



**REPORT**  
**ON**  
**HEMP MARKETING IN INDIA**

*Rel. Comd*

*By*

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# REPORT

ON

## HEMP MARKETING IN INDIA

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### CHAPTER I.

#### INTRODUCTORY.

1. *The Trade Term "Hemp"*.—The trade uses the term "hemp" for the fibre of at least four crops grown in India viz., *Cannabinus sativa* L., *Agave species*, *Hibiscus cannabinus* L., and *Crotalaria juncea* L. But *Sann* hemp with which the author of this report is concerned, is got from *Crotalaria juncea* and is comparatively the most important fibre plant in India, both as regards the extent to which it is grown for local consumption and also for export.

2. *History of Sann Hemp*.—*Sann* hemp (*Crotalaria juncea* L.) is "probably<sup>1</sup> one of the earliest (400 B.C.) of the distinctly named fibres in India, as we find in the Hindu Institutes of Manu that the sacrificial thread of the Kashatriyas or the Rajputs is directed to be made of *Sana*". Rheede<sup>2</sup> was the first European writer who in 1685 brought the plant to the notice of European botanists. As<sup>3</sup> early as 1803 it was brought to the notice of the East India Company and it excited the interest of the Board of Directors, who made a strong effort to get it taken up by the trade in Britain, but made no headway with it. In 1803 Roxburgh<sup>4</sup> conducted a series of experiments and observed "the quality of the fibre. . . . is naturally excellent, probably not inferior to the hemp of Europe". Dr. Wight<sup>5</sup> followed up the work with experiments on the comparative tensile strengths of ropes made of *Sann*, cotton, hemp, and coir and found that they could stand strains of 407 lbs., 346 lbs. and 290 lbs. and 224 lbs. respectively. These early writers also noticed the defective preparation of the fibre and suggested remedies. In this connection it is worthy of remark that in India the superiority of the fibre from the Konkon has been an established fact since the initial stages of the export trade which began about the middle of the last century. No serious attempt to improve the fibre for the overseas market appears to have been made in these early days, and even after the organisation of the Agricultural Departments, attempts at improvement have been casual and unsystematic.

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<sup>1</sup> Royle, J. F.—Fibrous plants of India, 1855.

<sup>2</sup> Rheede—Hortus Malabaricus Vol. IX, 1685.

<sup>3</sup> Wissett, R.—Cultivation and preparation of hemp, 1804.

<sup>4</sup> Roxburgh, W.—Flora Indica, 1832 (Carey's edition).

<sup>5</sup> Dodge, C. R.—A descriptive catalogue of the useful plants of the world, 1897.

3. *Vicissitudes in the sunn hemp trade.*—Before the war, Europe depended almost entirely on supplies of the cheaper Russian hemp mostly of the inferior grade known as Seretz with which Indian hemp competes. Russia's average production then was over 60 per cent. of the world's total production and her pre-war average export was 53,844 tons, against 8,652 tons in 1926, and 7,663 tons in 1927. The war thus interfered with the Russian supply which declined by nearly 50 per cent. and Indian hemp was in great demand.

During the first three years of the war Indian export of hemp steadily increased and in 1916-17 it was a little over that of the pre-war year (*vide* appendices 4 and 5). In 1917-18 it declined to less than half due to shortage of shipping. Owing to uncertain supplies from Russia just after the war, there was a temporary demand for Indian hemp, and the export from India in 1919-20 was more than double the average of the pre-war period (*vide* appendices 4 and 5). The years 1919-20 and 1920-21 were marked by speculative transactions, fancy prices being offered for Indian hemp. This boom period was followed by a heavy drop in the export of hemp from India and in 1921-22 the hemp export declined to one-third of that of 1919-20 and was almost half that of 1909-10.

In 1924-25, owing to the failure of the Italian crop, decline in Russian supplies and consequent increased demand for Indian hemp, the export trade appreciated considerably and reached the highest figure recorded since 1919-20. Belgium has been the largest buyer since 1922.

Owing to fancy prices offered in that year for the produce, crops in the Central Provinces, United Provinces and Panchmahals in the Bombay Presidency were harvested too early and the fibre was reported to be weak as it was extracted from immature stems.

Meantime Russia, having recovered from the effects of the war and organized her agriculture, commenced her activities in the hemp trade as in previous years, and from 1925 the demand for Indian sunn hemp and consequently the Indian hemp trade gradually declined owing to renewed competition from Russia. By 1929-30 the hemp export from India had declined both in quantity and value 23 and 19 per cent. respectively below the pre-war average. Authorities expect that the Indian hemp trade will be seriously affected in future by renewed competition from Russia and by the increased use of hard hems in Europe, unless the Indian fibre and its marketing system is improved at a very early date.

With an uncertain demand on one hand and a supply of doubtful quality on the other, the larger shippers do not find the export of Indian sunn hemp profitable at present and therefore some have reduced their export business, and some have discontinued it altogether. This state of affairs led the trade to press for improvement in the fibre marketed, and the agitation resulted in some improvement in its preparation. The matter was also taken up by the Imperial Institute's Advisory Committee on Plant and Animal Products and on Vegetable



Fibres; also by the London Hemp Baling Association, the object in all cases being to effect improvements which would enable Indian hemp to hold its own against renewed competition from the cheaper Russian supplies.

On this subject Sir David Prain, Chairman of the Advisory Council of Plant and Animal Products at the Imperial Institute, London, said before the Royal Commission on Agriculture in India in a meeting in London in 1927—"Now,\* for the first time, is coming an opportunity when it (Sann) can come in if India is anxious and willing to take an interest in the thing herself. It may now perhaps establish a sound position as against Russian hemp, which it never had before, and may never have again. If it is once established in the market, it will be difficult to dislodge in the future." He also referred to the possibility of Africa producing hemp.

The object of the creation of the temporary post of Hemp Marketing Officer under the Imperial Council of Agricultural Research to which the author was appointed, is therefore an attempt to discover whether India can improve the quality of the fibre exported, sufficiently to capture the market, and if so, how. In this connection particular attention has been paid by the author to the factors named by the Imperial Institute's Advisory Committee on Vegetable Fibres as limiting the consumption of Indian hemp, viz. :—

- (a) the great irregularity of quality;
- (b) excess of dust and dirt in the fibre; and
- (c) the unreliability of the packing.

4. *Appointment of the Hemp Marketing Officer.*—The author of this report Mr. T. S. Sabnis, I.A.S., was appointed Hemp Marketing Officer by the Imperial Council of Agricultural Research to enquire into and report on the condition of the *Sann* hemp trade, with special reference to possible improvements in the quality of hemp exported. He took charge of his duty on 1st September 1930 and relinquished the post on 17th April 1931.

5. *Procedure adopted.*—After studying the available literature and making out a plan of work, the author visited the most important hemp growing tracts in India including those in the United Provinces, Central Provinces, Bihar and Orissa, Bengal and the Bombay and Madras Presidencies. The Punjab, Assam and Burma being comparatively unimportant as regards hemp production, had to be excluded from his programme.

Among the objects of study were the suitability of the various tracts for the production of hemp, the methods of cultivation, retting processes, modes of extraction, preparation of the fibre, baling operations and the existing systems of marketing in up-country production centres. Results of experiments, which had been carried out in the various parts

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\* Indian (Sunn or sann) hemp—Empire Marketing Board, Bull. 25, 1930.

of India, were examined and the subject matter of the enquiry was discussed with Directors of Agriculture and agricultural officers immediately concerned with the crop, with Registrars of Co-operative Societies, Directors of Land Records, the Director-General of Commercial Intelligence and Statistics, Chambers of Commerce, Trade Associations, the principal balers and exporters. Touring took up most of the time available for the enquiry.

An enquiry of this type necessarily suffered from some handicaps peculiar to it. Unlike formal committees which get their facts and figures from responsible persons and organizations in the form of memoranda and oral examinations, the author of this enquiry had to be content with the results of his own efforts to get the relevant information from the persons concerned. Hence, the report does not claim to be an exhaustive treatise on the subject, but it is hoped that the tentative findings and proposals embodied in it will be helpful in evolving constructive schemes.

6. *Acknowledgment.*—The author takes this opportunity to acknowledge gratefully the assistance rendered by all whom it was his privilege to meet in the course of his duty.

I am indebted to Mr. F. J. Plymen, C.I.E., for the use of two photographs Nos. 23 and 24.

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## CHAPTER II.

### UNITED PROVINCES.

7. *Acreage, species grown and general methods of cultivation.*—The average net annual area under all crops in the province for the last five years was 42,323,553 acres, of which an average of 203,625 acres were under *Sann* hemp, therefore *Sann* hemp was 0.48 per cent. of the total cropped area. According to the figures given in the Season and Crop Report for the year 1928-29 the area under hemp (mostly *Sann* hemp) excluding the Indian States was 156,690 acres.

The crop is grown throughout the province, but the principal tracts where it is grown for fibre, lie in the eastern and north-eastern districts, notably Benares (20,759 acres), Jaunpore (18,440), Azamgarh (13,625), Allahabad (11,959), Partabgarh (11,822), Pilibhit (5,118) and Bilari tehsil of the Moradabad district (1,485).

The (*Sann*) crop grown in the different tracts of the province all belong to *Crotalaria juncea* L. Variations in the vegetative characters which are sometimes evident amount only to varietal differences.

Throughout the province preparation of the land consists in two to three ploughings. In the beginning of July after the first rain, seed is sown broadcast after the final ploughing and the field is run over with the Pata.\* The seed rate varies at different places, but generally

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\* A beam which is dragged over the surface of the land to level down the furrow tops.

speaking 60 lbs. of good seed suffice for an acre. Germination usually takes place within three days after sowing. No after-care is given, or required, until the crop is ready for harvest.

8. *Botanical work.*—Since about 1923, the Economic Botanist to the Government, United Provinces, has been working on the improvement of this crop and his work has been mainly confined to “selection” of improved strains. As a result, an improved strain named *Cawnpore 12*, which gives a better quality and also a higher yield of fibre (up to 10 maunds per acre), was evolved and its seed was distributed in the *Sann* hemp growing tracts in 1926. Samples of its fibre were sent to the Imperial Institute, London, and the report received contained the following statement:—

“The colour and preparation of the fibre is vastly superior to the fibre which is imported into this market as *Sann*. It would sell several pounds (sterling) per ton above the price of the material now imported from India.”

If after trial in the *Sann* growing tracts this strain is found to be really superior to the local strains, it should be spread as quickly as possible before it is contaminated by crossing with other strains. In connection with this work it was noticed that the *Sann* crop of the province was attacked by the stem-borer, *Laspeyresia pseudonectis*, and that this pest caused losses of 30-50 per cent. of the crop in the cases observed.

9. *Trade classification of the United Provinces Sann fibre.*—The trade classifies the *Sann* fibre of the United Provinces into (a) Pilibhit quality—a greenish fibre, and (b) Benares quality—a whitish fibre.

#### (a) PILIBHIT (OR GREEN HEMP).

10. *Areas and Cultivation.*—This quality is grown mostly in the Pilibhit, Bisalpur and Puranpur tehsils of Pilibhit district, but also to a considerable extent in the Bilari tahsil of Moradabad district. Small quantities are also grown in Biranpur-Katra (Shahjahanpur district) and in Orai (Jalaun district).

In the Pilibhit district the crop is grown mostly for fibre, a few plots being left for seed production. The cultivator keeps his own seed and uniformity of crop is thus maintained. In Bilari, it is grown either for green manuring, or for both seed and fibre.

The early crop known locally as *jethwa* is sown before the monsoon (about May) on a very limited scale on canal irrigated lands, and is used mostly for green manuring. The monsoon crop known locally as *katakia* is the main crop grown for fibre, or for both seed and fibre. It is the green fibre of this monsoon crop that is known to the trade as the Pilibhit hemp. Private landlords usually grow the *katakia* on their farms for green manuring, while tenants usually grow it for both seed and fibre as in Bilari, or only for fibre as in Pilibhit district.

11. *Harvesting, retting and extraction (photos Nos. 1 and 2).*—The crop in Bilari tahsil of Moradabad district is harvested after seed formation from the middle of November, while in Pilibhit district it is harvested for fibre from the middle of September to the end of October when it is in full bloom and pods are being formed. In the Pilibhit district it is left on the field after cutting for two to four days to dry a little; the tops of the plants are then cut off and largely fed to cattle while the topped plants are made into bundles which are stacked vertically near the retting pool to dry further.

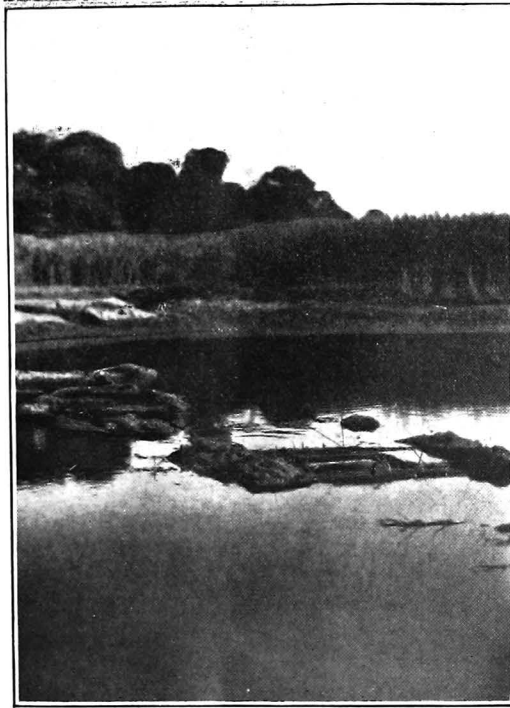
Retting is done according to the convenience of the cultivator. It starts in Pilibhit district from 15th September, and in Bilari tahsil from 15th November; continuing till the end of December in both cases. The period required for retting varies according to the temperature of the water in which the plants are retted. It is three to five days in September and October, five to eight days in November, and nine to fifteen days in December. The bundles of plants are immersed flat in stagnant pools and are weighed down with mud.

Before the material is fully retted—a condition ascertained by test with the fingers to discover whether the fibre is loose—it is removed from the water and stacked vertically to dry. The fibre is then extracted (photo 3) from the dried material by breaking the stalks at several places and pulling it away from the wood. Extraction is done by women (generally of the *Chamar* community). The average labourer extracts about two lbs. of fibre per day, and is said to get either 1/25 of the fibre which he extracts or the dry sticks as wages.

The fibre, without undergoing washing or cleaning, is folded and twisted into small bundles known locally as *gunchas*. Under-retting and absence of washing account for the large amount of dirt and dust generally found in it. Water pools for retting are scarce in Pilibhit district and Bilari tahsil of Moradabad district, and in such localities a hand machine for extracting the fibre from the green stalks would be very useful.

The yield of fibre is five to six maunds per acre, and the yield of seed is about the same when the crop is normal.

12. *Characters of the Pilibhit fibre.*—The fibre is dirty green in colour, three to five feet long, matted in the form of ribbons (*i.e.*, the vegetable matter connecting the bast fibres has not been fully decomposed during the retting process), weak as compared with the fibre from the Central Provinces and the Ratnagiri district of the Bombay Presidency; coarse, saturated with mud, but without much stick. The fibre is not tangled (*i.e.*, intertwined in a tangled mass) and except for its coarseness can be prepared into a good quality fibre after it is hackled. The fibre from Pilibhit district is superior to that from the Bilari tahsil of Moradabad district; and, as already stated, both are greenish in colour in spite of the fact that the former is harvested about the time when its pods are being formed, as is the case in Azamgarh, Partabgarh and other districts which grow Benares quality hemp in which the



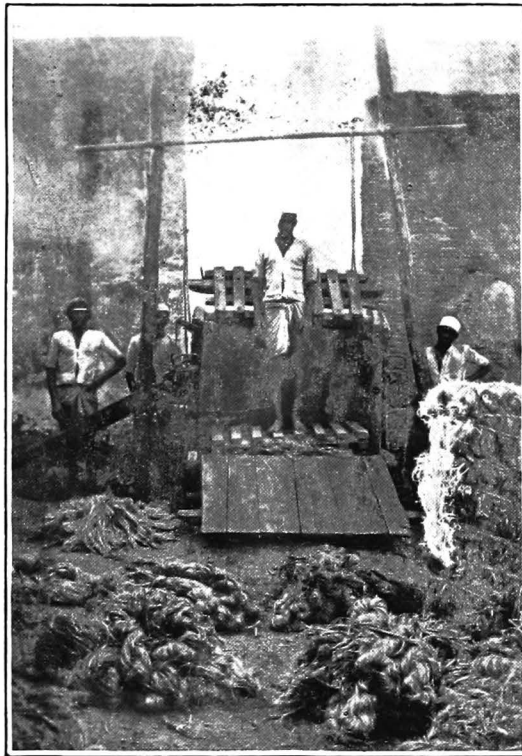
2. Retting.



1. Material being immersed.

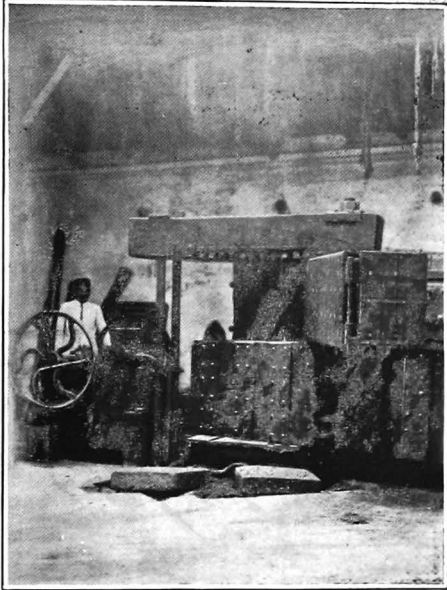


3. Extraction of fibre at Rajakasaipur.

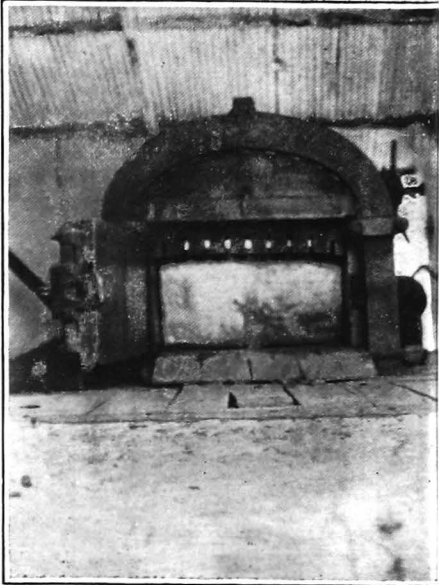


4. Hand press at Chandausi.

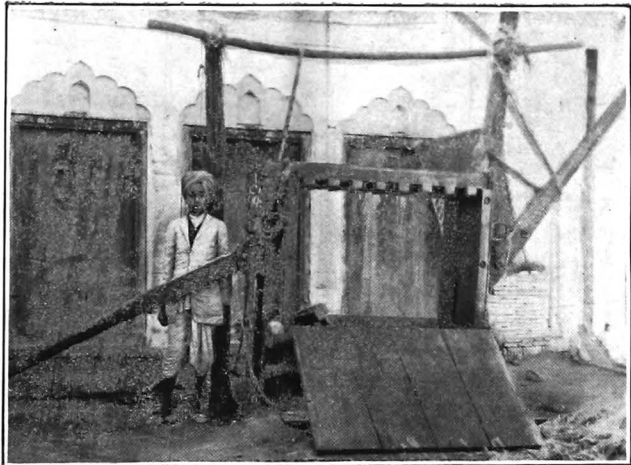
PLATE III.



