shall then be made finally by the Committee, who may elect or decline to elect a candidate as a member. The members are to abide by all the rules and by-laws of the Association then, and as from time to time, in force.

Each member shall pay an entrance fee of Rs. 500 on joining the Association, and the subscription of Rs. 32 annually, payable in advance in the month of September.

The members of the Association shall register with the Association a list and description of the marks and counter-marks of the baled jute they may offer for sale in the Calcutta market.

The members of the Association shall not do any business in Calcutta or elsewhere in India in any baled jute, cuttings or rejections with or for any firm or person who is not a member of this Association, save and except with the Calcutta jute mills.

The general management of the business and affairs of the Association shall be entrusted to a Committee consisting of nine members, to include an equal number, each, of the representatives of the Shippers, Balers and Brokers. The members of the Committee shall be elected by a majority of the votes of members at the

Annual General Meeting. The Committee shall elect their own chairman. The Secretary of the Bengal Chamber of Commerce shall be *ex-officio* Secretary of the Association.

Jute Dealers' Association

This Association has lately been established in Calcutta by the European dealers in loose jute. The rules and regulations for membership and management of affairs of this Association are not known to us. The Secretary of the Bengal Chamber of Commerce is *ex-officio* Secretary of this Association.

Indian Jute Association

The general object of the Association shall be the regulation and development of the trade in jute and the protection of the common interests of its members.

All firms or persons interested or desirous to engage in the jute trade shall be eligible as candidates for membership of the Association.

Any other person or firm whose connection with the Association may be considered desirable in the interests of the Association may be eligible for election as member by the Executive Committee.

Candidates for membership shall be proposed by one member of the Association and seconded by another. The proposal shall be in such form as the Committee may from time to time prescribe, shall be signed by the candidate, and his proposer and seconder, respectively, and the name of the candidate shall be put up on the notice board of the Association and kept there for at least one week. All objections, if any, should be communicated in writing to the Secretary within a week from the date of the notice.

All elections under these rules shall be made by the Committee, who may elect or decline to elect a candidate as they shall in their absolute discretion determine, and if elected, the candidate shall forthwith become a member of the Association and be subject to the rules of the Association then and as from time to time in force. Each member shall have one vote.

Each member shall pay an entrance fee of Rs. 15 on joining the Association.

The subscription for membership shall be Rs. 35 annually, and always payable in advance.

The affairs of the Association shall be managed by an Executive Committee consisting of 25 members, including the office-bearers, *viz.*, the President, Vice-President, one Honorary Secretary, one Assistant Secretary and one Treasurer. The members of the Committee shall be elected at the Annual General Meeting from amongst the members of the Association. Office-bearers shall be subsequently elected at the meeting of the Committee.

Calcutta Jute Balers' Association

This Association was founded in 1909 to provide rooms and other facilities to Indian Jute Balers, Shippers and Traders for holding and conducting sales of property, brokerage or commercial transactions, etc., to promote, protect and watch over the general commercial interests, to collect and circulate statistics and other information relating to the trade, to adjust controversies between members, to arbitrate in the settlement of disputes arising out of commercial transactions, and to maintain uniformity in rules, regulations and usage of trade. The Association was incorporated on the 8th June, 1918, under Section 26 of the Indian Companies Act of 1913.

JUTE DEALERS

The affairs of the Association are managed by a Committee of four members elected annually by the members at the Annual General Meeting and a chairman elected by the Committee. The routine office work is conducted by the Secretary.

Merchants and firms carrying on or desirous to carry on trade in baled jute in Calcutta may be elected as members of the Association. A candidate for election as a member shall sign the prescribed application form and be proposed by one and seconded by another member in the form itself, and shall deposit therewith a sum of Rs. 300 as admission fee and Rs. 216 as the annual subscription in advance. The Committee may elect or decline to elect a candidate as a member of the Association.

CHAPTER XIV

GLOSSARY OF DEALERS



RATDAR—An Indian commission agent who sells goods sent to him by *mahajans* or *beparies*, at his own discretion, if no other special agents are appointed by them to look after their sales. The *aratdar* charges a commission generally at the rate of one anna and three pies for every maund of jute sold, besides actual godown rent.

The *aratdar* is always responsible for the recovery of the money for goods sold. He now and then gives advances to his respectable *beparies*, for which an interest of 12 per cent. per annum is charged. An *aratdar* must be a rich person.

Baler—A jute dealer who buys loose jute and, after assortments, makes it up into bales of 400 lbs. each of the quality or qualities thus assorted, separately, and sells his stock either to shippers or the local mills for manufacture of gunnies or gunny cloth.

Bepari—An Indian trader who has no godown of his own. He carries on his business at the places of *mahajans* or *aratdars* for which he pays a commission at the rate of about 2 annas per maund. He disposes of this jute at local markets or despatches it to an *aratdar* in Calcutta for disposal.

In the Calcutta Bazar, the *bepari* pays the buyers $\frac{1}{2}$ anna per maund as brokerage, and Re. 1 per Rs. 1,000 as cashier's fee, and 4 annas per one hundred drums as *jalpani* (tiffin charge).

Broker—An agent employed to effect bargains or contracts between buyers and sellers for which he gets from the latter a commission called brokerage at the rate of 1 per cent. of the value of goods sold. In the

Calcutta Bazar, he gets 3 to 6 pies per maund of the loose jute sold.

Champadar—One who places jute over the scales for weighing.

Dalal—A Bengali term for a broker.

Faria—A petty Indian trader who goes about from house to house and buys jute from the raiyats. He disposes of it to other higher traders.

Jachandar—A person who examines the quality of the fibre of every bundle to be weighed, on behalf of the buyers.

Kapali—A Bengali sack-weaver by caste.

Koyal—A weigher who is an employee of the *araddar*

Mahajan—An Indian trader who buys jute at markets either from raiyats or *farias*. He generally sends his goods in drums to an *araddar* in Calcutta for disposal. He must have godowns of his own. If he has any *bepari*, he must help him by all means. A *mahajan* is also called *bepari* by the *araddars* if he sells his goods through them.

Ojan Sarkar—A clerk who notes the weights of bundles when weighing is made.

Paikar—Same as *faria*.

Raiyat—A petty Indian cultivator.

Shipper—A merchant who exports jute in bales out of India to foreign countries.

Under-broker—A broker who cannot approach the buyers, but effects business through a broker. The broker allows him a share of 25 per cent. in the brokerage.

CHAPTER XV

TERMS DENOTING QUALITIES OF JUTE



HERE are special terms denoting the qualities of jute used by the jute dealers in Bengal. Unless explained, the terms would not be intelligible to those who are not already in the jute trade. The following terms are in common use :—

Actuals—Specified marks of jute, guaranteed of some standard qualities, shipped during the two previous seasons, and recognised by the Calcutta Baled Jute Association, the London and the Dundee Jute Associations.

Ashmara—Weak stuff.

Ash mota—Coarse fibre.

Barky—The fibre containing epidermic bark which is not removed from the fibre in washing is called barky.

Batch pat—Fibre from immature plants rejected at the time of thinning.

Bombay—A hard, short and barky fibre with or without tap roots.

Bukchhal—Barky fibre at some middle places, due to plants being allowed to grow in flood water.

Croppy—Fibre having top ends rough and hard.

Dagi—Damaged.

Dana—It is used to mean a fibre, specially when the fineness or coarseness of it is referred to. Literally *dana* means a grain.

Fine—Fibre of superior quality, of which the *dana* (grain) is not coarse or thick, and free from impurities.

Flabby—Wanting in firmness—loose.

TERMS DENOTING QUALITIES OF JUTE

Fulpat—Immature stuff cut at flowering stage. This fibre is excellent in colour.

Ghatta—Indicates that the fibre is entangled and cannot be separated easily.

Glossy—Denoting the quality of a class of jute which possesses a good lustre.

Heart Damaged—So badly damaged, due to fraudulent watering, that the fibre changes to a powdery mass.

Knotty—Full of knots. Knot is a portion of fibre agglutinated which resists separation, mainly due to an insect bite or puncture on the growing plant.

Mora head—A term applied to jute when a bunch of fibre is folded for pressing. It is twisted at the head of the fold. It is not done commonly in case of "Rejections" class of jute.

Mossy—The low-land jute with numerous adventitious roots produced in swamps.

Rooty—The jute containing roots is called rooty.

Specky—Containing patches of outer bark here and there.

Sticky—Fibre with broken pieces of sticks or piths (stalks). This word has also been used in some places when the epidermic bark of a plant growing on certain soils is not easily removed from the fibre after retting process.

Substitutes—Marks of the grade and quality equal to those of *actuals*, of which they are substitutes.

JUTE IN BENGAL

PART V—STATISTICS

CHAPTER I

FORECASTS OF ESTIMATE OF OUTTURN



FORECASTS of outturn of jute are published by Government twice in a season. The preliminary forecast estimating the area sown with the crop and giving a description of weather conditions of the season for sowing and general condition of the crop, is out in the middle of July, and the final forecast, which is published in the middle of September, deals about the change in the area, if any, and the estimated outturn and the weather conditions during the growing period. The estimated outturn is the principal item of the report with which the trade is chiefly concerned.

The forecasts are prepared by the offices of the Provincial Directors of Agriculture on the basis of reports submitted by the District Magistrates, who collect the information through the agencies of the Police.

The first important factor in preparing an estimate of outturn is the area under a crop in a year. Unfortunately there is no Government agency in a village in the jute growing provinces to report on the area cropped accurately. Police reports are not of much value, unless they are thoroughly checked by experienced officers of the Agricultural Departments. The area reported in the Survey and Settlement Reports cannot also be taken as accurate, as

FORECASTS OF ESTIMATE OF OUTTURN

far as jute is concerned, for the area under jute varies considerably from one year to another, and secondly, as only the paddy stumps are found on the fields when surveyed, considerable portions of the area under jute is shown under paddy. Paddy is transplanted in the same fields, just after jute is cut, in some parts of the country. However, the portion of the area under jute in relation to the whole area cropped, may be roughly estimated by experienced men. The whole area cropped is accurately given of the districts which have been surveyed. Lately, efforts are being made to get reliable estimates of the area under jute, through the village *Panchayets*. The *Panchayets* prepare schedules showing the names of the cultivators of a village and the estimated areas sown with jute by them. Unless the fields are actually surveyed after the seed is sown, the estimate cannot be taken as correct. I checked, on many occasions, the figures thus submitted by the *Panchayets* of some parts of Purnea and found that the *Panchayets'* figures are, on an average, less by about 6 per cent.

The raiyats are suspicious of any work undertaken by the Government. They would hardly give accurate figures to the *Panchayets*. From financial consideration, it would not be possible for Government to employ an *amin* (surveyor) in each village for preparing crop reports. In these circumstances, until the raiyats have confidence in the officers under the Government, there would not be any other way that can be suggested for preparing agricultural returns. As a first step, to inspire confidence, we would suggest to organise village societies, taking a representative from each family. These societies will form the backbone of the country very soon, if once organised properly. The co-operative societies should be amalgamated with them. They will lend money to the deserving men; they will decide petty disputes both civil and criminal, and will help Government gradually in every way. They will also sell all the produce of the village

and take one or one-half anna from each rupee sold. So, after a few years, fund will be accumulating from which money can be lent to the members on nominal interest. In this way, the oppression of the *mahojans* or *baniyas* will cease, and the petty traders called *farias*, who are responsible for fraudulent watering of jute and adulterating other crops, will be extinct. In a word, all the corruptions of the rural country will disappear, in a short course of time, and the country will be prosperous. It is hoped that both the Government and the people will combine to form such societies. These societies would be most useful institutions for supplying Government with accurate information relating to area and outturn of crops, and to all other matters in which the people and the Government are interested.

The next factor, for estimating outturn at present, is the "standard normal outturn." This normal outturn of a crop, per acre, on an average soil, in a year of an average character of seasons, is ascertained by Government from past experience, on the basis of various crop-tests, in various parts of a province, conducted by Government officers. The figures of average outturns are ordinarily revised by Government once in five years.

There is another factor for calculation of outturn. It is the "fraction representing the relation of the crop reported on to the normal crop per acre," what is known as "percentage estimate." The cultivators estimate the crop outturn in annas or sixteenths—sixteen annas representing the full crop. A crop above sixteen annas, according to the raiyats' estimate, is a bumper crop. But commonly, raiyats underestimate their crops. Sixteen annas are, therefore, taken to represent a bumper crop, while twelve annas a normal crop, that is, cent. per cent. In some parts of India, sixteen annas however express a normal yield. The normal outturn of jute in Bengal is

FORECASTS OF ESTIMATE OF OUTTURN

taken at 3.5 bales per acre, 3.3 bales in Assam and 3 bales in Bihar and Orissa (1 bale = 400 lbs.) When these three factors are determined, they are multiplied to arrive at the required estimate of outturn.