5. Hand press at Pilibhit.



6. West Patent press for Kutchha and pucca bales at Chandausi.



7. Hand press at Chandausi.

colour is whitish. It is difficult to account for this greenish colouration in Pilibhit hemp. Early maturity of the plant may be a contributing factor but this is doubtful. Experimental work is needed to establish the cause.

13. *Markets, arrivals and handling in the year 1928-29—*

Name of market.	Arrivals. Maunds.*
Chandausi . . . . .	50,000
Pilibhit . . . . .	45,000

Both markets have hand presses (photos 4, 5, 6 and 7) for pressing the produce into *kutchā* † bales.

Here it should be noted that the *gunchas* (i.e., small bundles of fibre folded and twisted) are not opened and cleaned before they are pressed into *kutchā* bales.

BENARES HEMP.

14. *Areas, cultivation and harvesting.*—Amongst the districts which produce the white quality known in the trade as “Benares hemp” the most important are Partabgarh, Allahabad, Benares, Jaunpur and Azamgarh; and small quantities of fibre are also got from Fatehpur, Cawnpore, Unao and Hamirpur districts.

The crop is mostly grown for fibre. Seed is sown with the rains and cut when the crop is in full bloom, before pods begin to form. Small plots are left for seed production and are usually grown mixed with millets, pulses, til, etc.

15. *Retting and washing.*—The harvested crop is made into bundles which immediately, after the tops are cut for fodder, are immersed flat in stagnant pools of water, and weighed down with mud. The plants are not dried before retting. Retting starts from the middle of September and continues till the end of October. The material is allowed to ret three to six days and it is usually over-retted. Over-retting in that short time may be due to the immaturity of the plant, or to the practice of not drying the harvested material before retting.

The retted bundles are washed by beating first one end, and then the other of each of them on the surface of the retting pool. The process is completed by placing the butt ends in the water and vigorously lifting the bundles up and down and twisting them side-ways in the water. By the vertical and twisting motion the fibre from nearly half the length of the stem is loosened and forms into a tangled mass.

16. *Extraction.*—After the washing operation, the bundles are either stacked vertically, or (as in Allahabad district) opened out and spread on the field to allow the water to drain off. The sticks are then pulled

\* 1 maund = 82½ lbs.

† *Kutchā* bales = not full pressed bales.



out, and the fibre mass is straightened a bit, and allowed to dry on the field. The dried fibre is then folded and twisted into small bundles known locally as "bidi".

In Allahabad district, however, extraction is done by taking small bundles of the dried retted stems at a time, and breaking these in the middle. The sticks towards the butt ends are removed, but the sticks towards the upper half remain intact and covered by the fibre. The bundle is then divided longitudinally into two parts and re-made after turning one-half round so that the halves lie with sticks portion at either end. The loose fibre of the butt end of each half is then used to hide the sticks left in the upper portion of the opposite half of the bundle when twisting it into the form of the "bidi"; fifty per cent. of the sticks are thus left in the Allahabad fibre and it is regrettable that this practice is also spreading in Partabgarh district.

Extraction is usually done by the cultivator's family but when the crop is grown by landlords, they engage paid labour. In Jaunpur district the labourer's wage is  $\frac{1}{4}$  seer of *gur* \* and grain for the midday meal, and either about  $1\frac{1}{2}$  seers of inferior grain to take home in the evening, or the dry sticks instead. In Allahabad district the wage is  $1\frac{1}{2}$  seers of some inferior grain.

17. *Characters of the fibre.*—The fibre is not matted but is badly tangled; three to five feet in length, white, fairly soft, weak (as compared with the Bengal quality or the green quality from the Central Provinces) and containing varying amounts of dust and bits of stick.

The weakness of the fibre may be due either to over-retting and violent washing, or to the immaturity of the fibre caused by the forcing effect of the climate on the growth of the plant. The tangled character of the fibre is caused by the retted bundles being vigorously moved vertically in the pool during washing and the white colour, as in the case of white fibres from other provinces, is probably due to the crop being harvested before the seed has matured; also the vigorous washing is probably a factor. It is difficult to say without an experiment whether the omission of drying before retting has anything to do with the white colouration.

The produce of Fatehpur, Cawnpore, Hamirpur and Unao districts is considered the best quality, though quantitatively the crop in these districts is unimportant. As regards "loading" in the form of sticks, *i.e.*, leaving pieces of sticks in the fibre, fibre from the following places stand in the order given below:—

- (1) Least loading . . . Fibre from Bindki in the Fatehpur district.
- (2) Moderate loading . . . Fibre from Azamgarh district.
- (3) Heaviest loading . . . Fibre from Sheogarh and Siwait in Allahabad district.

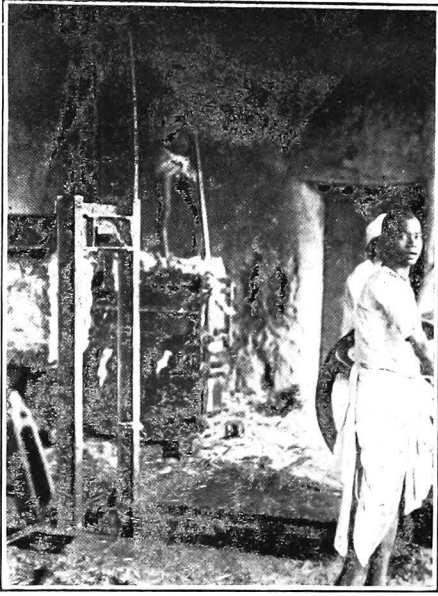
As regards quality of fibre, however, they stand as follows:—

Fibre from Bindki—first,  
Fibre from Azamgarh—second,

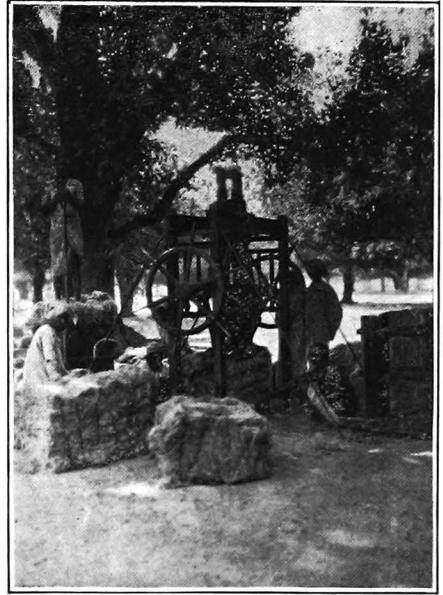
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\* Gur=crude sugar.

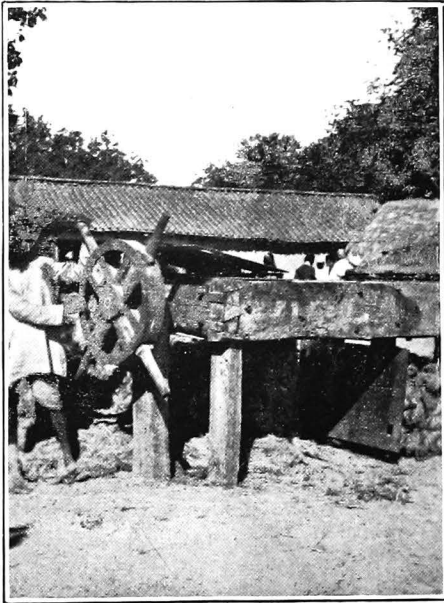
PLATE V.



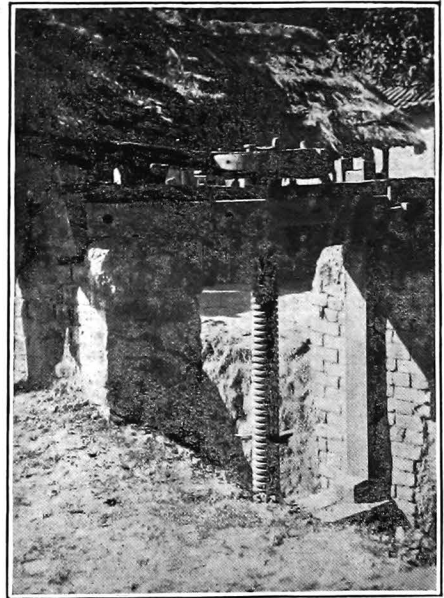
11. Fibre being pressed into kutchas at the Seogah market.



12. Kutchas at the Vishwanathgunj market.

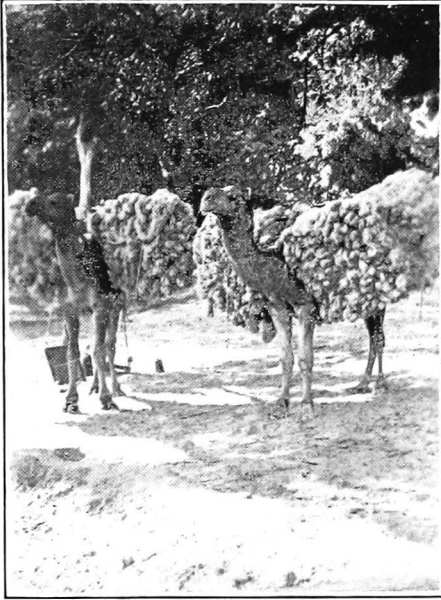


13. Wooden hand press at the Vishwanathgunj market.

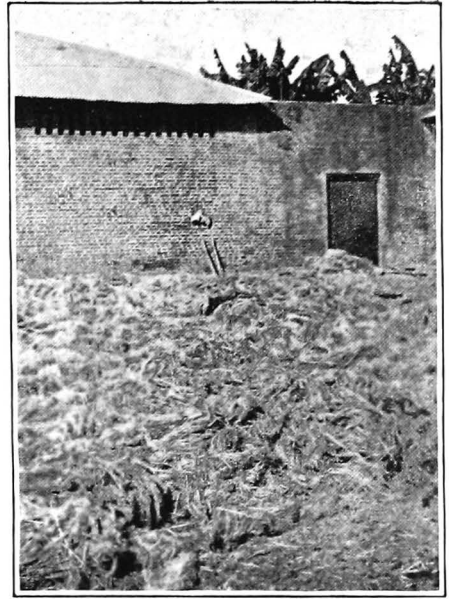


14. Wooden hand press at the Vishwanathgunj market.

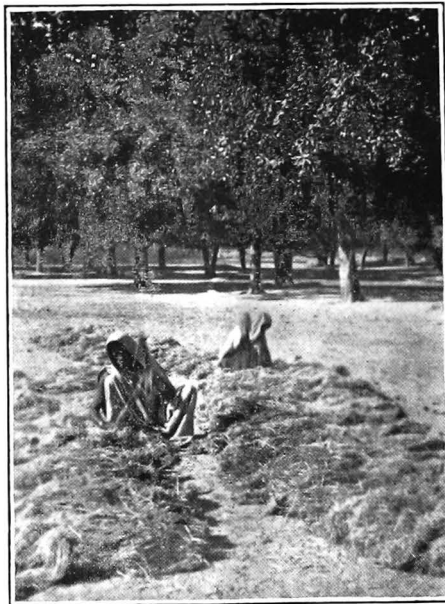
PLATE IV.



8. Fibre being brought to the Vishwanathgunj market.



9. Fibre being spread out for cleaning at the Seogart market.



10. Fibre being cleaned at the Vishwanathgunj market.

Fibre from Partabgarh and Allahabad districts—third,  
 Fibre from Benares and Jaunpur districts—fourth.

18. *Markets and arrivals in 1929-30.*—

Market.	Arrivals. Maunds.
Partabgarh district—	
Vishwanathganj, Madhoganj, Chibila and Antu . . . . .	50,000
Allahabad district—	
Shoogarh, Ismailganj talao, Siwait and Atrampur . . . . .	100,000
Jaunpur district—	
Karakat, Ramdayalganj and Jaunpur . . . . .	} 50,000
Azamgarh district—	
Rani-ki-Sarai . . . . .	
Benares district—	
Maheshpur, Shahabad, Chaubepur, Shivpur . . . . .	50,000

As the acreage under this crop grown for green manuring in the United Provinces is fairly large, and no separate figures are available for the crop grown for fibre, the arrivals of fibre in the markets are no index of the yield per acre.

Agents from Bombay and Calcutta firms, and from the factories of Shivpur near Benares purchase from these markets. In these markets the produce is usually made into *kutch*a bales of about 1 maund each by means of hand presses and is sent by rail, carts, camels and ponies to the factories at Shivpur for *pucca* baling.

19. *Marketing of United Provinces hems.*—The purchasing season starts from the middle of September and continues till the end of March. Arrivals vary according to market conditions. Cultivators usually sell their produce to the village dealer who brings it (photo 8) on carts, ponies or camels to a convenient larger market in the form of small bundles of hanks with the “loading” of dirt, dust and bits of stick (described on page 7, para. 16) and sells it to the market broker (*pucca arhatiya*) who takes an allowance of one to four seers per maund on account of dryage, when buying for the agents of the Bombay, Calcutta and Shivpur firms.

Each market has *kutch*a baling presses belonging either to the brokers or to the purchasing firms. The hanks are opened out in the yard where hand presses are installed, and are beaten with sticks or blunt choppers (photos 9 and 10). The fibre is then shaken to remove the loading of wood and dirt and are re-made into hanks which are pressed into *kutch*a bales (photos 11, 12, 13 and 14).

The *kutch*a bales vary both in weight and size. Chandausi bales are of  $3\frac{1}{4}$  maunds in weight and  $4' \times 2\frac{1}{2}' \times 2$  feet in size; or  $1\frac{1}{2}$  maunds in weight and  $2' \times 1\frac{1}{4}' \times 1$  feet in size; whereas Pilibhit bales are usually

of 4 maunds 22 seers in weight and  $4' \times 2\frac{1}{2}' \times 2$  feet in size. In other markets the bale is usually about one maund and its size about  $3' \times 1\frac{1}{2}' \times 2$  feet.

Cost of handling, pressing and cartage from the market to the railway station works out at four to six annas per maund. A deduction of about one anna per cent. is generally made in the name of public charities, etc., and brokerage amounts to eight to twelve annas per cent.

(Appendix 10 gives a more detailed description of the charges levied for various marketing operations.)

Up to about three or four years ago Chandausi and Pilibhit fibre was in good demand by Bombay and Calcutta but a large part of it now goes to the Punjab, and Marwar in the Bombay Presidency, for local consumption there. Benares hemp is cleaned, sorted and full pressed into bales mostly at Shivpur, and is sent *via* Calcutta for export.

20. *Baling for export.*—There are two hydraulic presses at Shivpur both of which have an equipment for hackling. The dealers there have their private trade marks to distinguish their grades. Besides buying from the local markets, they also buy from Bihar-Sharif and Chupra in Bihar and Orissa, bring the material to Shivpur and bale it there and are said to ship it from Calcutta. The aggregate turnover of the two presses is about 60,000 bales per year.

The bales containing Pilibhit and Benares hemp bear the shipper's distinguishing marks but these have no reference either to the quality of the fibre, the locality of growth or the baling press. The bales weigh about 400 lbs. and measure  $4' \times 1\frac{1}{2}' \times 1\frac{1}{2}$  feet.

21. *Grading and cleaning of Pilibhit hemp.*—The Pilibhit quality is mostly baled for export at Bombay but a small quantity is also baled at Shivpur (near Benares). It is baled either in a dressed or in an undressed condition and is usually cleaned and graded a little carefully before it is pressed. The grades of Pilibhit hemp exported are Pilibhit fine, Pilibhit No. 1 and Pilibhit No. 2.

Dressing consists of cleaning and hackling (photographs 15 and 16). The hackled fibre is made into loose hanks which are laid flat in the press. Tow from the dressed hemp is baled separately.

The undressed green hemp is only cleaned by beating with sticks and is not hackled. It is then re-made into hanks and thrown into the press anyhow.

22. *Grading and cleaning of Benares hemp.*—Benares hemp is graded into Benares 1, Benares 2 and Benares 3.

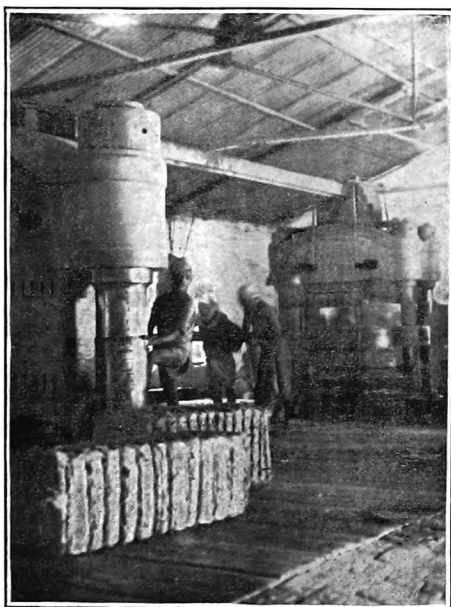
Cleaning and grading of the Benares quality is merely nominal. It is baled (photograph 17) in an un-hackled condition as the fibre is weak and so tangled that hackling would cause considerable loss in tow. The tangled mass is simply thrown into the pit of the hydraulic



15. Hackling of green hemp at the Parvati press—Shivpur.



16. Hackling of green hemp at the Parvati press—Shivpur.



17. Pressing Benares hemp into pucca bales at the Krishna press—Shivpur.

press along with the large quantity of stick and other refuse matter associated with this fibre.

23. *Cost of Handling*.—Rs. 5 per bale is the aggregate handling charge at the press for all the operations—cleaning, grading, pressing, cost of rope, loading, cartage and “railway station charges”.

An extra Rs. 3 per bale is charged for dressed green hemp, as it is hackled and the packing of the hanks in the press has to be more carefully done. Handling, shipping and port dues at Calcutta cost about seven annas per bale. The total charge per bale for Pilibhit and Benares hemp for all operations f.o.b. Calcutta thus amount to about Rs. 8-7-0 and Rs. 5-7-0, respectively. Freight and brokerage cost another 1 per cent. on the value of the consignment at the shipping port and 1 per cent. in London. About Rs. 5 per bale is the approximate expense for cleaning, grading, pressing and dock dues for the produce baled at Bombay, freight and brokerage being extra.

### CHAPTER III.

#### BIHAR AND ORISSA.

24. *Acreage*.—The average net annual area cropped for the last five years was 30,012,260 acres out of which 18,780 acres were under *sann* hemp, therefore *sann* hemp was 0.06 per cent. to the total cropped area. According to the Season and Crop Report for the year 1928-29 the area under hemp (mostly *sann* hemp) in this province (excluding the Indian States) was 15,300 acres.

Hemp is grown throughout the province but the principal tracts where it is grown for fibre are the districts of Patna (21,100 acres), Sambalpur (2,000), Balasore (800) and Bhagalpur (100). In Patna district the principal centres are Rakhsha, Babubigha, Jagai, Islamjpur and Bihar-Sharif and in Bhagalpur district the villages round about Barahat where the fibre is known as *Kashmira*. Sambalpur district possesses the important market of Bargarh which receives fibre not only from the district, but also from the surrounding feudatory states, viz., Balangir, Patna, Jasmunda, Lohasinga and Phuljhar.

25. *Strains grown*.—Bhagalpur district has two agricultural strains locally known as *Desi* and *Parwari*, respectively. Seed in both cases is sown in the rains but *Parwari* which is an early strain is said to be harvested for fibre by the end of August or early in September, whereas *Desi* which is a late strain is harvested from about the middle of September.

*Stem borer*.—Cases of attack by the stem-borer, *Laspeyresia pseudoceticis* are common, and loss in the yield and quality of the fibre from damages of this pest is sometimes severe.

26. *Cultivation*.—The crop is raised on uplands. When there is enough moisture in the land, seed is broadcasted and the field is run over with the implement known as 'Pata'. In the absence of enough moisture in the soil, the seed is broadcasted on the unploughed land, then the land is ploughed and the Pata is run over it.

The seed rate is between 60 to 80 lbs. per acre, and sowing starts with the rains in the beginning of July, germination being completed in 2-3 days.

The cultivation of *sann* hemp ranks low according to social estimation, therefore it is usually left to communities such as *Kols*, *Gonds* and *Kudas* whose social status is of the lowest.

In the Patna and Bhagalpur districts the crop is grown mainly for fibre; in the Sambalpur district it is grown for both seed and fibre; and in the Purnea district it is grown mainly for seed production, the seed yield being five to six maunds per acre. The seed from Purnea is reported to suit conditions in the *sann* hemp tracts in Bengal, and is popular with Bengal cultivators.

In Patna district the fibre crop is harvested from the middle of September to the end of October when the plants are in full bloom, and pods are being formed. In this district farmers leave a few plots for seed production. In Sambalpur district and in surrounding feudatory states where the crop is grown both for seed and fibre (mainly for local consumption) the agricultural operations resemble those of the Central Provinces; and harvesting starts after the seed matures (*i.e.*, from the middle of November) and continues till the end of January.

27. *Harvesting and retting*.—The harvested crop is not dried before retting. When the crop is harvested by pulling out the plants, the tops and the root portions are cut before the bundles are immersed in flowing or still water. The material is then weighed down in the water with mud; but in Sambalpur district and the surrounding feudatory states stones are used for this purpose, as in the case of the Central Provinces. Cultivators are of opinion that fibre from a crop harvested after seed formation is coarse, dark and weak. The time required to ret the material varies according to the temperature of the water and this varies according to the month in which the crop is harvested.

28. *Time and period*.—In the case of *sann* grown in Patna district, and also of the *Desi* variety in Bhagalpur district, retting starts from about the 15th September and continues till the end of October. Whereas in the case of Parwari strain of the Bhagalpur district retting starts in the end of August or early September.

In Sambalpur district and the surrounding feudatory states retting and extraction of the fibre is done at leisure as in the Central Provinces. It starts from about the middle of November and is finished by the end of January. The retting period is three to five days in Patna district and eight to eleven in Sambalpur district, according to temperature of the water.



In Patna district the retted material is washed as in the United Provinces by beating first one end and then the other of the bundle on the surface of the water, and then by vigorously moving the bundles vertically up and down and twisting them round in the water. The vertical and twisting motions are especially effective in separating the hemp from the stem and about  $\frac{1}{3}$  of the stem length is freed from it in this way, but this action collects the fibre in an entangled mass and lowers its market value considerably.

In Sambalpur district the retted material is washed by gently shaking the bundles in the water as in the Central Provinces and the fibre is not entangled.

29. *Extraction.*—In Patna district the fibre is completely separated from the stalk while it is still wet. A small portion of the butt end of the stem is broken in order to admit of a good hold of the fibre which is then stripped from the whole length of the plant; the fibre is then stretched out and left to dry.

In Sambalpur district the retted material is dried, usually for four to five days and the fibre is extracted from the dried stems at leisure as in the Central Provinces. When the fibre is extracted from wet stems it is spread out and dried.

In these three districts, *viz.*, Patna, Bhagalpur and Sambalpur the average yield of fibre per acre is four to six maunds, and the seed yield in the case of crops grown both for seed and fibre is two to four maunds per acre.

30. *Characters of the fibre.*—The produce from Sambalpur district and the neighbouring feudatory states, *viz.*, Balangir, Patna, Jasmunda, Lohashinga and Phuljhar is known in the trade as “green hemp”. The hemp from Balangir is considered the best in this class. Fibre from the Patna state is not as clean as that from Balangir, but ranks next to it. The produce of the Phuljhar state is strong but dark.

Generally speaking, the fibre from the Sambalpur district and neighbouring states is three to five feet in length, greenish, clean, fairly strong, comparatively free from sticks, but a little matted and coarse. It is not entangled because vertical stirring during washing is not practiced in this tract.

The white quality is received largely from Patna and Bhagalpur districts. It stands midway between the Benares and the Bengal qualities. It is clean, lustrous, a little tangled, about four to five feet long, fairly strong, a little coarse, and has some admixture of stick.

31. *Preparation of fibre for the market and its rates.*—After extraction the fibre is folded and twisted into small bundles known locally as ‘lundies’ in Patna and Bhagalpur districts; and as ‘bidies’ in Sambalpur district. The market rate of the produce varies according to the proportion of stick.

The rough local grades of the white quality and their market rates in the year 1931 are given below :—

Mixture of sticks.	Rate
	per maund. Rs. A.
(1) 2 to 3 seers . . . . .	4 0
(2) 5 to 6 seers . . . . .	3 8
(3) 8 to 15 seers . . . . .	2 8

The "green hemp" from Sambalpur contains the following qualities in varying proportion :—

Itarsi, Jubbulpore, and Seoni.

32. *Markets and arrivals.*—The purchasing season for the white quality is September to December, and for the green quality November to April. The produce is sold to *Paikars* (village money lenders) and after passing through the hands of a number of other middle men, reaches the larger markets.

The principal larger markets for the white quality are :—

	Arrivals in 1929-30 Mds.
Islampur (Patna district) . . . . .	2,000
Bihar-Sharif (Patna district) . . . . .	10,000
Mirjan and Aliganj (Bhagalpur district) . . . . .	6,000
Barahat (Bhagalpur District) . . . . .	10,000

Islampur and Bihar-Sharif markets have a number of metal hand presses, and the fibre is made into *kutch*a bales of one to two maunds in weight. There are no *kutch*a baling presses at the Mirjan, Aliganj and Barahat markets, therefore the fibre is sent in bundles to Calcutta and other places.

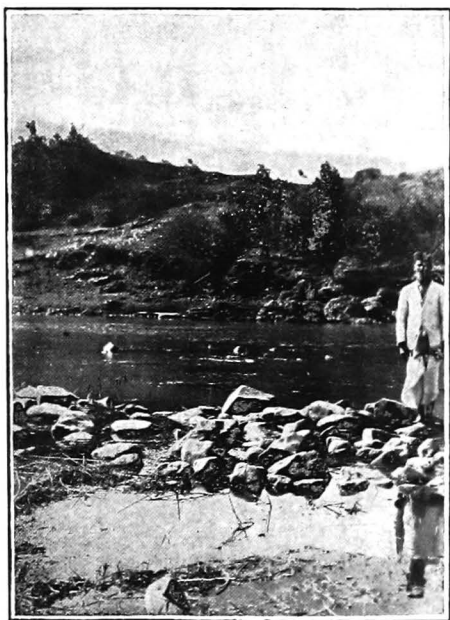
The "green" hemp is received at the Bargah market in Sambalpur district, forty to fifty thousand maunds being the average annual arrivals. There are a number of metal hand presses at the market which make *kutch*a bales usually of one to two maunds. About 100 *kutch*a bales are pressed per day, and six men are required to work the press. The cost of handling and pressing is about 9 annas per maund (*vide* appendix 10).

33. *Quality of arrivals and destination of the kutch*a bales.—The produce of Bihar and Orissa (both white and green) is on the whole fairly good, but the white quality could be considerably improved if washing is improved and the vertical stirring of the retted stalks is discontinued.

In previous years the white quality hemp was purchased by the hemp dealers at Shivpur (near Benares) and Calcutta for export; but owing to the reduced and uncertain demand from the overseas markets of late years, demand for this quality for export has gone down in the local markets. It is now largely purchased by rope manufacturers at Calcutta and Seorapalli (both in Serampur district). —

The principal local market for the green hemp is Bargah in the Sambalpur district and the produce goes to Bombay and Calcutta for export.

PLATE VIII.



21. Retting at Chappara—stones indicating retting material.



22. Retting at Saliwara—Jubbulpore district, stones indicating retting material.



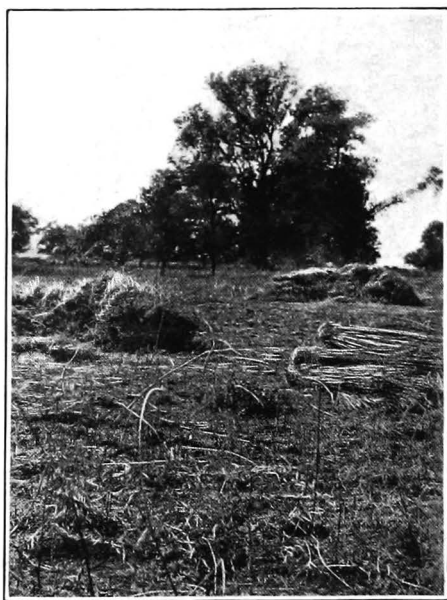
23. Retted bundles being removed from water.



18. Sunn hemp crop at Chappara.



19. Harvested crop being dried at Saliwara—  
Jubbulpore district.



20. Dried straw made into bundles at Saliwara—  
Jubbulpore district.

In 1928-29 the arrivals in these markets were said to be as follows:—

	Mds.
Calcutta . . . . .	25,000
Bombay . . . . .	15,000

Calcutta being nearer than Bombay and railway freight being less to that market, some of the Bombay buyers have the fibre baled and shipped from Calcutta.

## CHAPTER IV.

### CENTRAL PROVINCES AND BERAR.

34. *Acreage*.—The average total area cropped during the last five years was 27,284,920 acres of which 117,706 acres was under *sann* hemp; therefore the percentage of *sann* hemp to the total cropped area was 0.41. According to the Season and Crop Report for the year 1928-29, the area under *Sann* hemp in the Central Provinces and Berar (excluding Indian States) was 84,947 acres. *Sann* is grown throughout the province, but the principal districts where it is grown for fibre are Jubbulpore (2,578), Mandla (2,692), Seoni (6,409), Betul (2,956) and Chhindwara (3,305). Royle\* stated that Jubbulpore hemp was the product of *Crotalaria tenuifolia* but this was considered by Bentham and Hooker as a synonym of *Crotalaria juncea* and a careful examination of the crops at Jubbulpore and other places in the Central Provinces by the author has not revealed any specific difference of character from the plant now known as *Crotalaria juncea*.

35. *Cultivation*.—For preparation of the seed bed, the field is ploughed twice and the 'pata' is run over it. The seed is broadcasted and the field is again ploughed and run over with the *pata* to cover the seed. Sowing is done with the rains about 15th June, the seed rate being about 80 lbs. per acre. The crop is grown for both seed and fibre (Photo. 18) and is harvested after the seed has matured. Here there is a general belief that fibre extracted after seed formation is stronger and has better colour.

*Stem borer*.—Cases of attack of the stem by the stem-borer, *Laspeyresia pseudonectis* are very common and the loss in yield and quality of the fibre is considerable.

36. *Retting in the Central Provinces*.—The harvested crop is left on the field to dry (Photo. 19) for three to ten days and then made into bundles (Photo. 20). The tops are cut for seed, and the bundles are retted flat in ponds or preferably in shallow flowing river-water, the material being weighed down with stones (Photos 21 and 22) or logs of wood; mud is never used for this purpose. Retting continues from the middle of November to the end of March. At the Government Agricultural Farm, Sarkanda, the harvested crop after being dried is threshed by treading out the seed by bullocks, the heads of the plants only being trampled on; the threshed plants are then retted.

\* Royle, J. F.—Fibrous plants of India.

The retting period in flowing water is about eight days in December, eleven days in January, and fourteen days in February; in still water retting takes about four days less.

37. *Extraction*.—The retted material is washed by shaking the bundles gently in the water; they are then dried for four to five days (Photos 23 and 24) and the fibre is extracted usually at leisure by breaking the stems individually at several places and pulling the fibre off the woody part of the stem (Photos. 25 and 26). When the fibre is extracted from wet retted stems, it is dried by spreading on the ground (photo. 27).

The cultivation of this crop ranks low in social estimation, and is usually confined to people of the Gond caste. Even where other communities grow it, sowing and chopping of the tops for seed is entrusted to Gonds. Extraction is done by contract, the labourer receiving as wages either  $\frac{1}{2}$  of the fibre yield, or 1 anna per seer of fibre extracted. The extracted fibre is folded and twisted into a small bundle known locally as "*muda*". The dry sticks are used as fuel. In some parts of the Central Provinces a layer of these is placed below the ordinary grass thatching. The seed yield is about two maunds per acre and the fibre yield is four to five maunds.

38. *Characters of the fibre*.—The fibre is three to six feet long; green, brownish or dirty green in colour; with little dirt and stick, and of varying strength. In strength and texture it is inferior to the Pilibhit quality. The cleanliness is due to the fact that mud is not used in weighing down the material during retting.

The major portion of the fibre produced in Bhainsdehi tehsil in Betul district is "*Itarsi fine*", which is the best quality fibre grown in the Central Provinces. In Betul district it is known as "*Tapti fine*". Fibre from Mandla district is considered the worst in the province, and has badly matted butt ends; but it is still superior to the Chandausi fibre in cleanliness and colour. Jubbulpore quality resembles to some extent the fibre from Pilibhit district in colour, strength and texture, but is cleaner.

### Marketing.

39. *Markets and arrivals*.—The purchasing season starts from December, and continues till June, the largest arrivals taking place in March. The following are some of the chief markets which with the exception of Chappara are all close to a railway station:—

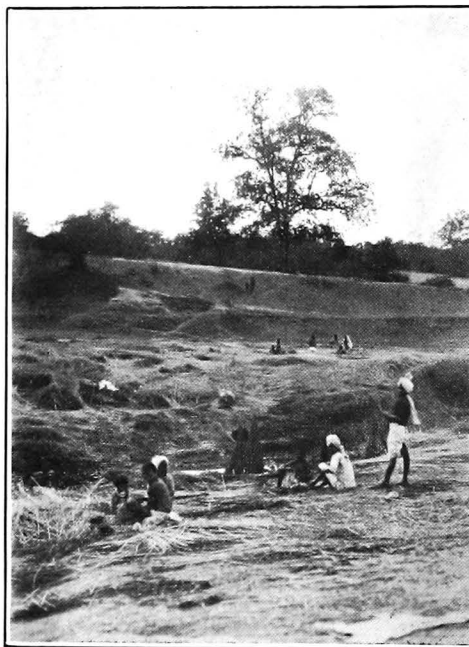
	Arrivals.	
	1925-26. Mds.	Estimated. 1931 Mds.
Chhappara (District Seoni) . . .	40,000—50,000	10,000
Keolari (District Seoni) . . .	40,000—50,000	5,000—6,000
Chhindwara district . . .	15,000—16,000	2,000
Betul district . . .	40,000—50,000 (Before 1922)	6,000
Jubbulpore Market for—		
Jubbulpore and Mandla districts . . .	40,000—50,000	10,000—15,000



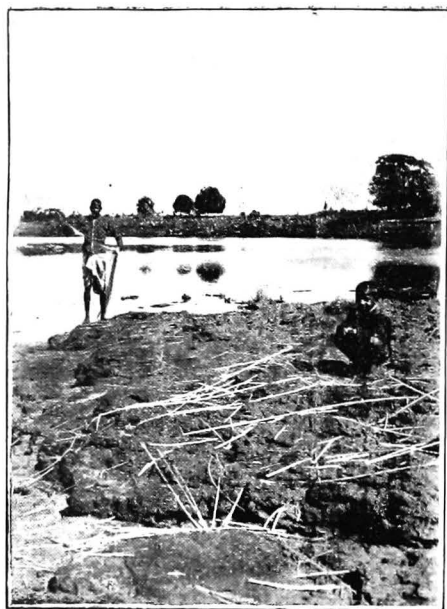
24. Retted bundles—water being drained off.



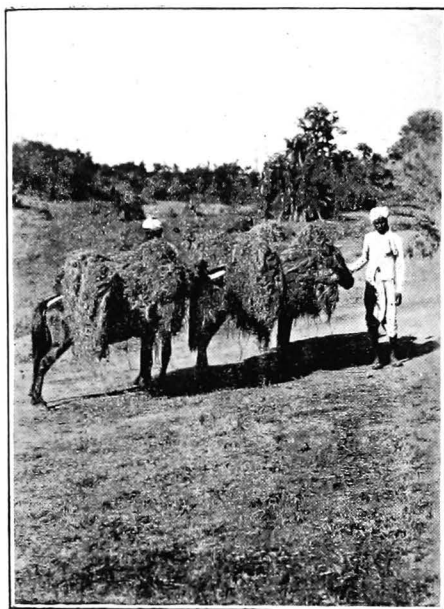
25. Extraction of fibre at Sarkanda farm, Bilaspur.