Thus taking the area under jute in Bengal in 1919 at 2,500,000 acres, the standard normal outturn at 3.5 bales per acre, and the "percentage estimate" at 80, the required estimated outturn may be worked out as follows:—

$$2,500,000 \times 3.5 \times \frac{80}{100} = 7,000,000 \text{ bales.}$$

The crop forecasts are issued in English which never reach the cultivators. They are quite in the dark as to why the information regarding area, etc., under a crop is wanted by Government. This is the main reason of their being suspicious. The object and usefulness of forecasts may be made known to the cultivators if vernacular editions of the publications be distributed among them. Thus they would be able to judge for themselves that it is for the benefit of the cultivators and traders alike the forecasts are published.

CHAPTER II

PRICES

HE export of jute to foreign countries commenced in 1828. Before that time, it is said to have been sold at Re. 1 per maund, at its highest; the ordinary rate was one pice a seer. Ever since that time the price of jute has been steadily rising. During 1845 the prices were recorded at Rs. 9-4 in January and at Rs. 8-10 in July, per bale (5 maunds), in Calcutta. The price of picked quality reached Rs. 30 per bale in 1882. Then there was a fall-off to Rs. 25, during a short period of five years. The market again steadily rose till 1894, when the picked quality was sold at Rs. 44 per bale. There was again a fall, which continued till 1904, when the picked quality was sold at Rs. 36 per bale. Since then, the market was again on the rise up to the year 1913. The maximum price per bale of ordinary quality (M) reached Rs. 69. The market continued to be dull from 1914 to 1919, owing to restrictions on exports, during the period of the great European war, and to shortage of tonnage and other difficulties following, after declaration of peace. It is however hoped that the normal condition of the jute market will soon prevail. The sellers appear to be firmer, although the buyers are reluctant, during this season, 1920-21. A short outturn is estimated this year.

The period from July to December is the busy season of the jute trade, the first six months of a year, from January to June, being the dull season. Often however the market is stronger during the dull season than in the busy season, when the stock in hand runs short, and the demand for the fibre is still keen. New crops begin to come in in July, which sell at higher prices. The following tabular statement will show the variation in prices of jute since 1873.

STATEMENT I

*Showing Prices of Jute, Hessian Cloth and Gunny Bags
at Calcutta Market*

Year	JUTE 'M' GROUP. MEDIUM QUALITY.				HESSIAN CLOTH, 10½ oz., 40", per 100 yds.				GUNNY BAGS, No. 2 TWILL, 44" × 26½", per 100.			
	January.		July.		January.		July.		January.		July.	
	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.
1919	77	0	81	0	21	0	28	0	58	0	61	0
1918	37	0	43	0	49	0	45	0	68	0	67	0
1917	53	0	40	0	17	8	18	0	44	8	43	0
1916	48	8	48	8	19	4	17	4	43	0	40	8
1915	42	0	48	0	11	0	22	0	34	0	43	8
1914	48	8	67	0	17	0	13	8	42	8	42	8
1913	60	0	69	0	17	8	17	0	39	4	39	0
1912	48	0	49	8	12	0	15	4	36	0	36	8
1911	50	0	54	8	10	0	11	12	30	0	32	12
1910	32	0	33	0	9	3	8	11	28	8	27	4
1909	33	8	30	0	10	0	9	4	29	4	26	4
1908	36	0	39	0	11	0	11	5	33	0	28	8
1907	58	4	45	8	15	2	14	12	33	12	37	0
1906	45	4	67	4	11	10	14	2	31	14	31	8
1905	33	10	40	0	9	14	11	2	27	0	24	8
1904	31	8	33	0	9	14	9	14	23	8	24	4
1903	33	0	34	0	9	8	10	0	21	0	21	8
1902	28	0	34	0	9	12	9	12	21	4	20	4
1901	30	0	34	8	11	0	11	12	23	0	22	12
1900	32	8	35	0	10	12	10	6	25	8	22	0
					March				March			
1873	...	...	...	..	11	0	...	...	22	0	...	..

STATEMENT II

*Showing current Prices of Jute of different Groups
at Calcutta*

Season 1920-21, September

A. Baled jute, per bale of 400 lbs. (5 maunds of 80 lbs. per maund).

Groups.	Price of marks of distinction, in rupees.	Price of ordinary marks, in rupees.
Diamonds	P. A. or equivalent 225	200
Reds	Şikdar 175 to 200	100 to 125
Firsts, 2/3, 50% each	90 to 110	70 to 80
Daccas ,, ..	90 to 100	70 to 80
Lightnings ,, ..	60	50
Mangos ,, ..	60	50
Hearts ,, ..	40	30
Daisee	70	60
Rejections	40	20
Bagging cuttings	35	30
Narainganj ,, ..	20	16
Mixing ,, ..	16	12

B. Loose jute, per maund of 82 lbs.

Groups.	Price of Narainganj quality.	Price of Northern quality.
1's	30	Not available.
2's	20	18
3's	17	15
4's	13	11
X 4's	10	8
Rejections	7	6

The figure 2, in the baled jute, indicates long jute, while 3 short jute, irrespective of particular colours. The price of the quality 3 in baled jute is less by about 33 per cent. than that offered to the quality 2.

STATEMENT III

Showing the estimated Area and Yield of Jute in Bengal, Assam, Bihar and Orissa and other places (Cooch Behar, Nepal, etc)

YEAR.	Area under Jute in acres. (a)	Yield in bales of 400 lbs. each.
1919-20	2,821,500	8,428,000
1918-19	2,500,400	6,955,600
1917-18	2,736,000	8,864,600
1916-17	2,702,700	8,305,600
1915-16	2,375,900	7,340,900
1914-15	3,358,700	10,443,900
1913-14	2,911,000	8,893,900
1912-13	2,970,500	9,842,800
1911-12	3,106,400	8,234,700
1910-11	2,937,800	7,932,000
Average.		
1910-11 to 1914-15 ..	3,057,000	9,069,000
1905-06 to 1909-10 ..	3,264,000	8,136,000
1900-01 to 1904-05 ..	2,335,000	7,036,000
1895-96 to 1899-1900 ...	2,035,000	5,771,000
1892-93 to 1894-95 ..	2,207,100	5,621,100
1886-87	1,284,000	3,852,000
1880-81	910,000	2,730,000
1872-73	926,000	2,778,000

(a) Excluding Nepal.

No statistics of area and yield of jute in Nepal are available. On an average 72,000 bales of jute are annually imported from Nepal into British India, which have been included in the yield.

STATEMENT IV

*Showing estimated Area under Jute in different Districts
in Bengal, Assam, Bihar and Orissa*

DISTRICTS.	1872.	1880.	1890.	1900.	1910.	1919.
	Acres	Acres.	Acres	Acres	Acres.	Acres.
Bengal						
Burdwan ...	4,000	900	.....	11,000	16,300	6,600
Midnapur ...	8,000	300	.....	12,500	10,700	11,900
Hoogly ..	34,600	25,000	9,700	13,300	52,400	30,800
Howrah ..					33,800	9,800
24-Parganas ..	47,100	59,900	41,700	37,700	80,000	63,300
Nadia ...	1,000	18,600	30,000	36,000	36,100	67,100
Murshidabad...	3,600	2,400	.....	24,200	15,800	20,800
Jessore ...	6,405	4,700	40,400	28,600	48,700	84,600
Khulna ...	.....	.....	27,800	16,100	16,200	21,600
Jalpaiguri ...	50,000	15,400	20,500	63,000	94,800	49,300
Rangpur ...	100,000	131,200	600,000	277,000	237,600	207,600
Dinajpur ...	117,600	14,600	96,000	80,000	92,000	60,900
Maldah ...	3,500	2,500	4,800	20,000	28,000	26,600
Rajshahi ...	14,300	25,700	118,400	107,800	60,900	73,500
Darjeeling ...	1,500	.....	.....	2,000	4,000	2,200
Pabna ...	122,900	102,300	150,000	136,500	180,100	103,000

ESTIMATED AREA UNDER JUTE

DISTRICTS.	1872.	1880.	1890.	1900.	1910.	1919.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Bengal—(Contd.)						
Bogra ...	46,600	36,600	35,000	88,000	120,000	69,900
Mymensingh ...	48,000	160,900	301,000	519,000	717,500	628,900
Dacca ...	40,000	111,500	180,000	161,000	184,600	283,500
Faridpur ...	16,600	79,600	80,000	100,000	120,200	258,400
Backerganj ...	11,600	200	.. ..	10,000	16,000	56,000
Tippera ..	78,400	.. ..	190,800	219,000	236,900	266,600
Noakhali	3,600	.....	... ..	1,900	29,000	54,500
Assam						
Sylhet ...	.....	.....	.....	.....	40,000	26,100
Goalpara ...	5,000	15,000	18,000	24,000	31,000	55,200
Kamrup ...	.....	.. ..	.....	.. ..	5,800	12,900
Darrang ...	.. ..	.....	.....	.. ..	.....	9,000
Nowgong ...	.....	.....	.....	.....	.. ..	11,700
Garohills ..	.. ..	.....	.....	.....	4,300	4,200
Bihar and Orissa						
Purneah ...	75,000	26,900	28,000	48,000	220,000	175,000
Bhagalpur ...	.....	.....	.....	22,200	3,000	1,100
Muzaffarpur ...	.....	.....	.....	.....	2,000	2,200
Champaran ...	.. ..	.. ..	.....	.....	2,000	2,400
Sonthal Parganas	.....	.. ..	.....	.....	.....	1,700
Cuttack ...	4,208	.....	.. ..	5,800	9,900	18,500
Balasore ...	1,000	900	.....	2,800	3,900	2,400

STATEMENT V

Showing the Area under Jute in each District, in order of importance, 1919-20

Bengal (including Cooch Behar)—2,498,100 acres

Mymensingh ...	628,900		Backerganj ...	56,600
Dacca ...	283,500		Noakhali ...	54,500
Tippera ...	266,600		Jalpaiguri ...	49,300
Faridpur ...	258,400		Hoogly ..	30,800
Rangpur ...	207,600		Maldah ...	26,600
Pabna ...	103,000		Khulna ...	21,600
Jessore ...	84,600		Murshidabad ...	20,800
Rajshahi ...	73,500		Midnapur ...	11,900
Bogra ...	69,900		Howrah ...	9,800
Nadia ..	67,100		Burdwan ..	6,600
24-Parganas ...	63,300		Darjeeling ...	2,200
Dinajpur ...	60,900		Chittagong ...	200

Cooch Behar—39,200 acres

Bihar and Orissa—203,400 acres

Purnea ...	175,000		Muzaffarpur ...	2,200
Cuttack ...	18,500		Sonthal Parganas ...	1,700
Balasore ...	2,400		Bhagalpur ...	1,100
Champanan ...	2,400			

Assam—120,000 acres

Goalpara ..	55,200		Garo Hills ...	4,200
Sylhet ...	26,100		Sibsagar ...	400
Kamrup ...	12,900		Lakhimpur ...	200
Darrang ...	11,700		Cachar ...	100
Nowgong ...	9,000			

Total area under Jute—2,821,500 acres

On an average, the area under jute, in Bengal, represents about 87·6 per cent. of the total area under jute in British India, Bihar and Orissa 9·1 per cent. and Assam 3·3 per cent.