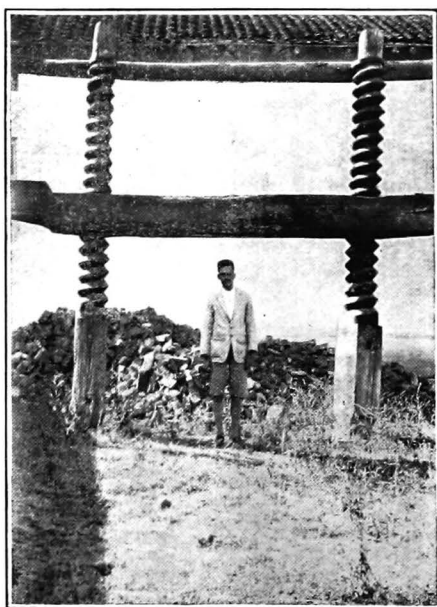
26. Extraction of fibre at Charaidongri—Jubbulpore district.



27. Fibre extraction and drying of fibre at Saliwara, Jubbulpore district.



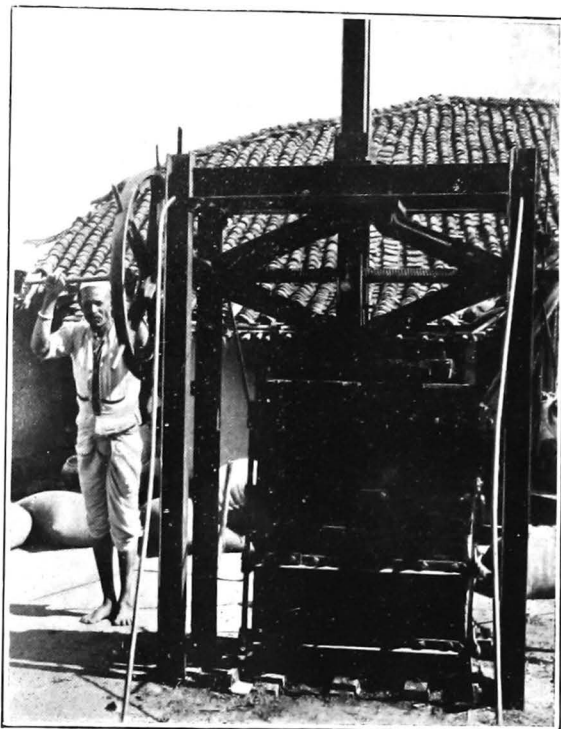
28. Fibre being carried from Bergi to the Jubbulpore market.



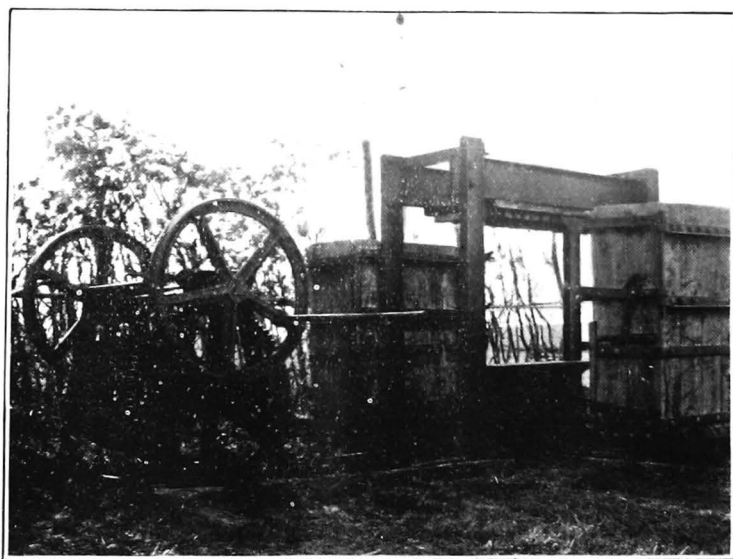
29. Wooden hand press at Chappara.



PLATE XI.



30. Metal hand press at Chappara.



31. Metal hand press at Keolari.

From the above it will be seen that in the past five years the total outturn of the Central Provinces has dropped from over 200,000 maunds to about 50,000 maunds. About 20 per cent. of the fibre is shipped from Calcutta and 80 per cent. from Bombay.

40. *Quality of arrivals.*—Itarsi grows no fibre for export but before Betul got its railway connection, its produce used to go from Itarsi, which accounts for the name of one of the most important commercial grades of green hemp. The produce from Betul consists of the following local grades :—

- Tapti fine,
- Chicholi fine,
- Berar fine (not usually available for export),
- Sewnee and
- Jubbulpore

with drops in price of  $1\frac{1}{2}$  to 2 rupees per maund after each grade mentioned above. Tapti fine which is synonymous with Itarsi fine is the produce of Bhainsdehi tehsil of Betul district. Genuine "Itarsi fine" is limited in quantity and is often mixed with the best of Seoni fine and other comparatively inferior grades and marketed as "Itarsi fine". Fibres from Kareli (Hoshangabad district) Gadaiwara (Hoshangabad district), Narsinghpur and Katni districts are full of dust and inferior in quality.

Amarwara and Chhindwara tehsils are the chief producing areas in Chhindwara district. Produce from Sankh, a village in Chhindwara district, though limited in quantity, ranks next to "Tapti fine". The hemsps from Barelipar, Indawadi, Bhoma, Ghanscor, Palari, Keolai, Lughadwada and Chappara (all in Seoni district) though not of the same quality, are all included under the trade term "Sewnee".

Hemp from the Silondi tehsil of the Jubbulpore district ranks first and that from Bergi tehsil second. The produce from Mandla district which is also received in the Jubbulpore market is inferior to that from Bergi and Charaidongri both in Jubbulpore district. Silondi has its own market at Omaryar (Jubbulpore district) from where most of the produce is sent in *kutchā* bales to Bombay.

41. *System of purchase.*—The cultivator usually sells his produce to the village dealer who brings it on carts, camels or ponies (photo. 28) to the market for sale through a broker (pucca āhātiya). The price varies according to the proportion of the superior grades in the produce. The broker buys from the village dealer at  $41\frac{1}{2}$  to 44 seers per maund and sells to the Bombay or Calcutta agents at 41 to 42 seers per maund. Out of the difference in weighments he gives the buyer some allowance for dryage and dust and keeps the rest for himself.

42. *Cleaning, rough sorting, kutchā baling in up-country markets.*—There are hand presses in the market and by means of these the fibre is made into *kutchā* bales (Photos. 29, 30 and 31) of one to three maunds

weight. These are sent mostly to Bombay where they are opened; their contents sorted into a number of trade grades and re-baled into *pucca* bales.

The grades of the Central Provinces hemp known in the hemp trade Bombay and Calcutta are :—

“ Itarsi fine ”

“ Sewnee fine,”

Seoni No. I,

Jubbulpore fine,

Jubbulpore and

Jubbulpore No. II.

The average Central Provinces hemp is superior to that from Pilibhit (United Provinces); and the worst C. P. fibre is said to be classed at the Chappara market under the Pilibhit grades. Jubbulpore extra fine is rarely available for export.

Handling in up-country markets of the Central Provinces costs about ten annas per maund at Chappara (Seoni district) and six to seven annas per maund at other Central Provinces markets (*vide* appendix 10). This includes weighing, *kutch*a baling, cartage to the station and “ station charges”.

Cleaning, grading and pressing are done at Bombay and Calcutta. The average expense per bale f.o.b. Bombay or Calcutta is Rs. 5.

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## CHAPTER V.

### BENGAL.

43. *Acreage*.—The average net area cropped during the last five years was 27,656,760 acres out of which 60,580 acres were under hemp; the percentage of the *sann* hemp to the total cropped area is 0.22. According to the Season and Crop Report of 1928-29 the area under hemp in Bengal is 58,200 acres.

The *sann* hemp, known as the Bengal hemp, is largely grown in Serajganj sub-division of Pabna district (30,300 acres), the largest areas being in the thanas of Balrampur, Betkandi, Shohup, Balkuchi, Rajnagar-Kalibadi and Ullahapara. The crop is also grown to some extent in Narsindi (Dacca district 200 acres) in Lalpur, Salimganj, Ujanehar and Barait (all in Tiperah district 200 acres). The places in the Dacca and Tiperah district are all situated on the Meghna river. Five hundred acres of it are also grown in Madaripur and Nilkandi thanas in the Faridpur district.

44. *Cultivation*.—The seed bed is prepared with three to four ploughings and a laddering to smooth the surface. Seed is then broadcasted at the rate of about 120 lbs. per acre and the land laddered again. The high seed rate is a precaution against bad germination.

The *sann* grown for fibre is a *rabi* crop sown from September to October and harvested from January to February. Cultivation is confined to Mohammedans and to a caste of Hindus known as Namashudras. Generally the rotation is, transplanted paddy, *sann* and jute.

45. *Retting*.—The crop is harvested by pulling up the plants when they are in full bloom and their pods are being formed. The harvested crop is made into bundles and neither root portions nor tops are removed before retting. Without any drying the bundles are generally first placed vertically bottom ends down, in nine to twelve inches of water and kept there for two to four days in order to soften the butts. The material is then immersed flat in flowing or stagnant water; covered with banana or banyan leaves, or with straw, and weighed down with mud.

The retting period is four to six days and it is said that retting in still water takes a day or two longer than in flowing water; also that the fibre is coarse, dirty and dark in the former case.

The officers of the Dacca Agricultural Farm stated that slow flowing water is the best medium for retting jute. This statement agrees with the opinion of the Senior Assistant of the Botany Section at Pusa who was in charge of *sann* hemp retting at the latter institute. Cultivators at Serajganj (Pabna district) were found to hold the same view.

46. *Extraction*.—The retted bundles are not washed before the fibre is extracted and the fibre is not extracted from individual stems as in other provinces. In Serajganj sub-division (Pabna district) a handful of stems are taken in the hand and about 2 feet of the butt ends are beaten with sticks. The fibre ends thus loosened are twisted round the right hand, and used to pull out the fibre off the whole stalks. In other districts a handful of stems is broken in the middle and beaten with sticks till the fibre is loosened; then the handful of stems is moved to and fro in the water and the central woody cores are removed. For quick working, three men are required; one man to beat the bundle in the middle and two men to move it to and fro and remove the woody cores.

The fibre is washed in water, doubled and twisted into a bundle known as *luchchhi*. The bundles are then placed on poles or strings to dry and when half dried, they are usually beaten against a *chatai* (mat) or a plank to remove any remaining woody cores and loosen the fibres from each other. The *luchchhis* are not so compactly made nor so tightly twisted as corresponding bundles in other provinces.

47. *Characters of the fibre*.—The fibre is up to  $4\frac{1}{2}$  feet long, clean, white, lustrous, strong, soft and not tangled. It contains little stick compared with white hemp from the United Provinces, or Bihar and Orissa. Serajganj fibre is whiter and softer than that from Faridpur district.

48. *Arrivals, grades and the system of purchase*.—The purchasing season starts from February and continues till the end of April, March being the busiest time. In the current year the arrivals of *sann* from Pabna—the principal district where *sann* hemp is grown for fibre—are estimated at 20,000 maunds.

The trade grades of Bengal hemp and the prices of these in the local markets for the years 1924-25 and 1930-31 are as follows :—

		Per md.
		Rs. A.
1924-25.		
Grade No. 1	. . . . .	21 0
Grade No. 2	. . . . .	19 8
Grade No. 3	. . . . .	18 8
Grade No. 4	. . . . .	17 8
1930-31 (estimated prices).		
Grade No. 1	. . . . .	3 0
Grade No. 2	. . . . .	2 8
Grade No. 3	. . . . .	2 0
Grade No. 4	. . . . .	1 8

The local dealers (known as *beoparis* or *pherias*) who work as brokers, purchase on behalf of the agents of the hemp firms of Serajganj and Calcutta, direct purchase by these firms being uncommon. The *beopari* takes about half a seer extra per maund to meet losses in dryage, dirt, etc. The best half of the produce is purchased by fishermen at high rates for making fishing nets. A small portion is purchased by Dacca rope makers, and the rest is sent to Calcutta for export.

49. *Method of packing.*—The fibre is either cleaned, sorted and well packed in *Kutch*a bales each containing about three maunds of fibre, or is packed into uncleaned and un-sorted bundles weighing about 1 maund and known locally as 'bosta' and to the trade as 'drums.' The *kutch*a bales and 'drums' are sent to Calcutta and in the case of 'drums' cleaning and sorting are done at Calcutta.

Handling, pressing and other incidental costs of *kutch*a baling aggregate about Re. 0-10-6 per maund, whereas the cost of making 'drums' and other handling charges connected with these amount to annas five per maund.

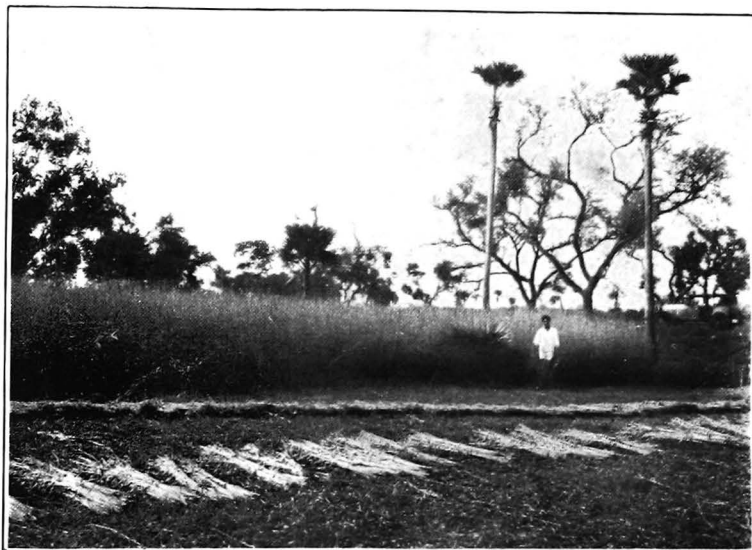
At Narayanganj there is a hydraulic press and an important firm used to send consignments direct to Europe but has now ceased to do so.

## CHAPTER VI.

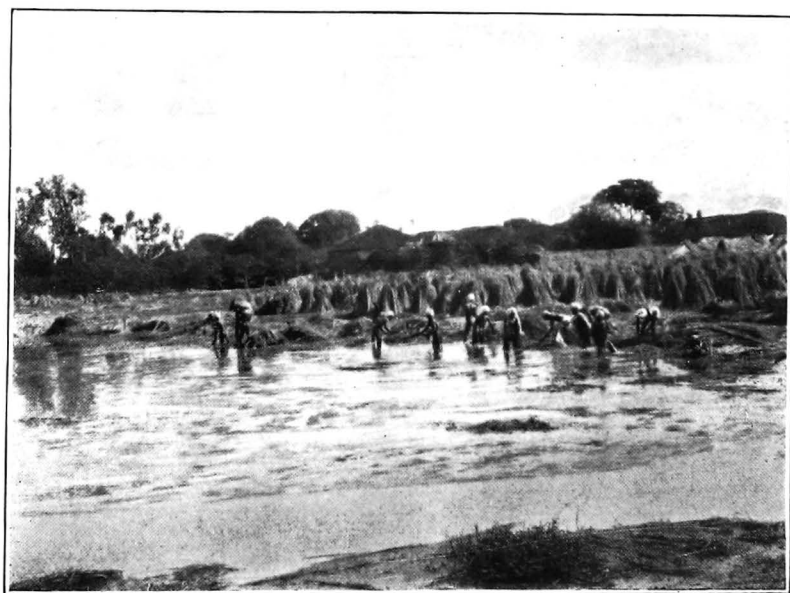
### MADRAS PRESIDENCY.

50. *Acreage.*—The average net annual area under all crops in the province for the last five years is 33,283,292 acres of which an average of 126,299 acres were under *sann* hemp, therefore *sann* hemp was .32 per cent. of the total cropped area. According to the Season and Crop Report of 1928-29 the area under *sann* hemp was 103,067 acres.

PLATE XII.



32. The crop made into bundles for retting at Vaddiparu—E. Godavari.



33. Extraction of fibre at Ubalunka—E. Godavari.

*Sann* hemp is grown throughout the presidency mostly for fodder and green manuring; and the acreage under this crop grown for fibre is very small. The actual percentage of *sann* hemp for fibre to the total cropped area must be very low.

The principal tracts are the districts of Ganjam (2,610 acres), East Godavari (16,227), Kistna (25,434) and Guntur (51,891). It is mostly grown for fodder, green manuring or seed in Kistna and Guntur district, therefore fibre from East Godavari and Warangal is supplied to these districts for local consumption. Crops for fibre are mainly confined to the delta portion of East Godavari, the largest area being in the villages—Peravaram, Vellicheru, Viddiparu, Ubalanka and Kothapatta.

51. *Varieties grown*.—Two agricultural varieties were reported (a) a large seeded and (b) a small seeded.

(a) is a fibre variety known locally as Ganjam or Godavari. It is broad-leaved, less branching than (b) and thin stemmed.

(b) is grown for green manuring and fodder. It is narrow leaved and its stem is also thin but more branching than (a).

52. *Cultivation*.—For fibre, green manuring or for seed production the crop is sown with the rains about the 15th June, and the crop for fibre and green manuring is harvested in September. The seed rate for a fibre crop is said to be twenty-five lbs. per acre. This is very low and by making the crop thin would stimulate branching in the plants which is undesirable. For seed production seed is sown mixed with other crops such as pulses, smaller millets and ground nuts and is harvested in the end of November. The yield of seed from the crop may be up to five hundred lbs. per acre depending on the proportion of *sann* hemp in the crop mixture. Fodder crops of *sann* hemp are raised after paddy and for these the seed is sown in October.

As regards pests, attack by the stem-borer is common and some crops become badly affected.

53. *Harvesting and retting*.—In September when the crop is in full bloom and pods are being formed, it is harvested by cutting, and after chopping off the tops, the plants are made into small bundles (Photo. 32). The tops are fed to cattle and the bundles are spread out to dry for a day; then they are immersed in shallow stagnant pools, the material being weighed down with mud.