STATEMENT VI

Showing the Classification of the Area, in acres, of Jute Districts, with reference to the Area under Jute

DISTRICT.	Net Area.	Net Area Cr. pped		Area under Jute.	
		1918-19.	1917-18.	1918-19.	1917-18
BENGAL.					
Burdwan	1,722,240	708,100	755,900	5,600	6,400
Midnapur	3,319,040	1,858,700	1,844,400	10,600	14,500
Hooghly	760,320	300,000	300,100	27,200	33,700
Howrah	326,400	129,100	146,300	7,300	13,400
24-Parganas	3,100,160	906,000	1,022,700	44,400	68,800
Khulna	3,179,624	741,600	828,500	22,800	27,700
Nadia	1,785,600	625,700	664,500	50,300	70,100
Jessore	1,861,253	991,300	991,200	52,000	84,700
Murshidabad	1,370,240	533,500	557,400	12,200	26,500
Malda	1,216,640	680,900	781,000	29,000	34,000
Dinajpur	2,525,440	1,352,400	1,077,900	60,000	61,700
Rajshahi	1,675,640	948,000	880,300	74,300	81,100
Rangpur	2,226,560	1,463,000	1,400,000	200,200	256,400
Bogra	869,760	457,200	454,900	66,400	64,800
Pabna	1,184,520	838,300	878,700	105,100	117,600
Jalpaiguri	1,868,160	917,000	951,700	45,900	52,500
Darjeeling	744,960	153,200	156,200	2,000	2,600
Dacca	1,785,224	1,286,100	1,232,300	292,500	262,100
Faridpur	1,668,455	1,279,900	1,316,900	218,100	200,000
Backerganj	2,952,787	1,681,200	1,665,800	50,200	57,000
Mymensingh	3,991,416	2,407,000	2,408,100	577,900	579,600
Tippera	1,599,360	1,067,600	1,069,300	227,500	228,300
Noakhali	1,064,265	739,800	739,800	37,500	32,500
Chittagong	1,594,880	629,100	632,100	200	200
Total	44,392,944	22,694,700	22,756,000	2,219,200	2,376,200
PROVINCIAL TOTAL	50,454,866	24,350,400	24,451,700	2,219,200	2,376,200

CLASSIFICATION OF THE AREA OF JUTE DISTRICTS

DISTRICT.	Net Area	Net Area Cropped.		Area under Jute.	
		1918-19	1917-18.	1918-19.	1917-18.
BIHAR AND ORISSA.					
Muzaffarpur ...	1,942,324	1,430,000	1,430,000	1,800	2,300
Saran ...	1,705,870	1,131,900	1,131,900	300	300
Champaran ...	2,259,840	1,430,200	1,430,200	2,400	2,500
Bhagalpur ...	2,661,020	1,463,100	1,645,600	2,600	2,300
Purnea ...	3,196,153	1,831,100	1,703,600	122,000	192,000
Sonthal Parganas ...	3,466,100	1,322,200	1,502,400	1,300	1,400
Cuttack ...	2,340,307	1,233,300	1,291,300	18,700	20,700
Balasure ...	1,332,621	829,700	863,800	2,200	2,100
Total ...	18,904,235	10,671,500	10,998,800	151,300	223,600
PROVINCIAL TOTAL ...	52,789,833	23,182,400	25,803,400	151,300	223,600
ASSAM.					
Cachar ...	2,412,160	322,576	321,965	135	399
Sylhet ...	3,478,400	2,141,808	2,424,836	13,613	18,697
Goalpara ...	2,547,840	430,821	396,126	50,892	48,442
Kamrup ...	2,472,640	663,149	652,934	13,095	10,746
Darrang ...	2,174,720	407,187	395,954	8,324	7,700
Nowgong ...	2,459,520	328,517	317,759	10,889	8,947
Sibsagar ...	3,168,304	672,437	658,127	419	435
Lakhimpur ...	2,547,078	366,634	360,217	153	130
Garó Hills ...	2,009,792	95,120	95,179	4,584	4,998
Total ..	23,270,454	5,428,249	5,623,097	102,104	100,494
PROVINCIAL TOTAL ...	31,330,534	5,680,076	5,876,624	102,134	100,524

STATEMENT VII

Showing estimated Normal Area, in acres, under Jute and the Percentage of the total Cropped Area, under Jute, in each District in Bengal, Bihar and Orissa, and Assam

Districts, in order of importance.	Area during 1919.	Normal area (average of preceding 10 years).	Percentage of total cultivated area, under jute, during 1919.
1. Mymensingh ...	628,900	707,700	24.7
2. Dacca ...	283,500	185,000	20.5
3. Tippera ..	266,600	260,000	22.2
4. Faridpur ...	258,400	125,000	18.7
5. Rangpur ...	207,600	303,000	15.5
6. Purnea ...	175,000	219,000	12.3
7. Pabna ...	103,000	180,000	16.6
8. Jessore ..	84,600	123,500	11.1
9. Rajshahi ...	73,500	86,200	10.6
10. Bogra ...	69,900	115,000	20.1
11. Nadia ...	67,100	49,400	11.1
12. 24-Parganas ...	63,300	76,600	8.4
13. Dinajpur ...	60,900	116,500	6.3
14. Backerganj ...	56,600	22,000	2.8
15. Goalpara ...	55,200	42,400	10.4
16. Noakhali ...	54,500	26,000	4.3
17. Jalpaiguri ...	49,300	106,300	6.4
18. Hoogly ...	30,800	38,400	12.7
19. Maldah ...	26,600	33,000	4.3
20. Sylhet ...	26,100	16,000	.9
21. Khulna ...	21,600	18,300	3.5
22. Murshidabad ...	20,800	39,800	5.7
23. Cuttack ...	18,500	16,400	1.4
24. Kamrup ..	12,900	8,100	1.4
25. Midnapur ...	11,900	10,400	.7
26. Nowgong ..	11,700	5,700	2.3
27. Howrah ...	9,800	42,100	12.2
28. Darrang ...	9,000	7,000	1.9
29. Burdwan ...	6,600	16,500	1.5
30. Garo Hills ...	4,200	4,100	5.6
31. Balasore ...	2,400	2,800	.3
32. Champaran ...	2,400	1,900	.2

ESTIMATED NORMAL AREA UNDER JUTE

Districts in order of importance.	Area during 1919.	Normal area (average of preceding 10 years).	Percentage of total cultivated area, under jute, during 1919.
33. Muzaffarpur ...	2,200	1,700	.1
34. Darjeeling ...	2,200	2,900	1.9
35. Sonthal Parganas	1,700	3,000	.3
36. Bhagalpur ..	1,100	1,257	.3
37. Sibsagar ...	400	300	.06
38. Cachar ...	400	300	.1
39. Chittagong ...	200	200	.03
40. Lakhimpur ..	100	200	.08
Bengal	2,458,900	2,643,800	10%
Bihar and Orissa ..	203,400	246,100	0.8%
Assam ...	120,000	84,100	2.5%
Cooch Behar ..	39,200	...	7.2%

Normal outturn of jute, per acre, as estimated by the
Provincial Departments of Agriculture :—

Bengal ..	...	...	3.5 bales of 400 lbs.
Bihar and Orissa ..	..	...	3.0 " "
Assam ..	..	...	3.3 " "

STATEMENT VIII

*Showing Percentage of the Cultivated Area under Jute
1919-20*

Bengal—10%

Mymensingh	...	24·7	24-Parganas	...	8·4
Tippera	...	22·2	Jalpaiguri	...	6·4
Dacca	...	20·5	Dinajpur	...	6·3
Bogra	...	20·1	Murshidabad	...	5·7
Faridpur	...	18·7	Maldah	...	4·3
Pabna	...	16·6	Noakhali	...	4·3
Rangpur	...	15·5	Khulna	...	3·5
Hoogly	..	12·7	Backerganj	...	2·8
Howrah	...	12·2	Darjeeling	...	1·9
Nadia	...	11·1	Burdwan	...	1·5
Jessore	...	11·1	Midnapore	...	·7
Rajshahi	...	10·6	Chittagong	...	·03
Cooch Behar			...	7·2%	

Bihar and Orissa—0·8%

Purnea	...	12·3	Bhagalpur	...	·3
Cuttack	...	1·4	Champaran	...	·2
Balasore	...	·3	Muzaffarpur	...	·1
Sonthal Parganas	...	·3			

Assam—2·5%

Goalpara	..	10·4	Sylhet	...	·9
Garo Hills	...	5·6	Cachar	...	·1
Nowgong	...	2·3	Lakhimpur	..	·08
Darrang	—	1·9	Sibsagar	...	·06
Kamrup	..	1·4			

STATEMENT IX

*Showing the Consumption of Raw Jute
As given in the Annual Reports of the Indian Jute Mills
Association.*

Season July to June. *	Quantities bought by the mills.	Actual Indian mill consumption.	Exports.	Total consumption (including 5 lakhs of bales estimated as the Indian domestic con- sumption).
	Lakhs of bales. †	Lakhs of bales. †	Lakhs of bales. †	Lakhs of bales. †
1919-20 ‡	60	.....	34'00	99'00
1918-19 ‡	60	50'00	22'00	87'00
1917-18	61'42	52'96	17'26	83'68 ¹
1916-17	53'5	55'2	28'10	86'6
1915-16	53'28	56'09	31'06	89'34
1914-15	60'10	48'05	29'67	94'77
1913-14	43'95	43'74	41'92	90'87
1912-13	47'41	44'35	49'42	101'33
1911-12	41'62	37'51	46'26	92'88
1910-11	36'72	39'80	35'31	77'03
1909-10	42'69	44'59	40'09	87'77
1908-09	36'49	35'93	46'31	87'80
1907-08	39'05	36'58	42'76	86'81
1906-07	38'37	34'31	45'06	88'43
1905-06	34'27	29'57	41'36	80'63
1904-05	28'86	30'77	35'25	69'11
1903-04	.....	28'92	37'65	71'57
1902-03	.....	27'45	32'53	64'98
1901-02	.....	25'51	43'14	73'65
1900-01	.....	24'15	35'42	64'57

* From 1892-93 to 1906-07, jute season extended from August to July.

† 1 lakh = 100,000.

‡ Estimated figures.

STATEMENT X

*Showing the Exports and Indian Consumption of Cloth
(Last three figures from each item of
quantities omitted.)*

Cloth in Yards

Year.	Export.	Year.	Indian Consumption.
1920-21 ...	1,352,739	1920 ...	...
1919-20 ...	1,275,125	1919 ...	34,415
1918-19 ..	1,103,211	1918 ...	52,949
1917-18 ...	1,196,826	1917 ...	37,275
1916-17 ...	1,230,950	1916 ...	37,789
1915-16 ...	1,192,256	1915 ...	30,555
1914-15 ...	1,057,324	1914 ...	26,567
1913-14 ...	1,061,151	1913 ..	19,638
1912-13 ..	1,021,816	1912 ...	14,714
1911-12 ...	871,484	1911 ...	24,273
1910-11 ..	955,300	1910 ...	30,716
1909-10 ..	940,101	1909 ..	15,597
1908-09 ...	769,798	1908 ..	15,488
1907-08 ...	789,855	1907 ..	16,229
1906-07 ...	696,067	1906 ...	16,477
1905-06 ...	658,671	1905	13,958
1904-05 ...	575,511		
1903-04 ...	552,320		
1902-03 ...	492,883		
1901-02 ...	418,569		
1900-01. ...	365,214		

Exports of gunny cloth including gunny bags—2 yards of cloth being equal to 1 bag—from the year 1918-19 to 1920-21, from Calcutta by all routes within India, are shown below :—

	1920-21.	1919-20.	1918-19.
Quantity Yards	... 230,023,952	248,167,202	286,550,568

STATEMENT XI

Showing the Exports and Indian Consumption of Gunny Bags (Last three figures from each item of quantities omitted)

Number of Bags

Year	Export.	Year	Indian Consumption.
1920-21 ...	533,908		
1919-20 ...	342,729	1920 ..	..
1918-19 ...	583,096	1919 ...	97,426
1917-18 ...	758,390	1918 ...	112,178
1916-17 ...	805,094	1917 ..	104,511
1915-16 ...	794,152	1916 ...	98,244
1914-15 ..	397,565	1915 ...	79,711
1913-14 ...	368,759	1914 ..	67,106
1912-13 ...	311,707	1913 ...	68,732
1911-12 ...	289,894	1912 ...	99,491
1910-11 ...	360,880	1911 ..	90,390
1909-10 ...	364,368	1910 ...	78,945
1908-09 ...	300,906	1909 ...	56,791
1907-08 ...	293,029	1908 ...	43,657
1906-07 ...	257,683	1907 ...	58,921
1905-06 ...	233,326	1906 ..	51,666
1904-05 ...	201,436	1905 ...	68,702
1903-04 ...	206,207		
1902-03 ...	225,196		
1901-02 ..	230,126		
1900-01 ...	202,908		

STATEMENT XII

*Showing the Exports and Value of Twist and Yarn
(Last three figures from each item omitted)*

Year.	Export.	Value.
	lbs.	Rs.
1920-21	10,179	3,546
1919-20	3,606	1,201
1918-19	5,115	2,018
1917-18	4,025	695
1916-17	3,395	545
1915-16	817	115
1914-15	51	9
1913-14	155	20
1912-13	319	45
1911-12	161	20
1910-11	265	22
1909-10	271	23
1908-09	922	129
1907-08	1,550	291
1906-07	1,655	327
1905-06	357	44
1904-05	444	36
1903-04	693	82
1902-03	1,791	201
1901-02	5,221	581
1900-01	2,224	290

STATEMENT XIII

*Showing the Value of Jute and Jute Manufactures
exported from India*

Year.	Value of Jute.	Value of Manufactures.
	Rs.	Rs.
1920-21 ...	16,36,08,642	52,99,46,798
1919-20 ...	24,69,94,523	50,01,54,627
1918-19 ...	12,72,00,782	52,65,22,838
1917-18 ..	6,45,38,400	42,84,31,005
1916-17 ...	16,28,81,038	41,67,23,712
1915-16 ...	15,64,20,356	37,97,85,050
1914-15 ...	12,91,02,030	25,82,03,189
1913-14 ...	30,82,63,940	28,27,37,292
1912-13 ...	27,05,06,730	22,87,21,755
1911-12 ..	22,55,66,010	16,00,82,760
1910-11 ...	15,48,99,736	16,99,48,792
1909-10 .	15,08,83,097	17,09,66,496
1908-09 ...	19,83,45,551	15,73,59,991
1907-08 ...	17,97,28,013	18,29,76,445
1906-07 ...	26,83,86,810	15,71,62,303
1905-06 ..	17,12,56,641	12,44,79,844
1904-05 ...	11,96,56,462	9,93,88,676
1903-04	11,71,81,222	9,46,91,969
1902-03 ...	11,12,64,752	9,01,98,987
1901-02 ..	11,79,72,723	8,71,14,174
1900-01 ...	10,86,77,562	7,86,46,012

STATEMENT XIV

Showing Exports of Jute and Manufactures to Foreign Countries. during 1920-21

Countries.	Jute.	Twist and Yarn.	Gunny Bags.	Cloth.
	Tons.	lbs.	Number.	Yards.
United Kingdom ...	136,624	.....	48,013,316	94,583,232
France ...	50,813	.....	13,810,600	18,980,299
Belgium ...	25,670	.....	15,584,780	.. ..
Germany ...	70,931	.....	.. ..	.. ..
Roumania ...	.. ..	.....	2,846,000	.....
Spain ..	23,857	.. ..	.....	.. ..
Italy ...	22,869	.. ..	750,000	.. ..
Greece ..	.. ..	.....	4,016,100	.. ..
Turkey ...	.....	.. ..	3,323,050	.....
Straits Settlements	.....	.....	7,330,560	.. ..
Java ...	.....	.. ..	24,612,530	.....
Siam ...	.....	.. ..	4,606,100	.....
Indo-China ...	.....	.....	17,373,500	.....
China ...	.. ..	.....	32,366,000	6,137,000
Japan ...	7,345	.....	13,858,000	.....
Philippines ..	.. ..	.....	.....	1,848,000

EXPORTS OF JUTE AND MANUFACTURES TO
FOREIGN COUNTRIES

Countries.	Jute.	Twist and Yarn.	Gunny Bags.	Cloth.
	Tons.	lbs.	Number.	Yards.
Egypt ... ..	.....	Not available separately.	13,112,700	1,236,000
Cape Colony ... ..	... ..		2,908,800	.....
Natal ... ..	.....		10,814,750	... ..
Transvaal ... ..	... ..		3,396,750	... ..
Other African Ports	... ..		9,230,500	... ..
Mauritius ... ..	... ..		4,110,500	.....
Brazil	8,709		... ..	... ..
United States	110,005		71,811,700	932,956,469
Canada ... ..	... ..		... ..	41,415,400
West Indies ... ..	... ..		31,916,300	... ..
Chili ... ..	... ..		54,310,100	... ..
Peru ... ..	... ..		5,063,300	... ..
Argentine ... ..	.....		4,550,100	208,585,000
Uruguay ... ..	... ..		... ..	6,779,200
Australia ... ..	... ..		91,391,800	17,273,980
New Zealand ... ..	.....		9,721,300	.....
Sandwich Islands	...		3,831,520	8,082,000
Other Countries	15,591		29,247,453	14,862,069
TOTAL	472,414		10,178,785	533,908,109	1,352,738,649
TONS	472,414	4,544	467,580	357,424

STATEMENT XV

*Showing Exports of Jute (Rejections and Cuttings excepted)
to all Foreign Markets*

Foreign Markets.	1905-06. Bales.	1910-11 Bales.	1915-16. Bales.
London	454,940	418,154	419,412
Liverpool	25,083	14,739	13,999
Dundee	1,177,293	769,181	1,126,734
United Kingdom (other ports)	2,749	.....	984
Hamburg	709,938	739,451	.....
Bremen	86,759	104,257	.....
Fiume	75,129	82,228	.....
Barcelona	48,841	20,185	85,039
Boulogne	156,367	39,374	59,077
Dunkirk	208,128	280,659	26,427
Treport	49,823	6,229	12,900
Leghorn ... ..	.....	18,649	78,461
Genoa	84,022	45,169	229,799
Ancona	18,496	31,566	.....
Venice	66,832	80,814	.....
Marseilles	15,433	18,569	24,022
Trieste	168,361	142,352	...
Port Said ... ..	...	23,503	.....
Continent (other ports) ..	82,764	165,242	162,767
New York	161,480	129,436	167,278
San Francisco	18,410	16,846	18,978
Philadelphia	42,265	33,630	28,625
Boston	19,187	83,032	159,447
Portland, etc.	85,411	28,481	64,569
Hongkong and Japan	11,676	12,347	22,600
Australia	805	1,093	2,148
Other ports	28	4	34,740

STATEMENT XVI

*Showing the Number of Jute Mills, Looms and Spindles,
and Persons Employed, in India*

Year.	Mills.	Looms.	Spindles.	Persons.
1919-20	76	41,045	856,307	280,431
1918-19	76	40,043	839,919	275,500
1917-18	76	40,639	834,055	266,038
1916-17	74	39,697	824,315	262,552
1915-16	70	39,890	812,421	254,143
1914-15	70	38,379	795,528	238,274
1913-14	64	36,050	744,289	216,288
1912-13	61	34,033	708,716	204,092
1911-12	59	32,927	677,519	201,324
1910-11	58	33,169	682,527	216,390
1909-10	60	31,418	645,862	204,104
1908-09	56	29,525	607,358	192,181
1907-08	54	27,244	562,274	187,771
1906-07	44	25,284	520,504	166,895
1905-06	39	21,986	453,168	144,879
1904-05	38	19,991	409,170	133,162
1903-04	38	18,400	376,718	123,869
1902-03	38	17,189	352,214	118,904
1901-02	36	16,119	331,382	114,795
1900-01	36	15,340	317,348	111,272
1899-1900	34	14,119	295,302	102,449
1894-95	28	9,638	199,757	74,357
1889-90	26	7,704	156,866	59,541
1884-85	24	6,926	131,740	51,902
1879-80	22	6,946	70,840	27,494

STATEMENT XVII

*Showing Number of Looms in the Jute Mills worked by
Mechanical Power in India*

(As given in the Report of the Indian Jute Mills Association)

Year (1st January)			Hessian Looms.	Sacking Looms.	TOTAL LOOMS.
1920	...	...	24,353	16,124	40,367
1919	...	...	23,376	16,075	39,451
1918	...	...	23,426	15,975	39,401
1917	...	...	23,197	15,868	39,065
1916	...	...	22,781	15,871	38,652
1915	...	...	22,603	15,751	38,354
1914	...	...	22,288	15,832	38,120
1913	...	...	21,288	16,028	37,316
1912	...	...	18,630	14,002	32,632
1911	...	...	...	..	32,711
1910	...	...	...	...	31,755
1909	...	..	...	...	30,824
1908	...	...	...	...	29,074
1907	...	..	...	...	26,449
1906	...	...	...	...	23,884
1905	...	...	...	...	21,318
1904	...	...	...	...	19,901
1903	...	...	...	...	17,597
1902	...	...	...	...	16,640
1901	...	...	...	...	15,336
1900	...	...	...	...	14,278
1895	...	...	...	...	9,638
1890	...	...	...	...	7,704
1885	...	...	...	...	6,926
1880	...	...	...	...	4,946

STATEMENT XVIII

*Showing the Number of Jute Mills, Looms, Spindles and
Persons employed in Bengal*

Year.	Mills.	Looms.	Spindles.	Persons.
1919-20	72	40,676	847,487	277,393
1918-19	72	39,677	831,659	272,080
1917-18	72	40,271	825,795	262,767
1916-17	71	39,404	817,759	260,199
1915-16	67	39,597	805,985	251,957
1914-15	62	38,090	789,236	236,294
1913-14	59	35,811	739,077	214,521
1912-13	59	33,799	703,684	203,327
1911-12	57	32,693	672,487	199,532
1910-11	56	32,935	677,495	214,507
1909-10	57	31,110	638,992	202,258
1908-09	53	29,217	600,488	189,888
1907-08	47	26,935	555,842	185,907
1906-07	42	25,061	515,632	165,692
1905-06	37	21,763	448,296	143,429
1904-05	36	19,816	405,542	131,886
1903-04	36	18,228	372,836	122,724
1902-03	36	17,018	348,656	117,810
1901-02	36	15,948	327,824	113,493
1900-01	34	15,169	313,740	110,051

STATEMENT XIX

Showing the Number of Jute Mills, Looms, Spindles, and Persons employed in Madras and the United Provinces

Year.	Mills.	Looms.	Spindles.	Persons
MADRAS.				
1919-20	3	294	6,540	2,667
1918-19	3	293	6,480	2,833
1917-18	3	293	6,480	2,736
1916-17	3	293	6,556	2,353
1915-16	3	293	6,436	2,186
1914-15	3	289	6,292	1,980
1913-14	2	239	5,212	1,767
1912-13	2	234	5,032	1,765
1911-12	2	234	5,032	1,792
1910-11	2	234	5,032	1,883
1909-10	2	234	5,032	1,846
1908-09	2	234	5,032	1,898
1907-08	2	234	5,032	1,589
1906-07	1	148	3,328	1,203
1905-06	1	148	3,328	917
1904-05	1	100	2,084	862
1903-04	1	100	2,082	835
1902-03	1	98	2,084	838
1901-02	1	98	2,084	489
The first mill was established during 1901-02.				
UNITED PROVINCES.				
1919-20	1	75	2,280	371
1918-19	1	73	1,780	583
1917-18	1	75	1,780	553
1916-17	1	75	1,780	553
1915-16	1	75	1,780	553

STATEMENT XX

*Showing the Names of the Jute Mills working in Bengal
during 1917-18*

Mills.	Looms.	Agents.
1. Albion ..	340	Andrew Yule & Co.
2. Alexandra ...	396	Begg, Dunlop & Co.
3. Alipur ...	50	Government.
4. Alliance ...	1,002	Begg, Dunlop & Co.
5. Anglo-India ...	2,000	Duncan Bros.
6. Angus ...	660	Angus Jute Co., Ltd.
7. Auckland ...	460	Bird & Co.
8. Balliaghata ..	177	James Luke & Sons.
9. Bally ...	541	George Henderson & Co.
10. Baranagore ...	2,275	Do.
11. Belvedere ...	400	Andrew Yule & Co.
12. Budge-Budge ...	782	Do.
13. Caledonian ...	350	Do.
14. New Central ...	586	Do.
15. Champdany ...	494	James Finlay & Co., Ltd.
16. Do. Welling on Branch ...	577	Do.
17. Clive ...	868	Bird & Co.
18. Dalhousie ...	704	Do.
19. Delta ...	610	Andrew Yule & Co.
20. Empire ...	400	McLeod & Co.
21. Fort Gloster ...	1,350	Kettlewell, Bullen & Co.
22. Fort William ...	900	Do.
23. Ganges ...	1,294	Macneil & Co.
24. Gondalpara ...	360	Gillanders, Arbuthnot & Co.
25. Gouripore ...	1,255	Barry & Co.
26. Hastings ...	1,052	Birkmyre Bros.

NAMES OF JUTE MILLS

Mills.	Looms.	Agents.
27. Hoogly ...	454	Gillanders, Arbuthnot & Co.
28. Howrah ...	1,663	Howeson Bros., Ltd.
29. India ...	1,033	Mackinnon, Mackenzie Co.
30. Kamarhatty ...	1,710	Jardine, Skinner & Co.
31. Kanknarrah ...	1,521	Do.
32. Kelvin ...	600	McLeod & Co.
33. Khardah ...	1,370	Anderson Wright & Co.
34. Kinnison ...	1,221	F. W. Heilgers & Co.
35. Lansdowne ...	870	Bird & Co.
36. Lawrence ...	704	Do.
37. Narcoldanga ...	16	Jas. Park & Co.
38. Naihati ...	430	F. W. Heilgers & Co.
39. National ...	611	Andrew Yule & Co.
40. New Central ...	586	Do.
41. Northbrook ...	544	Bird & Co.
42. Reliance ...	1,000	Howeson Bros., Ltd.
43. Samnagar ...	1,572	Thomas Duff & Co.
44. Soorah ...	175	McLeod & Co.
45. Standard ...	640	Bird & Co.
46. Titagarh ...	1,718	Thomas Duff & Co.
47. Union ...	504	Bird & Co.
48. Union South Mill	650	Do.
49. Victoria ..	1,053	Thomas Duff & Co.

Altogether, there were 72 mills with 40,676 looms and 847,487 spindles at work, in Bengal, during the year 1919-20, while, during 1917-18, there were 72 mills, 40,271 looms and 825,795 spindles.

STATEMENT XXI

Showing Average Wages, in Rupees, of Labourers in a Jute Mill, in Bengal

Year.	Carders. Per week.	Rovers. Per week.	Spinners. Per week.	Shifters. Per week.	Winders. Per week.	Beamers. Per week.	Weavers Per week.	Mistries. Per diem.	Co (lies Per diem.
1920	2.75	5.4	4.33	2.0	5.88	7.29	8.75	1.32	.61
1919	2.18	4.25	3.75	1.65	4.55	5.49	6.75	1.09	.47
1918	2.0	3.9	3.37	1.5	4.35	4.85	5.85	1.0	.45
1917	2.0	3.8	3.35	1.56	3.65	4.8	6.14	1.0	.44
1916	2.0	3.3	3.5	1.75	3.6	4.7	5.65	1.0	.44
1915	2.0	3.32	3.48	1.8	3.6	4.72	5.6	1.1	.42
1914	1.5	3.3	3.45	1.76	3.6	4.7	5.65	1.1	.43
1913	1.5	3.35	3.44	1.75	3.45	4.64	5.6	1.0	.43
1912	1.5	2.75	3.2	1.23	3.2	3.42	5.65	1.0	.37
1911	1.5	2.75	3.35	1.35	3.5	4.1	5.75	1.12	.37
1910	1.5	2.75	3.5	1.25	3.5	3.75	5.5	1.0	.37

The wages of agricultural labourers are now between 6 and 8 annas per diem in Bengal. During the jute seasons, specially when jute is stripped and washed, the wages rise to annas 12, sometimes to Re. 1.