Retting and fibre extraction start from the beginning of September and continue to the end of November, the length of time taken to ret each lot of bundles being three to five days. Owing to the abundance of canal water near retting pools, water for retting and washing can be had easily, but the available supply is not utilized.

54. *Extraction*.—The cultivator stands knee deep in the retting pool with the retted bundle between his hands and breaks the retted stem about one foot length from their butt ends, extracts the pieces of stick from the butts and throws the pieces on the bank. The fibre thus separated from the butt end is held in the left hand and by pressing the

bundle down in the water with the left foot the fibre is separated from the whole length of the stem (Photos. 33 and 34). The fibre is then made into small bundles, tied at the butt ends and hung on bamboos for two to three days to allow the water to drain off (Photo. 35). After this the small bundles are spread out on the ground to dry properly, the dried fibre being then arranged lengthwise and made into large loose bundles or kutcha bales and sent to Cocanada by rail or in country boats. The fibre is not folded or twisted to form hanks as is done in other provinces.

55. *Characters of the fibre.*—It is three to four feet in length, matted, dirty green, heavily impregnated with mud, coarse, strong and with very little stick. Compared with Chandausi fibre, it is, however, more dirty, though stronger. Hemp from Gopalpur in the Ganjam district of Madras is clean but is not available in large quantities. Fibre from Parvatipur (East Godavari) is tangled and full of tow.

56. *Marketing.*—The season for purchasing hemp for export starts from December and continues to the end of January. The dry sticks are used for thatching (Photo. 36), for screens and as fuel and fetch about Rs. 5 per acre.

Usually the cultivator sells his produce to his village dealer to whom he is generally indebted. The latter collects considerable quantities of the hemp and brings it to the local market where it is purchased by some big local dealer. At Cocanada, which is the principal exporting port for *sann* hemp in the Madras Presidency, a broker generally buys it.

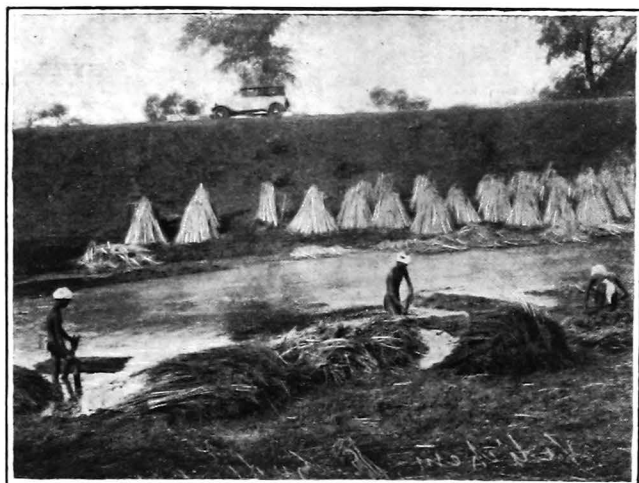
57. *Handling.*—Cleaning, sorting and baling of the fibre are done at Cocanada. *Kutcha* bales and bundles are opened and the fibre is spread out on stone platforms in the open yard of the press house. It is then beaten with sticks and shaken to remove 'loadings': then it is sorted according to colour and length but is not hackled.

58. *Grades of fibre.*—Grades (in order of merit) and prices in 1929-30 :—

Grade.	Localities of Origin.	Prices per
		khandy of 500 lbs. each.
		Rs.
Upper Godavari . . . .	Dummigodum and Srivansa .	85
Gopalpur . . . . .	Ganjam district . . . .	73
Cocanada or country hemp .	East Godavari . . . .	70
Warangal . . . . .	H. E. H. the Nizam's territory	65
Pallinara hemp . . . .	Mangaltur in Narsonpur taluka	65

59. *Pressing.*—Cocanada the principal export market for *sann* hemp has one hydraulic press and two hand presses.

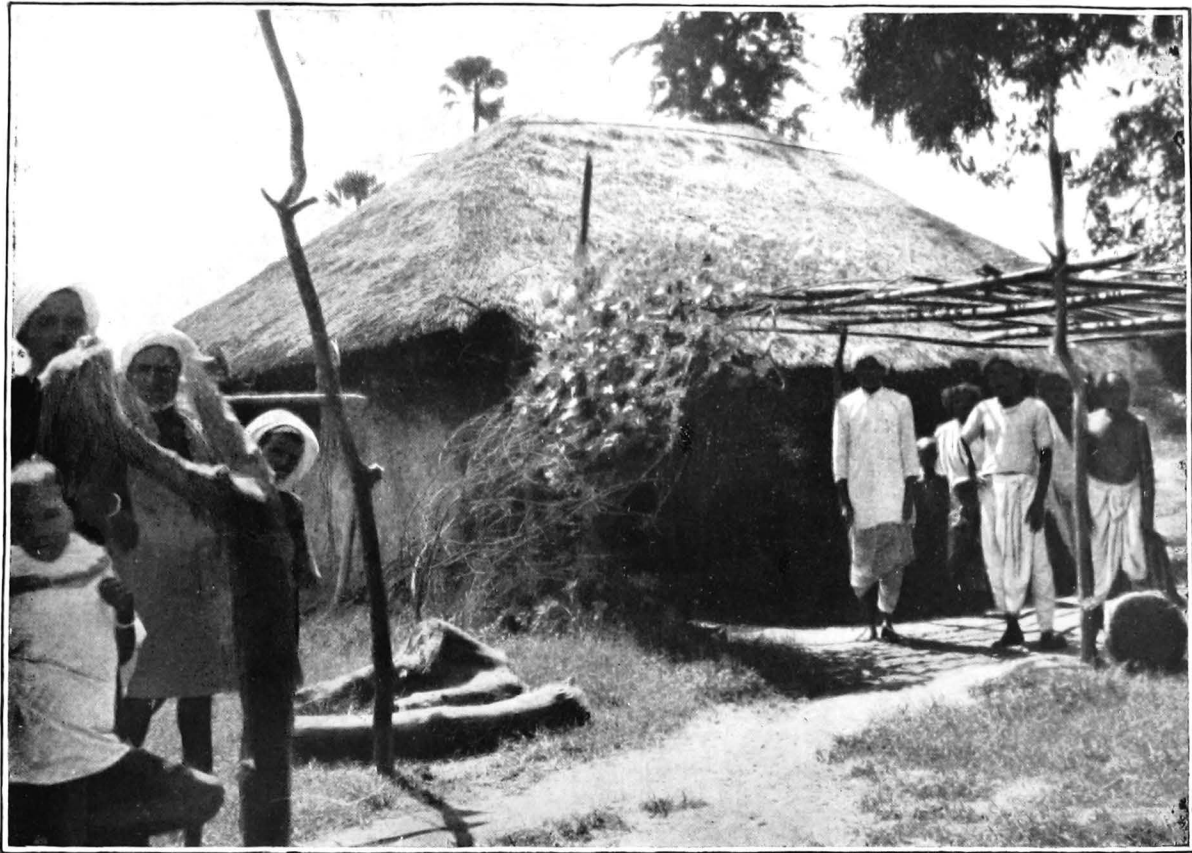




34. Extraction of fibre at Vellicheru—E. Godavari.



35. Fibre being dried at Ucheli—E. Godavari.



36. Dry sticks used for thatching the roofs of huts at Ubalunka—E. Godavari.

*T. S. Sabnis (Photo).*

Bales which weigh about 400 lbs. each are made with a hydraulic press and a pressure of about three tons, the size of the pressed bale being about  $4' \times 1\frac{1}{2}' \times 1\frac{1}{2}'$ . About 150 bales are pressed per day of ten hours. The bales are covered with *hessian* and tied with iron hoops.

One of the hand presses is an Accumulative Power Press (McComb's Patent). It presses about 60 bales of 400 lbs. each per day of ten hours, the pressure applied being about two tons and the size of these bales being  $3\frac{1}{2}' \times 2' \times 1\frac{1}{2}'$  feet. Such bales shipped last year from Cocanada to London were reported in London to have been preferred to those pressed tighter. The extra sea freight to London paid on account of the larger size of the bales was 1 sh. to 1 sh. 3d. per bale.

60. *Cost of handling.*—Transport by boat from the producing centre to Cocanada, cleaning, baling and carriage by boat to the steamer cost about Re. 0-15-4 per maund or Rs. 4-12-8 per bale of 400 lbs. each. For bales pressed by the hydraulic press the sea freight from Cocanada to ports in the United Kingdom is about 50 sh. per ton of 50 cubic feet and from Cocanada to Greek ports to which a few consignments are occasionally shipped it is about 65 sh.

61. †*Shipments abroad from 1st April 1929 to 31st March 1930 from*

(1) *Cocanada.*

	Bales.
Cocanada hemp . . . . .	1,506
Gopalpur hemp . . . . .	869
Upper Godavari . . . . .	794
Warangal . . . . .	195
Srivansa . . . . .	26*
Dummagadam . . . . .	18*
Pallinara . . . . .	28
	3,436 bales of 400 lbs. each.

(2) *From Vizagapatam and Bimlipatam.*

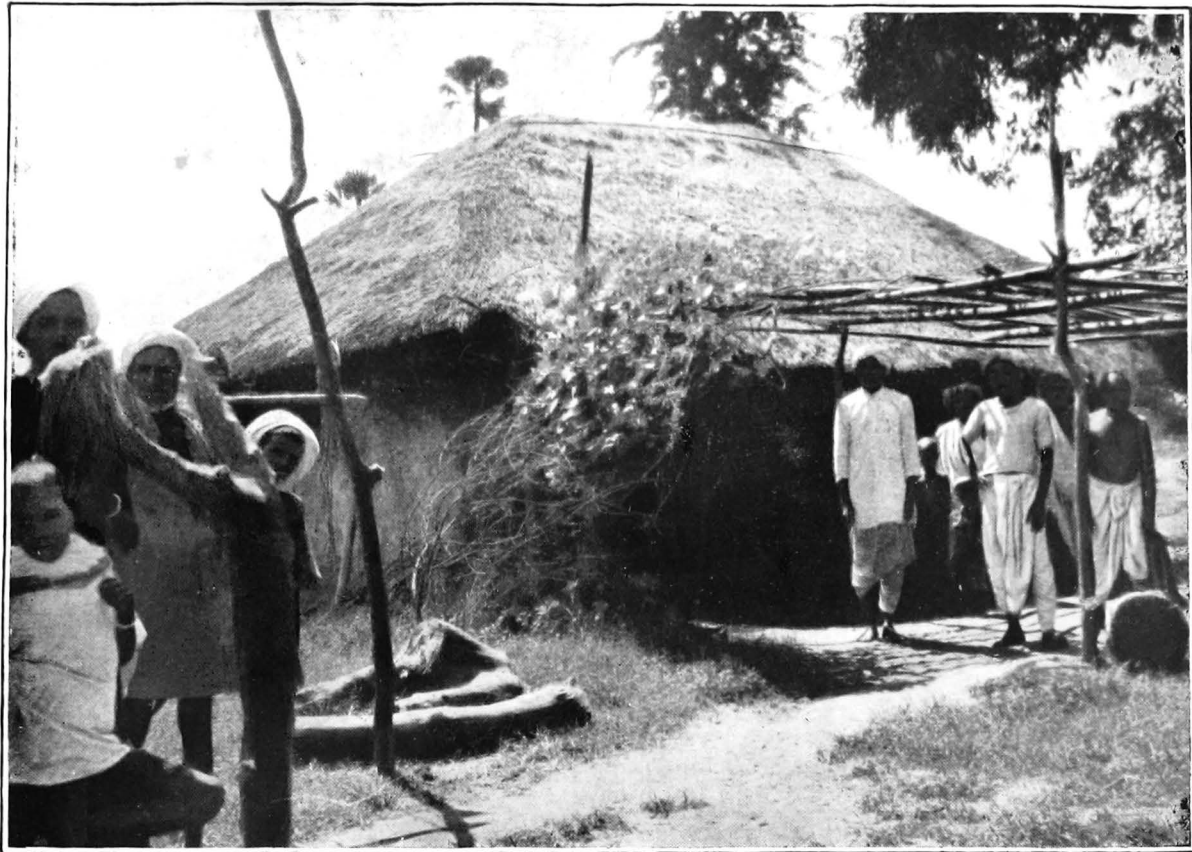
Gopalpur hemp . . . . .	299 bales of 400 lbs. each.
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Gopalpur hemp when available is usually shipped to Antwerp and London whereas Warangal and Cocanada hems are shipped usually to Belgium and also occasionally to Greece.

The whole trade in Madras has been declining during the last three years. Transactions are mostly c. i. f. basis and are negotiated through London brokers.

\* Shipments separate but belonging to Upper Godavari hemp.

† Figures were kindly supplied by Messrs. Ripley & Co., Cocanada.



36. Dry sticks used for thatching the roofs of huts at Ubalunka—E. Godavari.

*T. S. Sabnis (Photo).*

London, Antwerp and Dundee are the usual ports of destination. Recently some consignments were shipped directly to Greece and Italy. Warehouse charges in London are so high that it is not profitable to stock small consignments very long. As with many other raw materials *sann* hemp also suffers to some extent in quality and weights in the transit (perhaps due to climatic effects), even if all precautions are taken against malpractices and the consignments are up to the standard specified in the invoice when shipped.

## CHAPTER VII.

### BOMBAY PRESIDENCY.

62. *Acreage*.—The average area cropped during the last five years was 32,099,215 acres out of which 115,984 acres were under *sann* hemp, the percentage of the former to the latter being .35. According to the Season and Crop Report of 1928-29 the area under *sann* in this Presidency (excluding the Indian States) was 102,629 acres.

The *sann* hemp is grown practically all over the province. But, since a large proportion of the crop is grown for green manuring, the high acreages recorded in certain districts, e.g., district Ahmednagar (11,926 acres) and district Belgaum (10,438) do not give any indication of the acreage grown for fibre production. The principal areas where the crop is grown at present for fibre lie along the Devgad, Waghotan, Jaitapur and Purangad creeks in Ratnagiri district.

*Stem-Borer*.—Cases of attack by the stem-borer are very common and the loss in yield and quality of fibre is often heavy.

63. *Botanical work*.—Experimental work is in progress at the Hatk-tamba Farm near Ratnagiri, to study the effects of the application of sulphate of ammonia and bone superphosphate on *sann* hemp, with a view to discovering whether the cultivator in that locality could replace the practice of rab (burning vegetable debris and cowdung on their fields before cropping them) by the application of these fertilisers. Some selection experiments for evolving wilt-resisting strains are being conducted at the Manjri Farm, Poona, by the Plant Pathologist to the Bombay Government.

As agricultural operations and the system of marketing in Belgaum district markedly differ from those in the Ratnagiri district, the practices of both of these districts are discussed below separately. Under the Belgaum district, however, reference will occasionally be made to fibre from Panchmahals, Thana and Khandesh districts which is in some respects similar to Belgaum fibre.

### BELGAUM DISTRICT.

64. *Areas and cultivation*.—The crop is grown in Chikodi, Hukeri and Gokak talukas in Belgaum district. Cultivators there grow *sann* hemp for green manuring and to a smaller extent for fibre, which is at present largely used for local consumption.

In this district seed is sown during the third week of May and a small portion of the crop is harvested by cutting in September when seed is being formed, so that the field can be prepared for gram, garlic and onion ; but the major portion of the crop is harvested from December onwards by pulling up the plants when the seed has fully matured ; in that case the fields are then sown with sugarcane. The seed rate for fibre is about 60 lbs. per acre.

65. *Retting, extraction and characters of the fibre.*—The crop harvested in September is retted for about three days, while that harvested in December and January is retted for about four. Considering the low temperature in December, the four days retting is not sufficient and the fibre is matted, *i.e.*, the cellulose matter connecting the bast fibres is not sufficiently retted to allow these fibres to separate. The material is retted in ponds without previous drying, and is weighed down in the water with stones (Photo. 40).

In Belgaum district the village dealer purchases the dried bundles from the cultivators and gets the retting and extraction done on contract at four annas per *bhara* (*bhara*=1 to 1½ maund of 82½ lbs. each), the approximate yield of green stems per acre being about 200 *bharas*. The labour for retting and extraction is largely supplied by people of the *mahar* and *berad* castes and to some extent by *lingavats* and *jains*. A person can extract fibre from two *bharas* per day.

After extraction the fibre is not folded, but is made into bundles known as '*mudas*' which consist of three portions of fibre being twisted lengthwise like a three-ply rope. A number of *mudas* are tied together to form a large bundle for transport. The fibre is extracted from individual stems (Photo 42) and is known as "Hirakashi" in the local markets. In the trade it is known as Salsi hemp. It is three to five feet in length, dirty green, coarse, weak and admixed with dust.

66. *Markets—arrivals and handling.*—The Belgaum district possesses two principal markets for *sann* hemp, *viz.*, Sankeshwar and Nipani. The average annual arrivals of fibre at these markets from Belgaum district about 5 years ago were 8,000 to 10,000 maunds, but they have gone down considerably since then.

Belgaum fibre is at present partly used up locally and partly supplied to Bijapur, Kolhapur, Jamkhindi and Vengurula for making ropes, fishing nets, bags and fireworks.

The fibre made in Panchmahal district was known to the trade as 'Godhra' hemp but is said to be no longer exported. It is loaded with sand and dust, but is a little superior to the 'Salsi' hemp. Fibre from Khandesh district is also largely used for local consumption. It is superior in length and lustre to 'Godhra' hemp but contains varying percentages of sand.

'Salsi', 'Godhra' and 'Khandesh' hems can be improved by hackling but there is no demand at present for hackled hemp as it is more expensive, and the rates offered are not remunerative. Besides,

the prospect of extending the cultivation of *sann* hemp in the competition with more remunerative crops is unlikely at present.

67. *Cost of handling*.—When the produce from Belgaum district used to be sent to Bombay (*i.e.*, about 5 years ago), the cost of weighing, packing, brokerage, cartage and other incidental items were about six annas per maund f.o.r. Hukeri Road (Belgaum district).

#### RATNAGIRI DISTRICT.

68. *Areas*.—The cultivation of *sann* hemp for fibre for export is spread over the whole tract of Devgad and Rajapur talukas in the district (8,170 acres). *Sann* hemp is a cash crop raised by every cultivator to enable him to pay his cash rent. It is known locally as 'chakarmani' crop.