STATEMENT XXII

Showing Normal Rainfalls (from March to September) in Jute Districts, during Jute-growing Season

Districts.	March.	April.	May.	June.	July.	August.	September.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
<i>Bengal.</i>							
Burdwan	1'32	2'04	5'23	9'89	12'08	11'28	7'93
Midnapore	1'60	1'72	5'15	9'89	12'65	12'39	9'60
Hoogly	1'40	2'11	5'67	9'93	12'06	11'40	8'66
Howrah	1'40	1'88	5'22	10'97	12'59	10'77	8'69
24-Parganas	1'55	2'01	5'62	11'09	12'96	12'06	9'45
Nadia	1'58	2'91	6'88	10'33	10'63	11'03	8'49
Murshidabad	1'11	1'59	5'18	10'22	11'50	11'77	10'05
Jessore	1'94	3'48	7'56	11'84	10'98	10'76	8'55
Khulna	2'05	3'10	7'04	12'94	13'45	11'60	8'96
Jalpaiguri	1'74	4'87	12'88	27'32	31'01	25'62	22'27
Rangpur	1'35	3'33	11'30	18'72	15'31	12'95	13'68
Dinajpur	0'89	1'98	7'33	14'35	16'12	13'64	12'19
Malda	0'75	1'01	4'21	10'19	10'86	10'64	10'00
Rajshahi	1'06	1'88	6'39	11'34	11'71	10'61	10'40
Pabna	1'30	3'20	7'83	11'69	11'27	10'81	9'29
Bogra	1'11	2'40	8'66	13'81	13'40	12'63	10'97
Mymensingh	1'93	4'89	11'65	17'68	15'05	15'15	12'63
Dacca	2'50	5'09	9'90	13'42	12'93	12'87	9'40

NORMAL RAINFALLS IN JUTE DISTRICTS

Districts.	March.	April.	May.	June.	July.	August.	September.
	Inches.	Inches	Inches	Inches.	Inches.	Inches	Inches.
<i>Bengal.</i>							
Faridpur	2'06	4'46	9'07	13'42	12'24	12 20	8'00
Backergunj	2'10	3'76	8'85	18'07	17'75	15'57	11'61
Tippera	3'16	5'81	11'40	16'48	13'73	15 07	10'37
Noakhali	3'04	5'67	11'44	23'28	24'48	25'31	15'23
<i>Bihar and Orissa.</i>							
Purnea	0'61	1'47	5'14	12'47	16'77	14'95	12'56
Bhagalpur	0'56	0'72	3'38	7'26	12'10	11'62	9'13
Muzafferpur	0'67	0'59	2'32	7'80	11'18	13'38	7'11
Champanan	0'59	0'70	2'42	8'59	14'05	14'98	7'72
Cuttack	1'05	1'40	3'93	9'20	12'19	12'68	10'04
Ballasore	1'41	2'19	4'76	9'16	11'39	12'23	10'50
<i>Assam.</i>							
Cachar	6'93	14'05	15'16	21'99	20'82	19'95	14'17
Sylhet	5'97	13'89	19'54	27'23	23'64	21'23	16'27
Goalpara	2'08	7'29	15'62	23'52	22'07	15'72	14'34
Kamrup	2'48	7'85	11'06	14'80	15'09	12'83	8 06
Darrang	2'53	7'45	10'89	14'72	17'08	14'80	10'27
Nowgong	2'21	5'80	7'38	10'55	12'95	13 40	8'13
Sibsagar	4 12	9 71	10'19	12'63	15'20	15'36	10'28
Lakhimpur	4'76	10'74	12 75	18'34	21'29	20'22	13 97
Garo Hills	2'53	5'73	14'92	20'60	20'23	19'76	14'60

JUTE IN BENGAL

PART VI—MISCELLANY

CHAPTER I

SUBSTITUTES FOR JUTE



JUTE is the most widely used material in the world for making the sacks for packing cotton, sugar, coffee, grain, wool, etc. India exports, on an average, over a thousand million yards of jute cloth, each year, and about 500 million bags made of the material. Besides this, India also exports over six million pounds of jute yarn, not to speak of the raw jute, amounting to about 500 thousand tons, for manufacture elsewhere. So far, there has apparently been little effort made to find a substitute for jute, as its cost has been regarded as fairly cheap. But owing to the great European war, the price of jute had gone up in other countries, and consequently substitutes were being sought, with the result that it has been found that Cuba had a plant of considerable promise. This is known as *Malva*, heretofore considered as a weed, that grows wild in many parts of the island. There are not less than eleven species of this plant known in Cuba, but the one that is considered the best suited for the production of textile fibre is known as *Malva blanca*, and it has, of late, been cultivated to some extent. *Malva* is said to grow to a height of about twenty feet sometimes, but averages from six to ten feet in height, with a stalk ranging from half an inch in diameter to three times that size. The fibre is contained in the bark, that of the

young plant containing a single layer, while older plants may contain as many as eight layers. This fibre is said to be equal in strength to the Indian jute, but finer and more resembling flax, and it is therefore believed that it will be found useful for rope making, as well as for bag fabric. In Brazil also, a plant called *Paco-paco*, probably of the same family, grows wild to a considerable extent.

It is useless to draw the attention of the Indian jute growers, who are dumb people without education and capital. But we cannot do better than requesting the authorities of the Indian jute mills who have freely invested capital in this country in the jute industry, and the Bengal Zemindars who realize easily the rents from their tenants, on account of the ready sale of the stuff, to take joint action against any sort of danger to the jute crop. The seeds of the plants noted above should be brought in, and cultivated in this country in comparison with jute, both in yield and value of the crops.

Hibiscus cannabinus and *Crotalaria juncea* are the only two fibrous crops in India which may be mentioned as possible substitutes for jute. Brief accounts of these two crops are given below by way of comparison with jute.

Hibiscus cannabinus

(*Mestha pat*)

It is called *Mestha pat* or *Mesot* in Bengal, *Patua Kudrum*, *Channa* and *Amla patua* in Bihar and Chota Nagpur, *Deccan hemp*, *Ambari* or *Ambadi* in Bombay, and *Gogunara* in Madras. *Bimlipatam* jute is another name of this fibre. In some districts in East Bengal, both jute and *mestha* are known by the name of *koshta*.

SUBSTITUTES FOR JUTE

The *Mestha pat* is the most accommodating fibrous crop known. It grows on all kinds of soils and lands—alluvial or laterite, high or low. Some years ago, it was largely cultivated in Eastern Bengal, but of late, jute has completely taken its place. There is still a limited cultivation of this crop on the *bheel* lands which are considered too low to be suitable for jute. It is commonly sown as a hedge crop in Bihar.

On the *bheel* lands, in Bengal, it is sown in February and March, and harvested in July and August. In Bihar and Chota Nagpur, it is generally sown in June and July, and harvested in September and October. It thrives pretty well in other seasons, if the soil has sufficient moisture. Thirty seers of seed are ordinarily required for sowing one acre of land, if it is sown by itself. *Mestha* is commonly sown as a mixed crop with paddy in East Bengal, and with sugar-cane, *rahar* and cotton in Bihar. The quantity of the seed is, of course, to be lessened if it is sown as a mixed crop. The plants are so thinned as to allow a space of about 9 inches around each plant. The flowering stage is considered the best time for harvesting. It requires about four months from the time of sowing to the time of cutting. In East Bengal, the plants are pulled up and steeped as jute. In Bihar, the method of extracting fibre is the same as that of jute. In Bihar and Chota Nagpur, the bundles of plants, when they are ready for stripping, are taken away and dried; afterwards the fibres are separated from the stalks. Fifteen maunds of fibre per acre are considered to be a good yield in East Bengal, and ten maunds in Bihar and Chota Nagpur, if the crop is sown by itself.

The fibre of *Mestha* is bright and glossy, and a little stronger than jute, but coarse and harsh. On the whole, it is inferior to jute both in quality and yield. *Mestha pat* is commonly used in cordage and sacking.

HIBISCUS CANNABINUS.



CROTALARIA JUNCEA.



Crotalaria juncea(*San pat*)

It is commercially called *San* or *Sunn* hemp or Bombay hemp. Common local name is *San pat* in Bengal and *Sanai* in Bihar.

There are two varieties of *San* hemp in Bengal ; one of them, which is called *Ful* or *Bhadoi San*, is sown in May or June and harvested in October and November ; and the other variety, called *Gour San* or *Rabi San*, is sown in October and November and harvested in February and March. The quality of the fibre of the *Rabi San* is superior to that of the *Bhadoi San*.

It is stated by Mr. R. S. Finlow, the then Jute Specialist to the Government of Eastern Bengal and Assam, in the Bulletin on "the Extension of Jute Cultivation in India," that "the extent of the cultivation in Madras for fodder purposes may be gauged from the fact that of the 205,000 acres returned as being under *San* hemp this year (1906), much the greater portion of the crop will be used as fodder." *San* is never cultivated in Bengal as a fodder crop. It is grown to a very limited extent in some places in East Bengal for green manuring.

It thrives on all kinds of soils, provided the lands are well drained and above the inundation level and retentive of moisture.

The seed is sown broadcast thickly—2 maunds being required for one acre of land. The sowing must be very thick, otherwise the plants will grow bushy, causing the extraction of fibre extremely difficult. The *rabi* variety may be sown in rotation with jute or *aus* paddy in the same year. This variety cannot be grown in Chota Nagpur and Bihar, excepting Purnea District, for want of steeping water and for deficiency of moisture in the soils.

The plants are either pulled up or cut to the ground. The best fibre is obtained when it is harvested at the flowering stage. Generally the crop is harvested when the seeds ripen, in order to get a heavier yield of fibre, and also the seed.

In East Bengal, after the plants are cut or pulled up, they are spread over the fields for withering. On the second day, the plants are tied in bundles and submerged under water, applying some artificial weight (commonly sods of earth) over them. There is another process of steeping, in which the bundles are placed upright in water about 2 feet deep for one day, submerging them completely on the next day. Retting generally finishes by the fifth day. The plants are stripped immediately after retting is complete, or else the fibre will be totally lost. It is stripped in the same way as jute in Orissa, that is, handfuls of retted bundles are beaten over water to remove gummy matters from the fibre, which is then dried and separated. The great obstruction in the way of its extended cultivation is the difficulty in stripping. The yield of fibre is between 9 and 12 maunds per acre.

The *San* fibre is decidedly stronger than jute, specially when wet, but the yield is much less, while the cost for stripping is much more. In India, the fibre is very largely used for making fishing nets, but to a limited extent for weaving rugs. Excepting *Rhea* (*Kunkura*), which is very expensive, there is no other fibre in India which can replace *San* in the use of fishing nets. Wet or damp jute rots quickly, and, therefore, it is useless for fishing nets. Cotton yarn is also sometimes used for this purpose, for it is cheaper than *San* yarn. An everyday used fishing net made of *San* lasts for about three years, while a cotton-net gets impaired after it is used for two years, at the longest.

CHAPTER II

INTRODUCTION OF JUTE INTO OTHER COUNTRIES



U P to the present, attempts for introduction of jute into other countries have not been successful. Repeated trials were given to it in Brazil, Egypt, Java, Philippine Islands and some other places. It did not succeed even in Burma. The failures must have been chiefly due to selection of lands which were unsuitable to the crop, either physically or climatically. Ignorance in the cultivation of the crop might have been one of the causes of the failures.

A species of jute is cultivated in the plains of Ning-po and Tientsin in China. It does not, however appear to be an article of much importance in the trade of the country, as large quantities of Indian goods are imported by it every year. There is no demand from China for raw jute. Evidently it is due to the fact that there are few factories in China worked by mechanical power for spinning and weaving. The quantity and value of jute manufactures exported from India to China are given below :—

Exports of Jute Manufactures to China

(Gunny Bags* and Cloth)

Year.	Quantity. Yds.	Value. Rs.
1920-21	70,869,000	1,52,10,033
1919-20	35,717,600	99,41,097
1918-19	28,305,160	83,50,658

Vigorous efforts are being made by Brazil Republic to introduce the cultivation of jute into their country.

* One gunny bag being equal to 2 yards.

There is a great demand in Brazil for gunny bags of a superior quality for exports of coffee. In the State of Sao-Paulo, there are about ten mills which manufacture packing bags of special sizes out of an indigenous fibre called *paco-paco* (probably of *Malvaceæ* order) which is much inferior to jute in quality. *Paco-paco* grows wild in some parts of Brazil. The mill owners of Brazil import finer qualities of raw jute—about 15 thousand tons annually—from India for mixing purposes with *paco-paco* for the manufacture of bags. Sometimes they import Indian twist and yarn of good qualities for the purpose. Considering heavy charges incurred for freight and the delay in transshipment, they are resolved to introduce the jute crop into their country. It is hoped that the crop which is under experimental cultivation will succeed in the plains in Sao Paulo, watered by the tributaries to the river Parana, where the climatic conditions resemble those of India for a certain period of a year. The Amazon region, which is a vast country not yet reclaimed and peopled, appears also likely to be suitable for the crop.

Mr. Antonino da Silva Neves of the Republic came to India in 1920, on a mission, to study the Indian agriculture and commerce. He was particularly keen to learn all about the jute crop of Bengal. I was earnestly requested to go over to Brazil for a term at least of two years. But owing to family considerations, I was unable to comply with the request very kindly made to me. However, with pleasure, I rendered all assistance to Mr. Neves. I took him across the jute districts during the growing season of the crop, 1920. Different crops of jute of different tracts of the country were all shown to him. I also procured for him seeds of some typical races. He despatched over 100 maunds of the seeds thus collected to his country for sowing during the season beginning

in November, which is identical with the jute season in India commencing from April.

Many friends of mine took objection to my helping Mr. Neves in this respect, as they believed that it would harm India if jute were successfully cultivated in other countries. My friends were shortsighted indeed. In these days of democracy, no country had the right to monopolise a crop of the world's commerce. If their efforts be successful, I am sure the people of Brazil will ever remember India and our humble services to their country, in the introduction of a crop which has hitherto been a monopoly.

It is not known to us as to what Japan and the United States of America, as great enterprising countries, are doing in regard to the introduction of the crop into their tropical States. Jute industry has already made an astonishing progress in the United States. Before the war, Germany was, next to the United Kingdom, our best customer for raw jute, now the United States. France comes in next to the United States. Japan is following steadily. It is the only country in the East which imports raw jute amounting to between 7 and 10 thousand tons annually for manufacture of gunny bags and cloth. The first shipment of raw jute to Japan dates in 1886-87 (1,447 cwts.), while to the United States about the middle of the nineteenth century. The following table shows the exports of raw jute to the above countries during recent years.

Exports of Jute to the United States of America

Year.	Quantity. Tons.	Value. Rs.
1920-21	110,005	2,80,58,156
1919-20	77,649	2,57,59,639
1918-19	61,229	1,90,18,918

Exports of Jute to France

Year.	Quantity.	Value.
	Tons.	Rs.
1920-21	50,813	2,23,59,302
1919-20	80,731	3,76,32,533
1918-19	42,963	1,54,93,006

Exports of Jute to Japan

Year.	Quantity.	Value.
	Tons.	Rs.
1920-21	7,345	18,86,045
1919-20	10,566	34,49,156
1918-19	6,672	16,91,113

Japan's magnitude in the textile manufactures is manifested from the fact that it imported from India alone raw cotton worth Rs. 20,59,10,404 in 1920-21, Rs. 41,22,33,522 in 1919-20 and Rs. 23,37,39,864 in 1918-19. On the average of the last three years' figures, about 71 per cent. of the exports of raw cotton of India, amounting to 201 thousand tons (valued at 284 millions of rupees), out of the total quantity of 261 thousand tons of exports (valued at 437.6 millions of rupees), were supplied to Japan by India. Japan's progress, on industrial lines, is wonderfully rapid indeed!

Germany is again reaching its former position as a most important importing country for raw jute. During the year 1920-21, India exported to Germany about 71 thousand tons of raw jute to the value of Rs. 2,33,50,625.

The United Kingdom alone imports about 45 per cent. of the total exports of raw jute from India amounting

INTRODUCTION OF JUTE INTO OTHER COUNTRIES

to 487 thousand tons (total exports) to the value of about 18 crores of rupees (one crore being equal to 10 millions), taking the average of the figures of the last three years.

In the circumstances narrated in the preceding paragraphs, there is no immediate cause for fear, from the activities of other countries for introduction of jute. They will, at first, have to make experiments on the crop for a number of years. Secondly, a country will have to meet its own demand if the crop be a success there; and thirdly, the question of exports will arise. Our cheap production of the fibre is in our favour to compete successfully with the jute crop or any other fibre that may be produced elsewhere.

We should not, however, keep silent. In order to safeguard our interest, we should take active measures to improve the fibre both in quality and yield. Selected seeds should be the only seeds to be sown. Manuring of the jute fields should not be neglected as has hitherto been the case. The Department of Agriculture, Bengal, has done much by distribution of selected seeds among the cultivators. About 2,000 maunds of selected jute seeds, which are sufficient for sowing about 16,000 acres, are annually distributed by the Department at cost prices. The Departmental seeds, if available, should be preferred to any other kind.

CHAPTER III

PAPER AND PAPER PULP

THE UTILITY OF JUTE STALKS

(Contributed to "Commerce" of December 23, 1920.)



ACCORDING to modern historians, the art of paper manufacture was introduced into India, first of all in Kashmere, from Samarkand, sometime during the thirteenth century. From Samarkand, it is said, the knowledge of paper-making reached the Arabs early in the eighth century. Sir Aurel Stein, during his excavations of the Niya in Khotan, found a letter, dated 718 A.D., written by a Jew resident in Persia, addressed to a Khotan official. Various other kinds of paper written in Khotan and China were also discovered by him, which shows that Khotan was once the seat of paper manufacture. The art of paper-making is said to have been invented in China in 105 A.D. But it is difficult to understand as to why paper was not introduced in India earlier, although close relationship, religious as well as commercial, existed between the two countries from ancient times.

The Art of Paper-making

Indian antiquarians, on the other hand, are of opinion that the art of paper-making was not unknown in India, before it was invented in China. Niarcus, who accompanied Alexander the Great, in his conquest of the Punjab, found that a sort of paper-like pasted leaf made of cotton was used for writing documents in commercial transactions. However, it is true that paper was not used for writing sacred books until recently, even if it was

invented in India in ancient times or introduced later. Nicolo Conte, who visited India in the early part of the 15th century, says that the inhabitants of Cambay alone used paper. For writing sacred books, the barks of *Talish*, called *Talishpatra* (Cassia Tamala?), and birch tree (*Bhurjapatra*), and afterwards the leaves of palmyra palm (*Talpatra*) were used. There is no Sanskrit name for paper except *patra* (leaf), even if it was at all known in ancient India. *Kagaj*, which is now used in the vernacular, is a Persian word. In modern Sanskrit, which sprang up after the decline of Buddhism sometime during the seventh century A.D., a word *Kagada*, conveying the same meaning as *patra*, came into use.

Introduction in India

Whether *Kagaj* is derived from *Kagada* or not, I cannot say. I do not, however, propose to go further into the antiquity of the industry. It is true that the industry was introduced throughout India by the Emperor Akbar, probably after his conquest of Kashmere, which was then a famous paper manufacturing centre. Since then, the industry flourished in many places, Maldah, Rangpur, Dacca and Faridpur in Bengal being the most important among them. The paper was manufactured chiefly from waste paper, old rags and ropes. It was called *Tulat Kagaj*, that is, the paper made of *Tula* (cotton). It is not known why it was so called, although cotton, as far as we know was not used. Bamboo pulp has been used for paper-making in Nepal since a long time.

Hand-made Paper

Until 1880 or so, the hand-made paper industry was in a flourishing condition in Bengal, when steam power machinery was introduced. As a result of the *Swadeshi* agitation, some of the descendants of the old paper

manufacturers—a class of Mahomedans known as *Kagajia*—were induced to revive the industry. They made but little progress, due to competition with cheap and better stuffs either imported or manufactured in India by steam power.

Mill-made Paper

The quality of paper manufactured in the Indian mills has of late greatly improved. But it is still inferior to those imported from abroad. The yielding capacity of the existing mills is similarly unsatisfactory. In 1917 there were only ten mills in India, of which four were in Bombay, three in Bengal, one in the United Provinces, one in Travancore and one in Gwalior. The authorised capital was estimated by the authorities to be at about Rs. 53,00,000 only. The production of paper of these mills was estimated at 31,900 tons in 1917, which is much less than half of the Indian demand, the total demand being about 84,000 tons.

Rise in Price

Since the outbreak of the great European war the value of paper has increased beyond all proportions. There has been shortage of paper and raw materials all over the world. The import of paper into India has decreased from 1,027,800 cwts. in 1914-15 to 432,800 cwts. in 1918-19, that is, roughly speaking from 100 to 40 per cent., while the value of the imported paper has increased from £879,298 to £1,813,779 respectively;—approximately from 100 to 210 per cent. The import of wood pulp for paper manufacture has similarly decreased from 179,510 cwts. in 1914-15 to 41,800 cwts. in 1918-19. As a result, the value of the Indian production has increased from Rs. 80,37,000 for 27,100 tons in 1913 to Rs. 1,87,86,000 for 31,900 tons in 1917, that is, from

PAPER AND PAPER-PULP

Rs. 296.5 to Rs. 588.9 per ton. The price of paper is still rising higher and higher. The Indian mills were struggling for existence up to 1916. Since then handsome dividends up to Rs. 50 per cent. per annum have been paid.

Shortage of Paper

Scarcity of paper exists all over the world. The exporting capacity of the United Kingdom has diminished to such an extent that it will take a long time to regain its former position. The paper markets of the world are now controlled by Norway, Sweden, the United States of America and Japan. Five years ago Japanese paper was seldom imported into India, but it now holds a very strong position as an exporting country. The following table shows the present relative places held by different countries in exporting paper into India as compared between the figures for 1914-15 and those for 1918-19.

Exporting Country.	QUALITY OF PAPER IMPORTED.				Wood-pulp imported.
	Packing.	Printing.	Other kinds.	Paste board.	
1914-15.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.
United Kingdom ...	127,689	169,296	350,311	22,983	58,711
Sweden ..	5,653	40,720	8,885	266	95,207
Norway ...	9,823	60,980	11,448	617	4,425
United States ..	6,739	4,119	8,933	1,003	...
Japan ...	7	.	2,763	21,176	25
1918-19.					
United Kingdom ...	4,826	11,651	11,447	3,202	...
Sweden ...	8,544	6,084	2,557	6,425	23,900
Norway ...	11,345	96,244	16,280	205	11,001
United States ...	3,614	54,114	18,019	3,971	...
Japan ...	7,811	14,827	29,842	94,875	6,900

From the above figures it will appear that with the exception of Japan and Norway there is a falling off

in export of paper from all other countries to this country.

The Pulp Problem

The question of shortage of paper is receiving serious attention from the authorities in every country, and various suggestions are offered by the scientists to solve the problem to meet the world's demand. The supplies of cheap raw materials for paper-pulp are getting short everywhere. The woods from which paper pulp is manufactured in the United States are also getting dearer day by day. India is fortunately rich in raw materials. Bamboo alone can meet the world's demand for a number of years, and it is abundantly available in the forests of Assam and Burma. It is satisfactory to note that two British firms are erecting suitable machinery in Burma for the manufacture of paper-pulp from bamboo, and another factory is intended to be erected in Calcutta. The Government of India, too, has deputed Mr. W. Raitt, their cellulose expert, to England for special study in connection with the bamboo-pulp and the machinery required for its manufacture. It is also proposed to instal such a plant at the Forest Research Institute at Dehra Dun.

Raw Materials

The cost of procuring bamboos and other raw materials that can be utilised for the manufacture of paper-pulp should now receive our consideration. The cost of cutting bamboos in the forest as well as that of transporting to a mill may be estimated at about Rs. 30 per ton, at the lowest, the rate at which it is being sold in the towns for building and other purposes. *Nal* (elephant grass), which is also suggested for manufacturing paper-pulp, may be had at the same price. Although it grows wild in the

swamps of Bengal, it can supply only a limited portion of the expected demand. *Munj* (*Saccharum arundinaceum*) would be more costly as it is not available in large quantity. The *Baboi* (*bhabar, sabay*) grass, which is at present used in the Indian mills for paper-pulp and which was very cheap some time ago, is now sold at Re. 1-5-0 per maund. The quantity available is six to seven lakhs of maunds or over one lakh of bales. Even paddy straw is not now available at less than Rs. 30 per ton. Paddy straw contains a considerable quantity of silicates which make it very difficult to reduce to paper-pulp. This stuff is utilised for paper making in Germany only. In the United States, on the other hand, special powerful machinery has been introduced to get paper-pulp out of timber. Before the introduction of special machinery for treatment of the cuttings and rejections of jute for manufacture of gunny bags, these materials were largely used for paper-making, as they were very cheap then. The other materials, such as old rags and waste paper, which were formerly obtained at cheap prices, are not now available easily.