It is grown along the coastal creeks which facilitate transport. The principal trade centres with their arrivals in 1929-30 are :—

	Kandys.
Devgad (Devgad taluka) . . . . .	700—800
Waghota (Devgad taluka) . . . . .	500—600
Kharepatan (Rajapur taluka) . . . . .	1,000
Rajapur (Rajapur taluka) . . . . .	1,000

Fibre from the Ratnagiri district is well known in the export trade as the "Dewghuddy" grade and is considered the finest grade of hemp exported from India. But the total average produce from the district is very small (3,500 to 5,000 kandies). Fibre from Khudy in Devgad taluka is considered the best quality of Ratnagiri fibre.

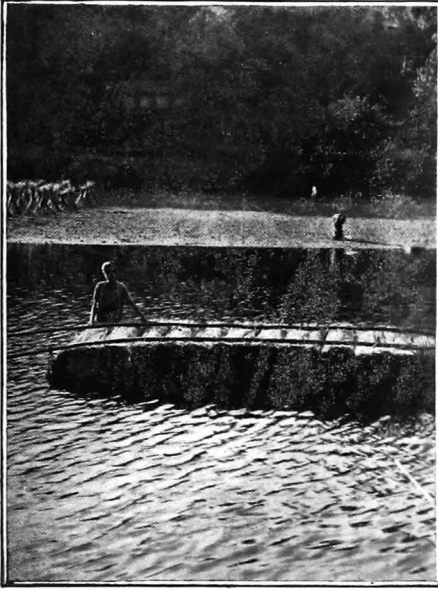
69. *Cultivation*.—Cultivation is in the hands of the Bhandari and Kulvadi communities and the *sann* hemp is grown only for fibre. It requires well drained soil and is generally grown on the slopes. The soil is prepared first by burning leafy branches, grass and cow-dung together (the 'rab' process) and then is ploughed and levelled. *Nachui* (*Eleusine coracana Gaertn*) is sown in the beginning of June with the rains. The ears of this crop are plucked and the straw is ploughed into the field in preparing the land for *sann* hemp which is sown in the middle of August. The crop is grown in isolated patches, as a result of the peculiar contour of the land. Therefore it was difficult to ascertain the exact seed rate but it was locally reported to be between sixty and eighty lbs. per acre.

70. *Seed supplies*.—The crop grown for fibre is harvested before the seed is ripe and consequently seed has to be obtained from elsewhere. Seed was formerly obtained from Nipani in Belgaum district, but at present it is got from Bulsar and Pardi (both in Surat district), Bilimora (Baroda State) and Daman in the Portuguese territory. Seed from Godhra and Jubbulpore was also tried formerly in Devgad and Rajapur talukas but was found unsatisfactory, as the plants raised from this seed branched considerably.

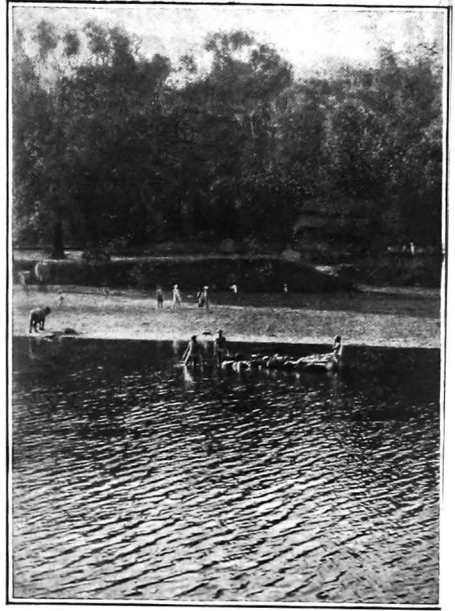
Seed is usually purchased from local dealers on the "sawai" system\* or on credit with varying rates of interest.

\* "Sawai"—Literally means that the borrower returns  $\frac{1}{4}$  more than he borrowed, but in practice it involves some further obligations on the borrower.

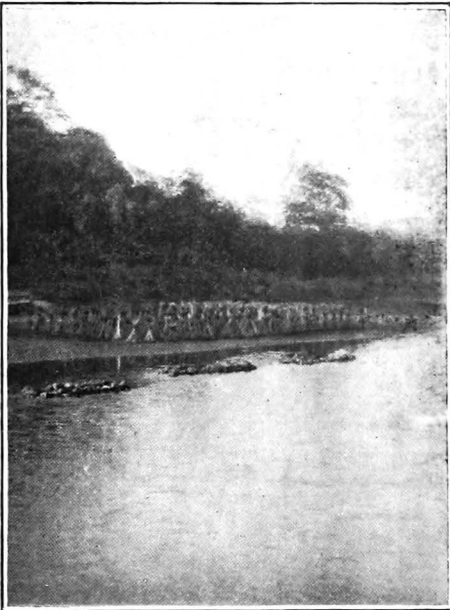
PLATE XV.



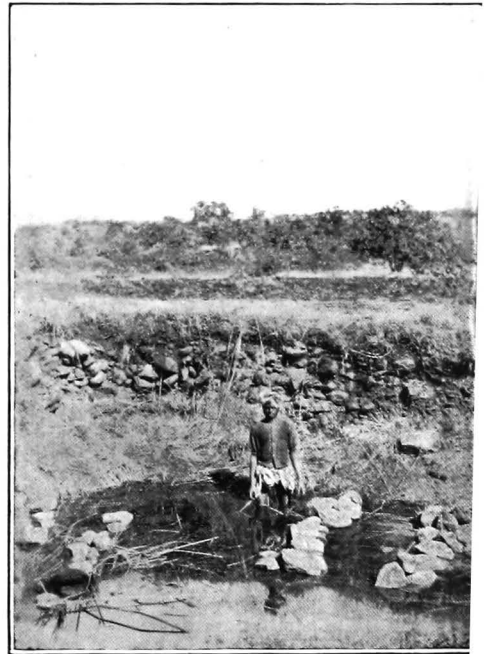
37. Bundles of straw being arranged in a rafter for retting at Rajapur.



38. The rafter being partially immersed in Rajapur



39. The rafter being completely immersed at Rajapur—stones indicating the retting material.



40. Retting at Huttargi—Belgaum district.



71. *Harvesting, drying and retting.*—The crop is harvested by pulling the plants up when they are in full bloom, about the middle of November, usually three months after sowing and the harvested crop is thinly spread on the rocky surface of the plateau or hill slopes for nearly a fortnight, during which it is turned over once or twice. If harvested hemp plants happen to be wetted by rain while they are being dried, the fibre from such plants becomes dark and weak. Therefore harvesting is done after the rainy season so that the harvested crop may not be damaged by rains. Dews are heavy in this season and consequently this procedure results in a sort of preliminary dew retting. The cultivators there hold that it is not possible to obtain a fine quality fibre without adopting this method. It is noteworthy that the method of harvesting, dry and retting is almost the same as is practised in Italy which produces the best quality soft hemp in Europe.

The dried plants are then made into bundles, and the top portions are cut off. The root portions are not removed; hence the fibre from the butt ends of the plants is much matted and bear dark spots. The bundles are placed side by side to form a sort of raft (Photos 37, 38 and 39) and kept in position by bamboo poles. They are then immersed in fresh water streams (the sea creeks are not used) or in ponds for four to six days. The material is covered with grass and coconut leaves and weighed down with stones. Mud is not used. Information regarding the differences in the retting period in flowing and still water could not be collected. After retting, the bundles are removed from the water and stacked like rifles vertically on the banks for a day or so to allow the water to drain off (Photo. 41). Retting and extraction continue from the middle of November to the end of January.

72. *Extraction.*—The fibre is extracted in the wet condition by breaking off a bit from the butt end of each stem to enable the worker to catch hold of the freed fibre and thus enable him to pull it off from the whole stem in long clean strips. One person can extract up to four lbs. of fibre per day. The dried stalks are used as fuel or as torches at night.

After being dried the fibre is folded, and then twisted into bundles known locally as "*pendi*". "*Pendies*" are made into bigger bundles and despatched to Bombay by country boats.

In Rajapur taluka (Ratnagiri district) Hindu communities (Kulvadi, Bhandari, Brahmin and Vani) grow the crop but do not undertake retting and extraction; these are left to the local Muhammadan dealer who purchases the dried bundles of plants from the cultivators.

73. *Characters of the fibre.*—The fibre is 4 to 5½ feet long, clean, greenish or creamy yellow, less matted (*i.e.*, in ribbons) and softer than Itarsi fine; strong but the butt ends much matted due to under-retting and dark. Hackled fibre from Devgad and Vijayadung is fairly soft, strong and golden coloured. The produce possesses the qualities required by foreign markets and were it not for the defective butt ends, it would be

in a position to compete with Italian hemp. The colour, strength and softness of the fibre are probably due to the system of drying, and then retting in flowing water.

74. *Marketing.*—The fibre purchasing season usually starts from January and continues to the end of April. The village dealers go round the houses of the cultivators or wait for them along the road-side near a market and the fibre is generally bought up before the owner reaches the market. The owner is usually under a big handicap during the negotiations as he is often indebted to the buyer and cannot afford to hold out against him.

Year.		<i>Average market rates.</i>	
		Per maund of 82½ lbs.	
		Rs.	
1924-25	. . . . .	. . . . .	24
1925-29	. . . . .	. . . . .	15 to 19
1930	. . . . .	. . . . .	17 to 19
1931	. . . . .	. . . . .	12 anticipated.

For weighments, the weights used are mostly of stone and are often in favour of the village dealer; also small quantities (a few seers) are weighed at one time. Therefore the village dealer usually gets one to four seers more per maund by the often repeated turns of the scale. Again the cultivator does not get an adequate premium for quality. He on his part often damps the fibre or mixes refuse matter with it before presenting it to the village dealer. Local brokers purchase the hemp from these village dealers on behalf of exporting firms in Bombay.

75. *Arrivals and grades.*—About twenty and twenty-five thousand maunds is the average annual arrivals of fibre in the local markets of the Devgad and Rajapur talukas respectively.

The fibre is not graded in these local markets but purchasing agents of the Bombay firms examine the consignments and pay on a basis of quality. The proportion of these qualities in the local produce and their prices in 1929-30 were as follows:—

Grade.	Price.	Unit of quality.	Proportion of the different qualities.
	Rs.		Per cent.
Double fine . . . . .	125 to 130	Per kandy .	12½
Fine . . . . .	115 to 120	Per kandy .	25
Rasband . . . . .	100 to 110	Per kandy .	37½
Rashi . . . . .	80 to 90	Per kandy .	25
		TOTAL .	100

Fibre from the Devgad taluka stands first, that from the Vijayadurg (in Devgad taluka) stands second and that from Kharapatan (in the Rajapur taluka) stands third.

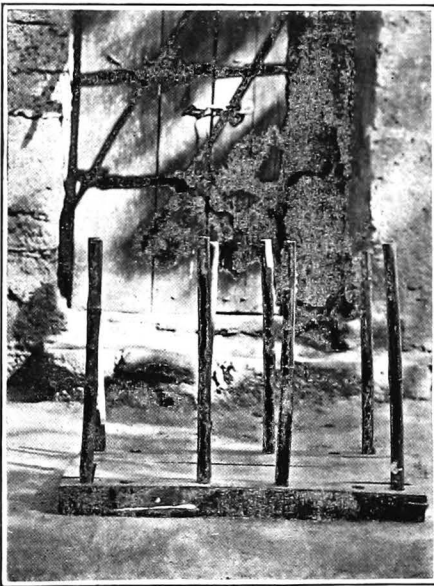
PLATE XVI.



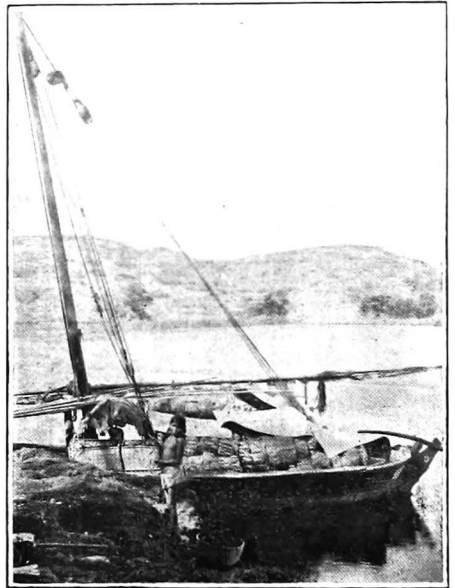
41. Retted material being dried at Bhatwadi—Devgad.



42. Extraction of fibre at Hukeri—Belgaum district.



43. Frame for tying fibre into bundles at Rajapur.



44. Padav carrying sunn hemp from Khanpatan to Rajapur.

The fibre from Malwan, one of the talukas of the Ratnagiri district is very coarse and is consumed locally for making ropes, fishing nets, etc. ; it hardly enters the trade.

Ratnagiri fibre is the best in India and mostly sent to Bombay for foreign export ; a little is used locally or sent to Malabar for making fishing nets and ropes.

76. *Packing and handling in the local markets and transport to Bombay.*—The produce is pressed in local markets by means of bamboo levers, or in a wooden press (Photo 43) and is sent to Bombay in country boats (Photo 44) known as *phatemaries*.

The average aggregate cost of weighing, brokerage and packing in the local markets and of freight in country boats to Bombay is annas 15 to Re. 1-2 per maund.

77. *Pressing and handling at Bombay.*—The produce is cleaned, graded and baled properly at Bombay at a cost of Re. 1-4 per maund including the cost of iron hoops and dock charges. The average annual export in the period 1924-25 to 1928-29 from Bombay was 132,172 cwts. valued at Rs. 3,201,296 against the pre-war of 222,073 cwts. valued at £213,410 or Rs. 3,291,150 (at Rs. 15 per £).

The exporting firms at Bombay generally enter forward contracts through their local brokers, advances being given to the village dealers for supplying stipulated quantities within a specified time. "Ready" sales are also fairly common ; in such cases the brokers generally charge interest at 9 per cent. per annum to the *exporting firms*.

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## CHAPTER VIII.

### A REVIEW OF THE AGRICULTURAL AND MARKETING CONDITIONS AND PRACTICES IN THE HEMP GROWING AREAS, MET WITH DURING THE ENQUIRY, AND SUGGESTIONS FOR IMPROVEMENT.

78. *Areas and qualities of hemp grown.*—The principal provinces where *sann* hemp is grown for fibre are the United Provinces, Bihar and Orissa, Bengal, Madras and Bombay. As regards the United Provinces the principal tracts lie in—

- (i) the districts of Benares, Jaunpur, Azamgarh, Allahabad and Partabgarh. These yield Benares hemp ;
- (ii) Pilibhit and Moradabad districts grow the crop on a small scale and yield "green" hemp known in the trade as Pilibhit hemp.

In the Central Provinces, cultivation for fibre is confined to Jubbulpore and Narmada divisions ; these yield Itarsi, Jubbulpore and Sewnee qualities.

In Bihar and Orissa, the Patna and Bhagalpur districts yield "white" hemp which is mid-way in quality between Benares hemp and Bengal hemp; Sambalpur district yields the same qualities of green hemp as the Central Provinces. In Bengal the Serajganj sub-division of Pabna district is the principal *sunn* hemp growing tract and yields "Bengal hemp".

In Madras Presidency the cultivation of *sunn* hemp for export is confined more or less to Ganjam and East Godavari. In the Bombay Presidency Ratnagiri is the principal tract where at present the crop is largely grown for fibre for export and yields the Dewghuddy quality.

79. *Soil, seed and seed rate.*—*Sunn* hemp will grow on any soil, but it thrives best on light, well-drained land. It is not profitable to grow the crop on heavy or very poor soil or on low lands, as the plants raised on such soils are stunted in growth and yield only coarse and brittle fibre.

An examination of samples of seed at different centres revealed admixtures in varying proportions of immature and foreign seed and it is likely that old seed was also present. As was to be expected, crops were almost invariably found to be full of weed. Weed seed can be removed by sieving and the percentage of old seed in the bazar samples can be ascertained by simple germination tests. The seed rate varies from province to province but is usually sixty to eighty lbs. per acre except in Bengal where it is approximately 120 lbs., and in Madras where it is 25 lbs. per acre. The heavy seed rate prevalent in Bengal appears to have been adopted as a precaution against bad germination. It undoubtedly suits the local conditions there. A heavy seed rate usually makes the crop very thick and the fibre obtained from such a crop is likely to be weak; but in Serajganj (Bengal) this usual result was not noticed.

The reported rate of 25 lbs. per acre in East Godavari (Madras) appears to be rather low, and, as is to be expected from a low seed rate, the crops there were found to be very thin, the stems have a tendency to branch and development of woody tissue is stimulated. Fibre from such a crop tends to become coarse and brittle.

The best seed rate depends on the quality of the seed and condition of the seed bed. About 60 lbs. of good pure seed per acre should generally suffice, but the exact rates must be worked out for each tract.

*Yield of fibre.*—The yield of fibre in maunds ranges from two to ten maunds per acre, the average being four to six maunds.

80. *Improvement of the strains grown.*—The results of the selection experiments on the improvement of this crop conducted by the Economic Botanist, Cawnpore, seem to show that the inherent qualities of the fibre—fineness, length and maturity—differ considerably in different strains and that there is scope for improvement of the fibre by plant selection.

One chief difficulty is that of maintaining the purity of the improved strain since free cross-pollination seems to be the main mode of fertilization of the plant. To prevent contamination of improved strains when

multiplying their seeds it is essential to grow them on a seed farm, isolated from other inferior strains and when the superiority of a new strain has been established its extension under careful control must be rapid so that inferior strains are replaced by the superior one in as short a time as possible. Considerable demonstration and propaganda will be necessary to impress the monetary advantages of the new strains on the cultivator who above everything is a hard headed practical man.

It is not, however, possible for the fibre even of a superior strain to secure a fair premium until the fibre is produced on a commercial scale and separately marketed. For optimum permanent improvement the extension of improved strains and the organization of marketing should, therefore, synchronize.

*Stem-borer.*—Cases of attack of the stem-borer—*Laspeyresia pseudo nectis*—which damages the apex of the shoot and arrests the further growth of the stem, were found in all the provinces. Also if the attack takes place at a very early stage, the fibre obtained is short and the loss in yield is heavy losses to the extent of one-third to one-half of the crop were met with by the Economic Botanist, United Provinces, during the course of his experiments. As effective measures of control are not so far known, it is essential that this problem should receive the attention of the agricultural departments.