Value of Jute Stalk

I may suggest the name of a material by the way of making experiments. It is the stalk of jute, a by-product of the jute fibre which is now either wasted or burnt as fuel. It is not valued much as fuel as it is very soft and burns quickly. In point of woody fibre it compares very favourably with other raw materials used in the manufacture of paper. Nay, it is much richer than any other materials mentioned above.

Chemical Analysis

The results of chemical examination of the jute stalk

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and some other raw materials conducted by us are tabulated below :—

Name of Article.	Fibre.
Jute Stalk	60·50 p.c.
Bamboo (ordinarily available in Calcutta)*	41·00 p.c.
Sabay Grass	38·00 p.c.
Nal	37·00 p.c.
Paddy Straw†	33·00 p.c.

What Jute Stalk Contains

The result of the complete analysis of the jute stalk will, it is hoped, be of much interest. They are as follows :—

Water (Hygroscopic)	5·85 p.c.
Protein	1·40 p.c.
Ash	0·92 p.c.
Carbo-Hydrate	31·33 p.c.
Fibre	60·50 p.c.

Its Vast Possibilities

The fibres of the above-mentioned materials were estimated by sulphuric acid and sodium hydrate treatments. The jute stalk, it will appear, contains only a negligible quantity of ash, for which it is easy to separate the fibre (pulp) out of it. It contains little colouring matter, requiring therefore little bleaching operation. About a ton and a half of the jute stalk, per acre, would be available as a bye-product of jute fibre cultivated in this country. Thus the jute districts of Bengal, Bihar

* Containing 3·20 per cent. of ash.

† Containing about 8 per cent. of ash.

and Assam would yield annually about 40 lakhs of tons of this raw material, producing roughly about 20 lakhs of tons of paper-pulp. If jute stalk be successful as a paper material, it will, it is hoped, like its main product, revolutionise Indian industries and commerce.

Hand-made Paper in Bengal

The art of hand-made paper manufacture, which was once in a flourishing state in Bengal, is now almost forgotten. From my recent enquiries on the subject, it appears that there is only one family out of about 1,000 at the village Arial in Dacca, who manufactures paper. Paper is also manufactured by a few families near Tarakeswar in Hoogly. They use waste papers, rags, old ropes, gunnies, gunny cloths, nets, etc., as paper materials. These stuffs are cut into small pieces and put into earthen vessels containing water. After a week or so, the stuff is washed in a basket in order to get rid of the dirt contained. Then it is again immersed into water which is strongly impregnated with equal quantities of *Saji-mati* (crude sodium carbonate) and quicklime. After a week or ten days, it is again washed, broken by beating, and dried. This process is repeated three to six or seven times, before the pulp becomes fit for making paper. Pulp is easily made out of waste papers. Rice gruel is used for sizing.

Hand-made Paper in Europe

In European countries good hand-made paper is still now manufactured out of rags. The rags are at first dusted and cut into pieces, and then washed to get them free from dirty matters. The stuff is then boiled in caustic soda solution of 5 per cent. to 10 per cent. in strength. Too weak lye leaves behind a part of substances to be eliminated: if too strong it injures the tenacity of the fibres.

It should be a little too strong, rather than to be too weak. Ordinarily soda and lime process is resorted to as it is cheaper. For 100 parts of rags about 1 part of soda and one-half to 2 parts of unslaked lime are used for preparing lye in 100 parts of water. Half the quantity of the solution is generally used in the beginning of boiling and the other half after six hours of boiling. If necessary this process is repeated for the second time. Slaked lime is dissolved by sprinkling with a little water, then mixed with soda in the preparation of the lye.

Beating

After boiling, the stuff is washed in clean water and bleached if necessary. Next comes beating for about six to eight hours to reduce the stuff to fineness, and pressed to remove excess water.

Sizing

The stuff is now to be sized. There are various ways of sizing, animal or vegetable. The animal size is gelatine or glue, and the vegetable size is being made of a combination of resin with soda. Alum is used to assist in fixing the size in the paper.

Filling

Mineral matters are employed for filling or loading. China clay is the principal, others being Barium-sulphate, Calcium sulphate, Magnesium silicate.

Colouring

Colouring matters are required for the majority of papers. Small quantities of blue and red colours are used for white papers, and aniline dyes as well as various pigments for coloured papers. Finally the stuff is made into paper.

Paper Manufacture by Steam Power

In the same process paper is manufactured by steam power by which the work is done far more quickly at much less cost. In the mills vacuum pans are employed for boiling.

Fibres for Paper-pulp

Rags are the best as a paper material. But, for cheapness, all kinds of vegetable fibres are utilised for paper-making. Cellulose is the substance required for paper. It is found more or less in all tissues of plants. In most cases the presence of colouring matters and various waxy and resinous substances render the cellulose very impure. It is, therefore, desirable that all impurities be removed, as far as possible, before the fibres are made into paper. Tenderest rags, such as muslins, are employed for blotting papers. Jute fibre is smooth but difficult to bleach: however, the resulting paper is strong and tough.

The length of vegetable fibres, varying from $\frac{1}{25}$ th to $\frac{1}{8}$ th inch, operates an important part in the manufacture of paper. Short length of a fibre weakens the quality of paper. Papers made out of straws are weak. Straw pulp is generally used as an admixture. Wood pulp is now in common use, specially in America.

Straws and wood are reduced to pulp by steam power by either Soda-lime or Caustic soda process. Caustic soda is preferred. Wood is to be cut into chips after removing its bark and grasses into pieces before boiling. These stuffs may also be reduced to pulp by boiling over a naked fire in stationary cauldrons unlike rotatory boilers used in the mills. But it will take much time and labour before the stuffs will be reduced to pulp. However, our energetic young men might follow

this process in making pulp from jute stalks, as it is the cheap and easy way. If successful, it would open a way for a new industry in this country.

Literature on Paper Manufacture

The following books may be consulted for further information on the subject :—

Art of Paper-making—A. WATT.

Commercial Products of India—SIR G. WATT.

Paper—H. A. MADDOX.

Paper-making—CROSS and BEVAN.

Paper and Its Uses—DAW.

Practical Paper-making—CLAPPERTON.

CHAPTER IV

A THREE-HUNDRED-ACRE JUTE FARM



WE need hardly repeat that jute will never succeed if sown under unfavourable conditions. We have accentuated these points on several occasions, in the preceding pages. However, it will be well to caution a beginner again, who takes to the cultivation of jute somewhat on a large scale. Jute grows on particular soils, under particular climatic conditions. Sowing and after-treatments must be finished in proper time. Delay in these treatments will harm the crop materially, and the grower will sustain a loss thereby. Although there is a sudden fall of prices, yet a well-grown crop pays handsomely to its grower.

Of the 300 acres of a farm, 150 acres may be sown with jute and the other 150 acres with paddy, in the same season. Jute may be rotated with rape seed or pulses or tobacco in the first year, while paddy with jute in the second year. An additional area of 50 acres is also wanted for the farm for buildings and grazing.

Detailed statements showing receipts and expenditure of a three-hundred-acre jute farm, are given as follows :—

RECEIPTS :—	Rs.
3,000 Maunds of jute at Rs. 8 per maund (20 maunds per acre) ...	24,000
3,000 Maunds of paddy at Rs. 3 per maund ...	9,000
1,500 „ of mustard at Rs. 5 per maund ...	7,500
7,500 „ of <i>pekati</i> (stalks) at about 4 annas per maund (50 maunds per acre) ...	1,875
3,000 „ of paddy straw at 8 annas per maund	1,500
4,000 „ Juar plants for fodder... ..	500
	<hr/>
	Rs. 44,375

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CAPITAL EXPENDITURE :—

	Rs.
Cleaning and plotting lands	10,000
120 Bullocks at Rs. 75 each	9,000
10 Iron ploughs (Hindusthan)	200
70 Yokes	35
10 Bidas	60
4 Five-tined grubbers	80
4 Hengas (beam harrow)	20
6 Ladders	5
2 Chaff cutters	300
1 Scale	20
200 Sickles	50
200 Khurpies	25
60 Kodalties	60
10 Carts	500
1 Cake crusher	100
Tin-roofed cowshed	3,000
Thatched shed for servants	500
Tin-roofed godown	3,000
Superintendent's quarters	1,000
Office rooms	1,000
	<hr/>
	Rs. 28,955
Working capital	" 6,045
	<hr/>
TOTAL RS.	35,000

THREE-HUNDRED-ACRE JUTE FARM

			Rs.
RECURRING EXPENDITURE :—			
Cultivation charges—			
50	Country ploughs	... ..	100
60	Ploughmen at Rs. 12 each per mensem	...	8,640
6	Sirdar coolies at Rs. 15 each per mensem	... ..	1,080
6	Servants for feeding and grazing cattle at Rs. 10 per head per mensem	... ..	720
100	Extra coolies for 6 months for weeding and harvesting, at Rs. 12 each per mensem	... ..	7,200
200	Extra coolies for 10 days for transplanting paddy, at annas 6 per diem per head	... ..	750
50	Extra coolies for 20 days for cutting paddy	... ..	375
100	Extra coolies for 20 days for thrashing paddy	... ..	750
100	Extra coolies for 10 days for thrashing mustard	... ..	375
550	Maunds of oil cake for bullocks at 1½ maunds per diem	... ..	1,100
36	Maunds of salt for bullocks	... ..	100
2,000	„ of paddy straw	... ..	1,000
4,000	„ of juar plants	... ..	500
50	„ of jute seed	... ..	500
60	„ of seed paddy at Rs. 4 per maund	... ..	240
25	„ of seed mustard	... ..	150
	Depreciation on bullocks and implements	600
	Rent at Rs. 3 per acre	1,050
	Miscellaneous	770
			Rs. 26,000

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Establishment charges—

	Rs.
Salary of Supdt. at Rs. 200 per mensem ...	2,400
" " First Assistant at Rs. 50 per mensem ...	600
" " Second Assistant at Rs. 30 per mensem ...	360
" " two Peons at Rs. 8 each per mensem ...	192
	3,552
TOTAL RECURRING EXPENDITURE ...	Rs. 29,552
TOTAL RECEIPTS ...	44,375
	14,823
Net profit (on a Capital of Rs. 35,000)	14,823

CHAPTER V

KEROSENE EMULSION.



KEROSENE emulsion is the most simple and effective remedy against all insect pests. It kills insects when applied to their bodies. In raw state, Kerosene oil injures the plants, so it should always be applied after being diluted with some other materials which would form an emulsion in mixture with the oil. It can be used by means of an ordinary hand sprayer in small plots or gardens. For a large area under field or garden crops, a larger machine of Knapsack Sprayer pattern would be very useful. It is specially valuable when delicate plants are attended to. The sprayer which is used commonly by the Municipalities for disinfection will do well for ordinary purposes. Emulsion may be prepared according to the following formulæ :—

Soap Formula

Kerosene	...	...	...	2 gallons.
Fish-oil-soap (or 1 quart soft soap)	...	...	...	½ lb.
Water	...	...	...	1 gallon.

The soap, cut into small pieces, is to be dissolved in the water by boiling and immediately added, away from the fire, to the kerosene oil. The whole mixture is then agitated violently while hot with an ordinary butter churn used in this country. The emulsion should be ready after 5 or 6 minutes' agitation, when it would assume the consistency of cream. The emulsion should be diluted with water when it is to be used. If fish-oil-soap or soft-soap (potash soap) be not available, ordinary bar soap may be used.

In the up-country, where the water is hard, some of the soap will combine with the lime or magnesia in the water, and more or less, the oil will be freed, specially when the emulsion is diluted. Such water should be broken with lye, or rain water employed. It would be better to follow the "milk emulsion" formula, with which the character of the water, whether hard or soft, does not affect the result.

Milk Formula

Kerosene	...	...	...	2 gallons.
Sour milk	...	...	...	1 gallon.

The oil and sour milk are to be mixed together and churned as in the former case. After about 5 minutes' agitation, a change from a watery liquid to a thick buttery consistency takes place, which is thicker than that with the soap. Sweet milk may also be used for the sour milk after a little vinegar is added to it. Milk emulsion cannot be stored for a long time. It would be better to prepare it when required.

The Emulsion is to be diluted

For the soft-bodied insects and plant lice, one part of the emulsion is to be diluted with from 10 to 15 parts of water; for the spider and other plant mites, the same, with an addition of 1 ounce of flowers of sulphur to a gallon. For scale insects, the larger plant bugs, larvæ and beetles, it should be diluted with from 7 to 9 parts of water.

CHAPTER VI

LAND MEASURES AND BAZAR WEIGHTS



IN several places of this Book, local measures of lands and standard *bazar* weights have been quoted in reference to outturns of jute fibres. A purchaser should know local weights, which vary at different markets, before prices for commodities are settled. The diversity is still more confusing in case of land measures in this country. Almost every Zemindari (an estate) has its own standard measurement. The unit of measures of lands is a *nal* (reed) in Bengal or *laga* (a piece of bamboo) in Bihar, which may vary in length from 4 cubits to 8 cubits—18 inches making a standard cubit now-a-days. The *bigha* measurement is in vogue in Western and Central Bengal. Eastern Bengal has both *bigha* and *kane* measures, while in Northern Bengal it is known by the name of *done*.