81. *Sowing and harvesting dates, stage at which the crop should be harvested and method of avoiding different lengths of fibre.*—In the United Provinces, Bihar and Orissa and in the Madras Presidency the crop is generally grown for fibre; and there it is sown with the monsoon and harvested towards the end of September or the beginning of October when the plants are in bloom. In the Central Provinces and in the districts of Moradabad (U. P.) and Sambalpur (B. and O.) *sann* hemp is grown for both seed and fibre. In all the three places and for both purposes the seed is sown with the monsoon and the crop is harvested after seed formation from the middle of November to the end of February. In Ratnagiri district it is grown only for fibre and is sown about the middle of August after removal of the smaller millets; it is harvested from January to March when the pods are being formed. In Bengal it is grown only for fibre; it is sown between September and October and harvested between January to March when the pods are being formed.

If the crop is cut a little early as is done in the United Provinces (excepting Bilari tehsil) and Bihar and Orissa (excepting Sambalpur) the fibre though white and soft is found to be weak; if it is harvested after seed formation as is done in Bilari tehsil (in the Central Provinces) and Sambalpur, the fibre tends to turn green and coarse but it is strong.

The length of time required by the plant to develop the fibre depends on the climatic conditions under which the plant grows and whether fibre develops the desired commercial characters, *e.g.*, strength, colour and softness—at flowering time, or when seed begins to mature, or at a stage between flowering time and seed formation, can only be determined for each of the important *sann* hemp tracts by actual experiment.

Owing to the great diversity of climatic and other conditions, such experimental work must be decentralised. In the United Provinces the Economic Botanist obtained the best results by harvesting the crop eleven weeks after sowing when the pods were being formed.

If, before retting, the stems be sorted according to length, and each assortment of stems be retted and stripped separately, the mixture of fibre of different lengths could be avoided. It is difficult to sort fibre according to its length after extraction.

82. *Drying of the harvested crop.*—In the United Provinces, Bihar and Orissa, Bengal and Madras, the harvested crop is not usually dried before retting; in the Central Provinces on the other hand it is dried for varying periods, and in Ratnagiri district (Bombay) it is carefully dried for a fortnight before retting.

Betul in the Central Provinces and Devgad in the Bombay Presidency produce the best *sann* hemp at present though the climatic and agricultural conditions differ in the two places. It is noticed, however, that the practice of drying the harvested crop before retting exists in both the tracts (*see paras. 36, 75*). Also it may be noted that the method of drying in Devgad is practically the same as that followed at Bologna and Ferrara in Italy. Therefore, it is desirable to ascertain whether the fine quality (*e.g.*, colour and strength) of the produce from Betul and Devgad is due to such drying; and if so, it might also be tried in the other *sann* hemp tracts.

83. *Retting and washing.*—The method of retting and period required to ret the plants differ from Province to Province and sometimes from district to district in the same province. But obviously the length of time taken to ret plants must depend on the temperature of water, and must vary according to the season. It is shorter in slow flowing shallow water where the water temperature is higher than in deeper still water of ponds. In the former case also bacterial activity is not hampered by the accumulation of putrified material as it is in still water. Cultivators in Ratnagiri district, in the Central Provinces and in Bengal believe that the colour, strength and softness of the fibre is improved by retting in slow flowing water, but the general opinion held by cultivators elsewhere is just the opposite.

A sudden fall in temperature of the water is said to tend to discolour the fibre. Also if the same water is repeatedly used for retting, the fibre will be discoloured and the fibre from successive lots retted in the same pool will tend to vary in shade. These problems offer suitable fields for investigation, experiment and educative propaganda.

Admixture of dust and dirt in the Pilibhit (U. P.) and Cocanada (Madras) hemp are due to retting in muddy water and absence of washing; if pucca tanks with wells attached could be constructed at central places in *sann* hemp tracts they would undoubtedly prove useful for washing the fibre. But unless they are built on co-operative lines or by capitalists in the *sann* hemp areas, who would be prepared to lease the use of these tanks to neighbouring cultivators on very easy terms they

may not prove economical. Old deserted indigo vats are available in certain *sann* hemp tracts and would be very useful for washing ; for retting, however, they would be rather small.

The weakness of Benares hemp is due to over-retting and the tangled state of its fibre to washing the retted bundles with a vertical and twisting motion. The defective butt ends of Ratnagiri (Bombay Presidency) fibre are due to the root portions not being cut off before retting.

Cultivators should be educated to realise the loss that is caused by the defects in their methods of retting.

84. *Sweating*.—“Sweating” of the retted material is unknown in India but is said to be commonly practised in Russia and Italy. The retted bundles are washed and left standing stacked like rifles for a day to allow the water to drain off. Then the bundles are spread out to dry for a day, after which they are heaped together and covered with straw to make them ‘sweat’. When the bundles have ‘sweated’ enough they are again stacked like rifles so that the air passing through and between the bundles dries them slowly. Though Russian and Italian hems are obtained from *Cannabibus sativa* which is botanically quite different from *Crotalaria juncea* which produces the Indian *sann* hemp, ‘sweating’ experiments might be tried on *sann* hemp to ascertain their effect on the quality of the fibre.

85. *Extraction*.—The fibre is extracted from the retted stalks while they are wet, or after allowing the water to drain off, or after they are thoroughly dried. The method of extraction also varies from province to province and sometime from district to district. In the United Provinces, in Bihar and Orissa and in Ratnagiri district (Bombay Presidency) the fibre is extracted from individual stems, while in Allahabad district (U. P.) and in Bengal and Madras it is stripped from the whole bundle of stems in one operation.

Extraction of fibre from individual stalks is preferable to extraction from the whole bundle, as the latter method fails to remove all the fibre ; also the fibre becomes somewhat tangled and entails loss in tow during cleaning operations. Beating of the retted material with cudgels which is a common practice in some parts of Bengal (para. 46) appears to be detrimental to strength and evenness.

Breaking and scutching by hand and power machines similar\* to those used in Russia and Italy for extracting fibre from *Cannabibus sativa* could perhaps be used for extracting fibre from the green stems of *sann* as well as from the retted material.

The fibre extracted from *sann* without retting is harsh, coarse, and unsuitable for spinning, but it may not lack in strength, and may, like other hard fibres be good enough for cordage. *Sann* hemp is a cheaper

\* Oakley, F. J.—Long Vegetable Fibres. Pub. E. Benn, Ltd., London, 1928.

Woodhouse, T. and Kilgour, P.—Cordage and cordage hemp and fibres.—Pub. Isaac Pitman & Co., Ltd., London, 1919.

Goulding, E.—Cotton and other Vegetable fibres. Pub. John Murray, London, 1917.

Wissett, R.—Cultivation and preparation of hemp, 1804.



fibre than the Italian and Russian hemp and at present is not very remunerative to the cultivator; hence caution in introducing expensive methods is necessary.

The Indian hemp at present generally lacks the softness of the Russian and Italian hems. If the experiments undertaken at the Technological Institute, Cawnpore, by Mr. Mulani on retting and softening the fibre with cheap chemicals could evolve a cheap method for softening some of the coarse qualities in Indian hemp, without impairing its strength and other useful characters, the Indian hemp will be better able to compete with the Russian hemp; and Dewghuddy and Itarsi grades will form suitable substitutes for the Italian hemp.

86. *Making of hanks.*—The dried fibre is made into hanks which generally serve to hide “loading” matter and tend to twist the fibre.

The fibre should be tied only at the butt end as is done in East Godavari (Madras) or slightly twisted into hanks as is done in the case of hackled hemp.

Tight and compact twisting damages the fibre and entails undue expense to undo it, also wastage when it is undone. Besides, it successfully hides any stick left inside and makes inspection very difficult; Allahabad fibre presented this difficulty.

As a result of pressing, the sticks and mud in the hanks get fixed to the fibre, and the hackling of Benares hemp, weak as it is, is made extremely difficult. It also involves heavy loss in tow.

87. *Effect of agricultural and retting practices on the fibre.*—As far as the season of growth and the harvesting time are concerned, the fibre from Bilari tehsil (included in the trade grade Pilibhit hemp) should resemble fibre from the Central Provinces; and Cocanada hemp should resemble the produce of Benares. In actual fact, however, these resemblances do not occur and even in the trade they are not known by identical names. On the other hand Bilari fibre resembles Cocanada hemp in spite of differences in climatic and harvesting conditions.

Differences of strength, colour and texture between Bilari fibre and Central Provinces fibre seem to be largely due to the method of retting in muddy water and want of washing. Cocanada hemp resembles Pilibhit hemp in colour, dirtiness and texture owing to the similarity of the method of retting in muddy water and want of washing.

Bengal fibre is stronger, whiter, softer, cleaner and with less stick than Benares hemp; and whether the superiority of Bengal fibre is due to its season of growth, method of retting, climatic conditions or varietal differences of plants grown can only be ascertained by experiments.

Dewghuddy hemp (from Ratnagiri district) forms a class by itself in regard to colour, strength, cleanliness and texture and is superior in its commercial qualities to genuine Itarsi hemp which is considered the best among the green hems from the Central Provinces and Sambalpur

district of Bihar and Orissa ; the difference might be due to harvesting before seed formation and careful drying before retting.

The differences in the commercial qualities in the produce from the various centres of production are thus partly due to the indifferent handling of the crop by cultivators and partly to the lack of uniformity in the time of harvesting, method and period of retting, and preparation of the fibre as practised in the different areas. In the United Provinces the produce of villages in Allahabad, Partabgarh and other areas producing Benares hemp contains varying proportions of the grades—Benares Nos. 1, 2 and 3 ; similarly the produce of Bilari tehsil (Moradabad district) and Pilibhit district contains the grades—Pilibhit, fine and Nos. 1 and 2, in varying proportions.

Similarly fibre from the Central Provinces and Sambalpur district contains varying proportions of the grades—Itarsi fine, Sewnee fine, Jubbulpore fine and Jubbulpore No. 1. For example, Chhindwara fibre contains 60 per cent. Itarsi fine, 25 per cent. Sewnee fine, 15 per cent. Jubbulpore fine while in the fibre from Jubbulpore district are found 5 per cent. of Itarsi fine, 60 per cent. of Jubbulpore fine, 25 per cent. of Jubbulpore No. 1 and 10 per cent. of Sewnee fine.

Again Bengal hemp contains in varying proportions, the grades—Bengal Nos. 1, 2, 3 and 4. Fibre from different villages in Devgad and Rajapur talukas contains, on an average  $12\frac{1}{2}$  per cent. of Dewghuddy double fine, 25 per cent. of Dewghuddy fine,  $37\frac{1}{2}$  per cent. of Rasband and 25 per cent. of Ras.

It is only by actual experiments that the reasons for varying proportions of the different grades in the produce of any local area can be ascertained ; such experiments will have to be based on an observation of the methods, most suitable for any particular grade in that area. Experimental work of this type is a necessary preliminary stage before the current agricultural practices could be improved and thereafter disseminated.

#### MARKETING.

88. *Collection of fibre for the market and some malpractices.*—The grower sells his small quantities of fibre to the village dealer who is the primary collector and being frequently handicapped by his poverty and indebtedness to that dealer he cannot afford to hold back his stock even when he is offered a price lower than he should reasonably get. The producer is thus more often than not at the mercy of the buyer.

The weights used by the village dealer are rarely tested and sometimes consist of rough pieces of stone. It is desirable that the use of authorised iron weights should be prescribed in each province. Besides, as a rule, small quantities are weighed out at a time with the result that the primary dealer gets one to four seers more of the produce per maund by the often repeated turns of the scale in his favour.

As a result the farmer tends to be indifferent regarding the preparation of the fibre. On the other hand he sometimes resorts to malpractices, *e.g.*, loading which hanks help to conceal, and damping. The village dealer collects fibre from a number of cultivators and brings the mixture to the nearest important collecting centre or market as the case may be. In this way mixtures of various qualities not only from different villages but also from different districts and sometimes adjoining provinces are collected at the market.

The number of middlemen through whose hands the fibre passes before it reaches the exporters varies according to the distance between the production centre and the market. The agents of exporting firms usually visit these upcountry collecting centres and make their purchases through *ārhatiyās* (local brokers and commission agents) but some times the exporting firms purchase their requirements directly (without agents) through their *ārhatiyās*. After the fibre is purchased, it is mixed up into one lot with the result that the defects which are in any one lot appear in the whole mass.

The desirability of controlling the transport of *sann* hemp from one growing centre to another with the object of discouraging adulteration should be considered and if necessary suitable legislation should be adopted. The problems of adulteration will have to be studied with care and discrimination and no undue restrictions should be imposed on the grower. Such measures might tend to discourage the mixing of the different qualities of *sann* hemp which are at present practised, *e.g.*—

- (i) inferior green hemp from Chandausi (U. P.) and Bareilly (U. P.) with better hemp from Pilibhit (U. P.) or
- (ii) dirty hemp from Gadarwara (C. P.) and Narsinghpur (C. P.) with clean fibre from Seoni (C. P.) and Jubbulpore (C. P.),  
or
- (iii) Allahabad (U. P.) hemp which is full of stick, with Azamgarh (U. P.) hemp which has very little stick in it.

89. *Other Malpractices.*—Other current malpractices, *e.g.*, damping, mixing with dirt, stick and other foreign matter, etc., hamper the trade considerably. The cultivator and the village dealer are both responsible for these practices; and even the buyer for export cannot disclaim some share of the responsibility.

The fault lies in the system, as it does not provide an adequate stimulus to the grower; does not inflict tangible penalty on the dealer, and does not permit of concerted action on the part of buyers for export. It is not impossible to check these malpractices provided that primary marketing is properly organised to enable the larger buyers to get reasonably large quantities of properly cleaned and graded fibre and the primary producers to get a reasonably remunerative price.

Co-operative sale societies can help in bringing the cultivator into direct touch with the buyer and also can help him to sell his produce

independently, or through certified or licensed brokers. Such societies can also help the cultivator to obtain good clean seed or the cash with which to buy it.

A local missionary society is reported to have achieved considerable success in the handling of agricultural produce including *sann hemp*. It has borrowed the services of a few officers of the Co-operative department and has started rural reconstruction work in Peravaram in East Godavari district. The cultivator's debts have been paid up by the society. The society supplies food on credit and advances money to meet other necessities of life. It takes over the produce from the cultivators and sells it on their behalf. Each farmer has his account. The society hopes to recover the money invested by it within one year.

Although this society's methods cannot necessarily be applied everywhere, efforts should be made wherever conditions are favourable to adapt them to local circumstances in conjunction with the co-operative movement or the activities of philanthropic bodies or individuals.

90. *Kutcha baling*.—Generally speaking the fibre is not properly cleaned and sorted at the upcountry collecting centres where it is made into *kutcha* bales, *e.g.*, in the United Provinces, Central Provinces, Bihar and Orissa or into bundles, *e.g.*, in Bengal, Madras and district Ratnagiri (Bombay Presidency) and despatched for *pucca* baling to Shivpur, Bombay, Calcutta and Madras according to transport facilities.

The *kutcha* bales and the bundles carry the defects already existing in the fibre. Thus the buyer has to pay unnecessary freight on the dirt and stick; also the cost of cleaning and preliminary sorting at the ports is necessarily heavier than at the up-country centres of production or collection. On account of the heavy expense, and to some extent the lack of sufficient space at the ports, the fibre is not properly cleaned or sorted there excepting the small quantity selected for hackling. This extra cost can be avoided if such work is done in up-country rather than at the ports.

Enquiries made at Chandausi (U. P.) showed that the cotton presses there are not inclined to undertake the full pressing of bales of *sann hemp*, as the produce is small and is not received regularly. But even then cleaning and sorting could be undertaken with advantage to all concerned. A noteworthy gain accruing from *pucca* baling at the up-country centres (*e.g.* at Seoni) would be the reduction of opportunities for adulteration of different qualities; for example of Pilibhit (U. P.) hemp with hemp from the Central Provinces.

91. *Supervision over important processes especially kutcha baling at the up-country markets*.—Supervision over the important processes, especially *kutcha* baling at the up-country centres is not only desirable but necessary if certain palpable defects and malpractices are to be minimised. Opinions may legitimately differ on the question whether such supervision should be organised by Government or by the trade itself, and ordinarily one would hesitate to recommend the setting up

of a Government controlled supervising agency. The *Sann hemp* trade is, however, so small that it would not be reasonable to expect the trade to organise itself for such action. Whether a Government controlled agency should be set up is a question which should be investigated.

92. *Cleaning and hackling for export.*—*Sann hemp* is exported either in an *undressed* or *dressed* condition. The former is known as the Bombay method and the latter as the Calcutta method.

The Bombay method is generally practised at Bombay, and consists of merely shaking the hanks without opening them, indifferent grading by ordinary labourers, and pressing, after throwing the hanks pell-mell into the press.

The Calcutta method is generally practised at Shivpur and Calcutta. According to it the *kutchu* bales and bundles are opened, dried and beaten with cudgels or blunt choppers; then they are shaken to remove the dust and sticks and are hackled, graded and pressed. At Cocanada the process is the same except that the fibre is not hackled.

Hackling consists in passing the hanks, which are already freed to some extent from dirt and stick by cleaning, through hand hackles (a row of long spikes fixed in a block of wood, which acts like a large comb). Hackling effectively frees the fibre from loadings and makes it loose but the operation necessarily costs a good deal (about Rs. 3 per maund at Shivpur). It cannot profitably be practised in the case of Benares hemp as it is weak, much tangled and would involve considerable loss in tow. Whether hemp from Bengal, Central Provinces, Pilibhit and Ratnagiri is in any particular case hackled or not depends on the nature of the demand. The extra price offered for hackled hemp has not been remunerative for the last three to four years and even at present it is difficult to sell hackled hemp at a price which can compensate for the extra work except occasionally in small quantities to Germany.

93. *Pressing, for export.*—For export, Benares hemp at present is pressed at Shivpur; Pilibhit hemp and hems from Central Provinces, Sambalpur district (Bihar and Orissa) and the Bombay Presidency are mostly pressed at the press houses at Bombay; Bengal hemp is mostly pressed at Calcutta, and Madras hemp largely at Cocanada.

It may be noted that the Central Provinces which are next in importance to the United Provinces in hemp production have no arrangements for *pucca* baling. Baling of the Central Provinces fibre in some central and convenient place in the Central Provinces, therefore, would save the unnecessary freights on the transport of *kutchu* bales to Calcutta and Bombay.

Seoni might prove to be a suitable centre for hydraulic presses; and cleaning, grading and packing for export may be done there to the general advantage of both cultivators and shippers. Such centralised *pucca* baling would be more amenable to supervision by the supervising agency—whether Government's own or set up by the trade.