The principal common measures are given below:—

Land measures

English—

12	inches = 1 foot
3	feet = 1 yard
5 $\frac{1}{2}$	yards = 1 pole
22	yards (4 poles) = 1 Gunter's chain
1	square chain or } = $\frac{1}{100}$ th acre
484	square yards }
4,840	square yards = 1 acre
640	acres = 1 square mile

Bengal—Standard bigha

1	square cubit = 1 ganda	
20	gandas or	} = 1 chatak
5	cubits × 4 cubits	
16	chataks = 1 cottah	
20	cottahs = 1 bigha	
	or	
4	cubits = 1 nal	
1	nal × 20 nals = 1 cottah	
20	nals × 20 nals or	} = 1 bigha
1,600	square yards	
3.02	bighas or	} = 1 acre.
60½	cottahs	
1⅓	Bihar bighas	} = 1 acre
(5½	cubits making a <i>laga</i>)	

Done = 13 cottahs or ⅓th acre

Kanee = 3 bighas and 12 cottahs or
1.16 acres

16 Kanes = 1 drone

In the district of Tippera 1 drone is equal to 6½ acres or about 19 bighas.

Kiari or Kiar = nearly 1 bigha

Pakhi = .8 bigha

Hal = 15 bighas or 5 acres

Bazar Weights*English*—

16	drams = 1 ounce (oz.)	
16	ounces = 1 pound (lb.)	
14	pounds = 1 stone	
2	stones or	} = 1 quarter
28	lbs.	
4	quarters or	} = 1 hundredweight (cwt.)
112	lbs.	
20	hundredweights or	} = 1 ton
2,240	lbs.	

Bengal—Standard weight

- 5 tolas = 1 chatak ($2\frac{1}{4}$ oz.)
 4 chataks = 1 powa
 4 powas = 1 seer (sr.) [$2\frac{2}{3}$ lbs.]

In some places 60 tolas and somewhere 90 tolas make a seer.

- 5 seers = 1 panseri
 40 seers = 1 maund (md.) [$82\frac{2}{7}$ lbs.]
 27·22 maunds or
 27 mds. and 9 srs. } = 1 ton

CHAPTER VII

BENGALEE YEAR



BENGALEE year ends with *Chaitra*, corresponding to the months from the middle of March to the middle of April, after harvesting and storing the crops of the year. New year begins in *Baisak*—the most auspicious month of the year. Social as well as religious festivals are held almost daily, during this month, in all parts of the Province—miseries and failures of the past year being forgotten. Old traders renew their books and new traders step in. After a year's hard work, the jolly peasant of Bengal enjoys heartily the merriments of the month for a few days and commences field-works again with greater energy. His crops are only a few and the area is but limited. Hence, every plot under cultivation receives his careful attention, although it is carried on in a primitive style. Jute is specially a favourite of his, as it secures a loan for him readily, when he is urgently in need of money. The present slump in the jute trade has no doubt made the situation dull, but better days are assuredly awaiting him. Jute as well as other substitutes are being vigorously tried in other parts of the world, but up to now they have been unsuccessful. We wish good luck to the growers, the traders, and the manufacturers—all who are concerned, in any way, in the crop of our book "Jute in Bengal."

Bengalee months were frequently quoted in this work for convenience sake, when information regarding the seasons related to sowing or harvesting was collected from the cultivators. Jute season of the trade begins in July and ends in June. The table following gives the Bengalee months corresponding to the English months.

BENGALEE YEAR

**Bengalee Calendar months corresponding to
English months**

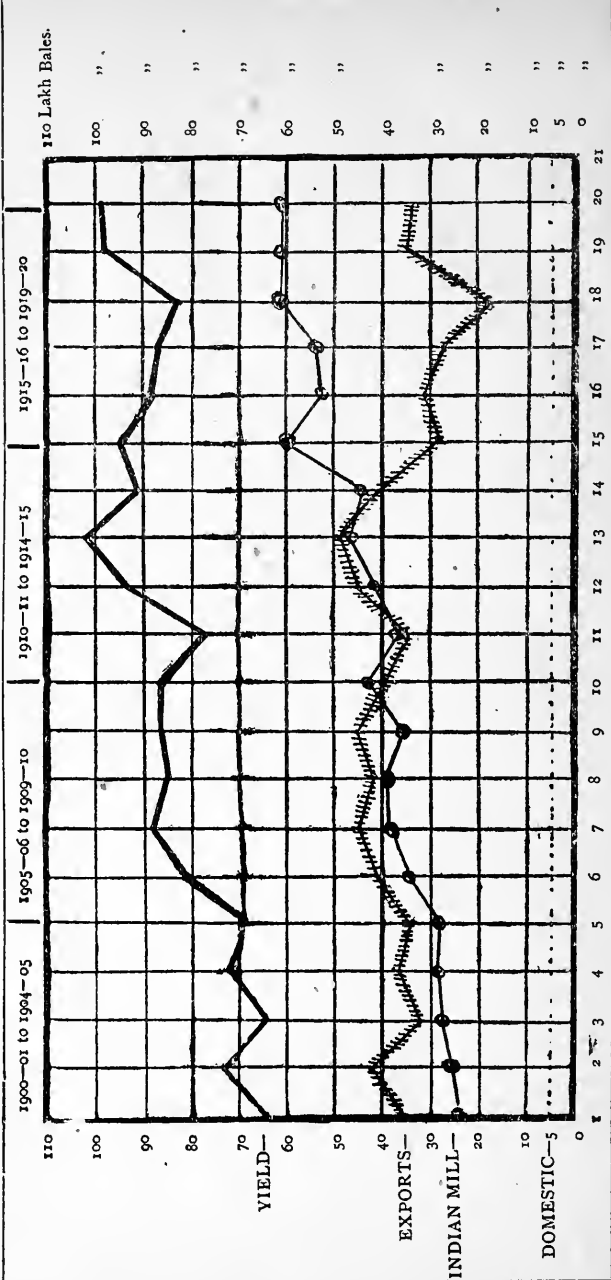
Bengalee.			English.
Baisak	from middle	April	to middle May.
Jaistha	"	May	" June.
Ashar	"	June	" July.
Sravan	"	July	" August.
Bhadra	"	August	" September.
Aswin	"	September	" October.
Kartick	"	October	" November.
Agrahayan	"	November	" December.
Poush	"	December	" January.
Magh	"	January	" February.
Falgoon	"	February	" March.
Chaitra	"	March	" April.

CHART OF THE JUTE CROP

Showing Yield and Consumption

(IN LAKHS OF BALES)

From 1900-01 to 1919-20



JUTE IN BENGAL

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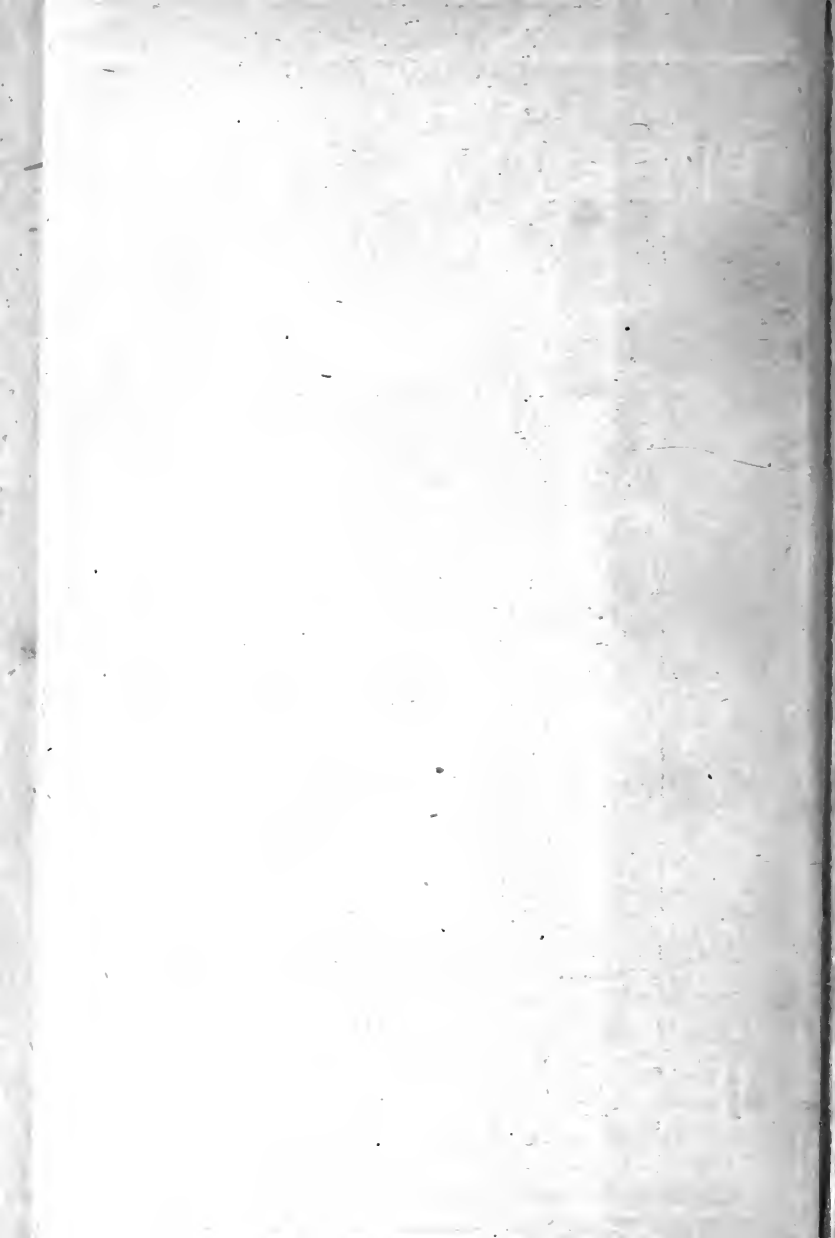
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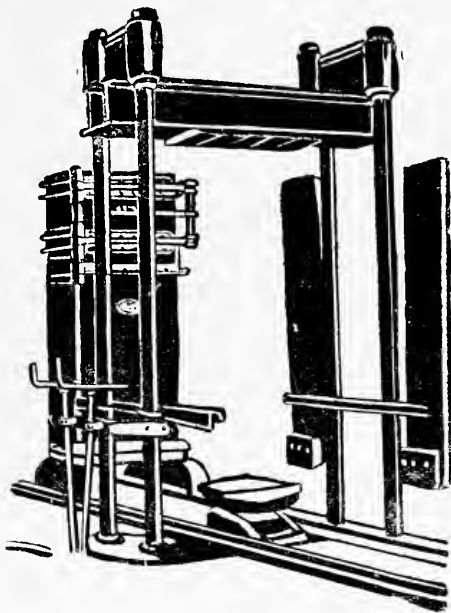
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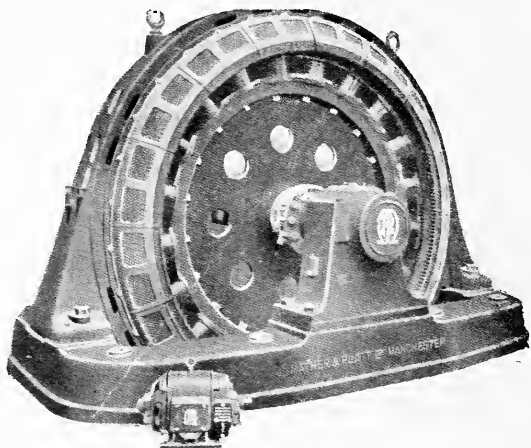
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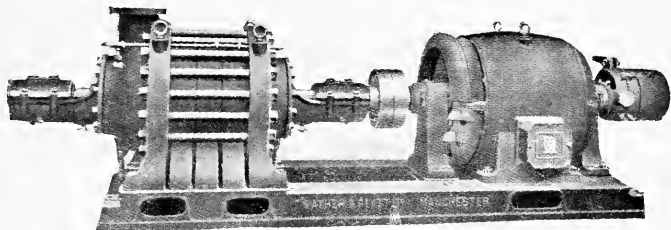
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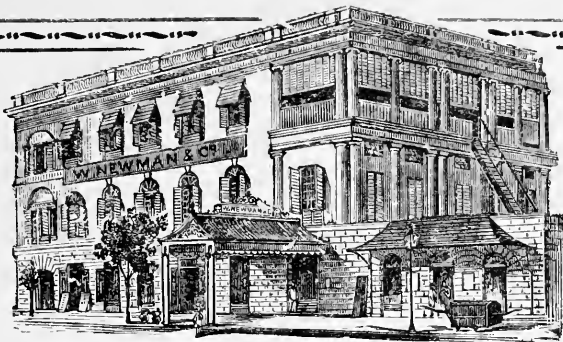
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