The Bales are pressed with about three tons pressure, weigh about 400 lbs. and are  $4\frac{1}{2} \times 1\frac{3}{4} \times 1\frac{1}{2}$  cubic feet in size. Those shipped from Calcutta are necked and tied with jute or *pat-ann* ropes, while those exported from Bombay and Cocanada are covered with hessian and tied usually with iron hoops.

The charges as reported per bale inclusives of cleaning, assorting and pressing and dock charges are about Rs. 5 at Shivpur, Bombay and Calcutta and about Rs. 6 at Cocanada.

The outturn per hour by a hydraulic press is 20 to 22 bales of Benares hemp and unhackled green hemp, or about 15 bales of hackled hemp.

Overseas buyers complain of the denseness of the bales as it damages the fibre ; but under present terms of contract, it will not pay the shipper to export less densely packed bales (*e.g.*, with 2 tons pressure) as besides the extra charges for packing, tying, increased cost of handling and cartage, freight alone would cost 1 sh. to 1-3 sh. more per bale on account of its larger size. This was the experience of some of the Cocanada shippers. If smaller bales containing a less quantity of fibre are made, the cost of pressing, packing and tying, handling and cartage would be proportionately increased. The Chambers of Commerce interested in this trade have considered the question of packing and have stated that shippers would be prepared to supply loosely packed bales provided the Hemp Balers Association in London would be prepared to consider a revision of the conditions of the present contract which they consider are unfair to the Indian shippers.

94. *Suggestions for improvement of Grading.*—As is the case with many other forms of primary produce one of the greatest needs is standardised grading and specifications in *Sann hemp*. The bales of *Sann hemp* at present bear the private trade marks of the shipper ; but these marks have no reference to the place of production, the quality of the fibre or the name of the press ; and the bales pressed for different traders even at the same press house are not uniformly graded.

As already stated, the produce received at the up-country markets as well as at the press houses is a mixture of various grades, and is also mixed with stick, dirt and other foreign matter. Cleaning and sorting as practised at some of the press houses is far from satisfactory.

A system of grading cannot be imposed on the trade as almost invariably the trade prefers a system evolved by itself. But considering the importance of standardised grading and detailed specifications of grades not only to the internal but also to the foreign buyers, the trade should be encouraged and assisted to evolve its own scheme. If it received an authoritative imprimatur from any statutory Fibre Committee or a central *sann hemp* trade association it is likely, in course of time, to establish itself all over the country.

Initially there may be some opposition from some exporting firms on the ground that their trade secrets would be exposed ; it is a fact that at present individual exporting firms sometimes do succeed in mak-

ing money by packing the produce from an inferior grade and passing it on as a new grade under a name suggestive of a superior grade ; but in the long run profits must depend on intrinsic quality and not on false grading ; and the general interests of the trade demand a reliable uniform system. Such procedure would not be inconsistent with the interests of individual firms, as private trade marks would still remain, and continue to carry the market value attached to the firm's name.

95. *Supervision at the Press.*—The remarks in paragraph 91 regarding supervision over *lutcha* baling apply *mutatis mutandis* to *pecca* baling for export. In the Philippine \* Islands there is full fledged service for the inspection of fibre before export and a scheme on these lines adapted to local circumstances may be welcomed by the shippers, particularly because it would simplify arbitration in London, and would strengthen the shippers hands in the case of disputes.

96. *System of sale and arbitration in London.*—Indian *sann* hemp is sold in London on the basis of "f. a. q. of the grade." In the absence of standard grading, the f. a. q. of the grade has little significance and tends to vary according to the arbitrator's notion as to what the average quality grade should be. All arbitrations on Indian hemp, sold to the United Kingdom, are held in London, and in the absence of standardised grading and specifications, the arbitrators have to depend on their knowledge and experience of the general average quality of Indian hemp ; but men with first hand knowledge are few. Arbitration of this type is unscientific and unsatisfactory ; shippers and the Bombay † chamber of commerce have protested against it in emphatic terms.

Complaints have frequently been made by the trade that the existing terms of the contract for hemp exported are unfair to the shipper ; and that in actual operation they tend to favour the buyer. But so long as standardised system of grading and specifications is not evolved, it is difficult to see how matters can be set right.

97. *Necessity for studying foreign production centres and markets.*—An enquiry into the preparation of the Indian (*sann*) hemp and the conditions under which it is handled and marketed in India will not suffice by itself for evolving any effective scheme so that the Indian hemp trade could be enabled to hold its own against the increasing competition of Russian and Italian hems in the European markets. A thorough knowledge of the methods of cultivation, preparation, handling and marketing of Italian and Russian hemp as well as accurate information about the uses of the Indian hemp in the various European countries is also necessary. If and when funds permit, the deputation of an officer to study the production, etc., of hems which compete with Indian *Sann* hemp and foreign markets may be considered.

98. *Railway transport.*—Freight rates are fixed on the telescopic mileage basis which favours "long distance" transport, e.g., to Bombay

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\* Oakley, F. J.—Long Vegetable Fibres, pp. 114, 115.

† Proceedings of a meeting of exporters of Hemp held on 2nd July 1930.

or Calcutta, and discourages transport to up-country centres like Shivpur where many of the processes preparatory to final export could otherwise be carried out efficiently and economically. Even organised supervision over these processes at the stages where it can be effective can be set up. The question of giving special railway rates to such centres should be seriously considered.

The following freight figures will show how Shivpur presses are handicapped on account of telescopic rates:—

	Distance.	Charges.		
		per md.		
		Rs.	A.	P.
Chandausi to Bombay . . . . .	1,074	1	2	3
Chandausi to Calcutta . . . . .	805	0	12	6
Chandausi to Shivpur . . . . .	379	0	8	2
Pilibhit to Calcutta <i>via</i> Lucknow . . . . .	779	0	13	6
Pilibhit to Shivpur . . . . .	353	0	13	2
Pilibhit to Bombay . . . . .	1,408	0	13	6
Shivpur to Calcutta . . . . .	432	0	7	10
		( <i>Pucca</i> bales).		
Shivpur to Calcutta . . . . .	432	0	8	4
		( <i>Kutch</i> bales).		
Partabgarh to Shivpur . . . . .	82	0	4	0

Numerous complaints were also received that whereas one wagon of registered carrying capacity of X maunds would accommodate 160 bales of hemp, another wagon of the same registered weight carrying capacity would accommodate far fewer bales; and that the same freight was charged by the railway because the registered weight carrying capacity of both wagons was the same. In some cases it was stated that wagons of the shape which would carry the maximum number of bales were on the station but were not freely supplied and it was suggested that railways might issue instructions for the supply of wagons of the most suitable shape when available. It was also suggested that a specified fractional deduction from the maximum weight capacity on which the charges are based might be considered in the case of certain unsuitable types of wagons, but this seems difficult to reduce to practice.

99. *Necessity for a permanent organisation.*—*Sann hemp* is a minor crop and has consequently been neglected so far, as the hemp trade only came into prominence since the Great War. Under normal trade conditions it might be urged with some justification that the improvement of any commodity should be left to the trade itself, *i.e.*, by the buyer paying a premium for quality. But in the face of renewed competition from Russian hemp, the position of the Indian hemp trade has become precarious. As already stated, unless prompt action is taken, India may lose for ever its position, weak as it already is, in the European markets.



A central organisation was recommended by the Imperial Institute Advisory Committees on (a) plant and animal products; and (b) vegetable fibres; this was also recommended by the late Agricultural Adviser to the Government of India and by some of the principal exporters of *sawn hemp*. It was thought then that jute, *sawn hemp* and other fibre crops should be grouped together and that a central organisation should be entrusted with the work of improvement of vegetable fibres. Since then, however, the constitution of a Central Jute Committee has been announced. Although it might perhaps be beyond the scope of his enquiry, the Hemp Marketing Officer would like to record his view that the original proposal to have a central organisation to deal with vegetable fibres as a whole had many advantages which cannot be secured as effectively and economically by different bodies dealing with the various fibres individually and piecemeal. The formation of an independent permanent committee for *Sawn hemp* may not be practicable for financial reasons as a cess on *sawn* at a reasonable rate would not yield the funds necessary to meet the expenses of such an organisation. In view of the *fait accompli* of the Central Jute Committee, however, it is suggested that a sub-committee of the Central Jute Committee might be formed to stimulate research, improve the preparation of the hemp for market, deal with malpractices, and bring about other improvements in the trade in *sawn hemp* and other minor fibre crops; and also to stimulate the utilisation of these fibres by various small industries in the country itself.

100. *Provincial Statistics*.—The Season and Crop Reports group *sawn hemp* with the other fibres for the purpose of recording acreages. Other fibre crops are also grown besides *sawn hemp*, e.g., Deccan hemp or Bimalipatam jute (*Hibiscus cannabinus*) and Sisal hemp (*Agave* and *Aloe* species) and although they are of minor importance the areas under these should be shown separately.

Provincial Season and Crop Reports do not even show the acreage under *sawn hemp* grown for fibre as the acreage recorded under hemp includes the area under *sawn* used for green manuring, and in Madras for fodder also. The fact that such areas are not shown separately detracts from the value of the statistics for affording information when required on any one of these three points. A more accurate estimate of the acreage for fibre could be obtained if the area in which the hemp crop is ploughed in, or is used for fodder could be eliminated from the final statistics. It seems to the author that all these crops could be recorded separately at little or no extra cost, as even at present the village record keeper has to show, after his second round, the area in which any crop has failed; and it would perhaps not be a very difficult matter for him to ascertain at this, or a subsequent round, the area in which hemp has been ploughed in or used for fodder.

These problems may be put to the provincial departments of Land Records and Agriculture. Bengal, and Bihar and Orissa are under permanent settlement and do not possess subordinate revenue staff

under Government control such as is available in other provinces; therefore in their cases there may be some difficulty. On the other hand these provinces also publish their Season and Crop Reports, and it may be possible to adapt their present system, so as to obtain fairly reliable information of the acreage under (i) *sann hemp* and (ii) *sann hemp* for fibre.

The principal local markets and Co-operative Central Banks where they exist should be supplied with current market rates in *sann hemp* at Bombay and Calcutta.

101. *Uses of sann hemp in India.*—*Sann hemp* is put to a variety of uses in India. It is made into *Tat* (matting for the floors) in Partabgarh, Azamgarh and Benares districts. Also it is used by the rope making industry all over India. In this case it is generally of only local importance, but in some places (e.g., Pandepur, Tanakpur, Daultapur and Lalpur in Benares district and Chatra and Sheoraphulli in Serampur district) it is of more than merely local importance. In Berhampur, Vizagapatam, Godavari and Kistna districts, there are cottage industries for manufacture of canvas, and bags.

All these industries are capable of development. Lower grade *sann hemp* could be profitably utilized for manufacturing cheap ropes, matting and tarpaulins. Further utilization of the fibre by industries in India itself will be of great help to the *sann hemp* trade by providing an additional outlet for it.

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## CHAPTER IX.

### SUMMARY OF RECOMMENDATIONS.

1. *Sann hemp* should be grown on light well-drained soils (para. 79).

2. There is considerable scope for improvement in the existing strains. Improved strains with higher yield and better quality fibre can and should be evolved by 'selection' (paras. 8, 80).

3. The need for ensuring supplies of pure good seed with instructions about the seed rate for each tract has been clearly established (para. 79).

4. Cultivators in Bengal should be educated to cut off the root and top portions from the plants before retting; similarly cultivators in Ratnagiri district (Bombay Presidency) should be advised to cut the root portions of the plants before retting (paras. 45, 71 and 83).

5. The advantages of drying the harvested crops as practised in Ratnagiri district (Bombay Presidency) should be investigated. (Paras. 71 and 82).

6. Instructions should be given to cultivators regarding the proper time and method of harvesting, retting and extraction of fibre and efforts should be made to improve facilities for washing the fibre where these are deficient. (Paras. 11, 15, 29, 36, 45, 53, 71, 83 and 85).

7. The vertical and twisting actions of the retted bundles during washing as practised in the United Provinces (para. 15) and beating of the retted material during extraction as practised in some parts of Bengal (para. 45) are undesirable (para. 83).

8. The practicability of improving the quality of *sann hemp* fibre by 'sweating' should be investigated (para. 84).

9. The practice of leaving sticks and dirt in the fibre and of twisting it tightly into hanks which serve to hide "loading" should be discouraged (paras. 16, 86).

10. The experiments undertaken at the Technological Institute, Cawnpore, by Mr. Mullani on retting and softening the fibre with cheap chemicals are promising, and the authorities of the Institute might be encouraged to continue them (para. 83).

11. The possibilities of breaking and scutching green as well as retted stems, by hand and power machines, should be investigated (para. 85).

12. It is desirable to study the effects of the season of growth, and of harvesting and retting practices on the fibre with a view to improvements (para. 87).

13. The practicability of regulating up-country markets on the lines of cotton and grain markets in Berar (para. 88), and of introducing standard iron weights by legal prescription should be investigated (paras. 74 and 88).

14. Co-operative Sale Societies and philanthropic bodies should be encouraged to help in ameliorating the condition of the cultivators (para. 89).

15. The practicability of controlling the transport from one growing centre to another through trade organizations should be considered (para. 88).

16. The economy and benefit of cleaning and assorting the fibre at the up-country collecting centres before it is made into *kutchra* bales or bundles (para. 90) should be brought home to all concerned.

17. Supervision over *kutchra* baling at the up-country markets will help to minimise some of the defects and malpractices and is not only desirable but necessary (paras. 13, 19 and 91).

18. If suitable supervision over the cleaning, grading and packing of the fibre for export could also be provided, it would undoubtedly help to reduce the defects and malpractices. Shivpur (near Benares) being one of the important centres for baling, experiments should be tried there (paras. 92 and 93).

19. The Central Provinces, which rank next in importance to the United Provinces in *sann hemp* production should have arrangement for *pucca* baling. Seoni might prove to be a suitable centre for hydraulic pressing (para. 93).

20. A reliable and uniform system of grading and specification of the grades is very desirable in the general interests of the trade and efforts

should be made to evolve a suitable system through the trade itself (para. 94).

21. Bales should bear the name of the grade, the place of production and the name of the press. The shipper's own trade marks may of course continue (para. 94).

22. Supervision over cleaning, grading and packing at the presses at the ports through some permanent organization is essential (para. 95).

23. Packing for export at the up-country baling centres like Shivpur should be encouraged by giving special transport facilities (para. 98).

24. Indian shippers complain that the terms of the form of the contract at present in use when hemp is exported are one-sided and are frequently unfair in their operation. An attempt should be made to bring about their revision (para. 96).

25. A study of the foreign centres of production and markets for hemp is desirable before any effective scheme for the improvement of the Indian hemp trade can be evolved (para. 97).

26. A permanent central organisation on the lines of the Indian Central Cotton Committee is necessary to effect improvements in the preparation and marketing of *sann hemp* and to put the Indian hemp trade on a sound footing (para. 99).

27. The industrial utilisation in India of *sann hemp*, e.g., the manufacture of ropes, matting, canvas, etc., offers a promising field which should not be left out of the scope of work entrusted to any central organisation which may be set up (para. 101).

T. S. SABNIS.

*The 17th April 1931.*

APPENDIX I.

ACREAGES UNDER HEMP ACCORDING TO THE SEASON AND CROP REPORTS.

Name of Province.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	Quinquennial averages or lesser averages as the case may be.
						Acres.
Bengal . . . . .	44,700	44,900	39,300	35,900	36,300	36,200
Bihar and Orissa . . . . .	(Not available)	(Not available)	21,900	23,200	20,800	21,067
Bombay . . . . .	155,599	143,895	(Not available)	114,728	134,234	137,114
Central Provinces and Berar . . . . .	168,206	112,691	121,387	140,133	159,664	140,416
Madras . . . . .	223,590	238,934	279,737	(Not available)	308,184	262,611
Punjab . . . . .	52,057	46,248	22,551	52,013	53,480	45,269
United Provinces of Agra and Ondh . . . . .	155,435	(Not available)	112,382	162,531	222,178	163,131

ACREAGES UNDER HEMP ACCORDING TO THE SEASON AND CROP REPORTS.

Name of Province.	1914-15.	1915-16.	1916-17.	1917-18.	1918-19.	Quinquennial averages or lesser averages as the case may be.
						Acres.
Bengal . . . . .	42,400	40,900	43,100	42,700	44,500	42,720
Bihar and Orissa . . . . .	20,800	31,100	30,000	32,500	34,400	29,760
Bombay . . . . .	155,163	144,482	(Not available)	117,958	81,664	99,817
Central Provinces and Berar . . . . .	176,014	138,035	163,950	131,745	90,977	140,144
Madras . . . . .	(Not available)	269,068	200,665	296,051	184,215	237,450
Punjab . . . . .	48,951	27,315	49,116	45,080	19,480	40,657
United Provinces of Agra and Oudh . . . . .	170,352	124,761	176,903	211,974	124,248	161,648

ACREAGES UNDER HEMP ACCORDING TO THE SEASON AND CROP REPORTS.

Name of Province.	1919-20.	1920-21.	1921-22.	1922-23.	1923-24.	Quinquennial averages or lesser averages as the case may be.
						Ares.
Bengal . . . . .	48,800	78,700	79,400	77,800	76,900	72,320
Bihar and Orissa . . . . .	30,400	38,600	40,800	33,300	29,500	34,520
Bombay . . . . .	111,357	81,329	104,016	107,446	120,365	104,903
Central Provinces and Berar . . . . .	146,616	(Not available)	99,906	(Not available)	102,434	116,319
Madras . . . . .	159,476	87,747	98,489	104,673	110,461	112,169
Punjab . . . . .	46,863	43,727	45,249	46,716	41,969	44,905
United Provinces of Agra and Oudh . . . . .	182,788	175,814	(Not available)	(Not available)	(Not available)	179,301

ACREAGES UNDER HEMP ACCORDING TO THE SEASON AND CROP REPORTS.

Name of Province.	1924-25.	1925-26.	1926-27.	1927-28.	1928-29.	Quinquennial averages or lesser averages as the case may be.
						Acres.
Bengal . . . . .	62,900	62,700	60,700	58,400	58,260	60,580
Bihar and Orissa . . . . .	18,700	18,600	21,700	19,600	15,300	18,780
Bombay . . . . .	162,445	105,252	99,798	109,795	102,629	115,984
Central Provinces and Berar . . . . .	138,773	158,719	113,299	92,792	84,947	117,706
Madras . . . . .	141,806	177,570	112,941	96,111	103,067	126,299
Punjab . . . . .	41,291	48,751	47,510	41,274	36,451	43,055
United Provinces of Agra and Oudh . . . . .	176,700	244,581	249,661	190,494	156,690	203,625



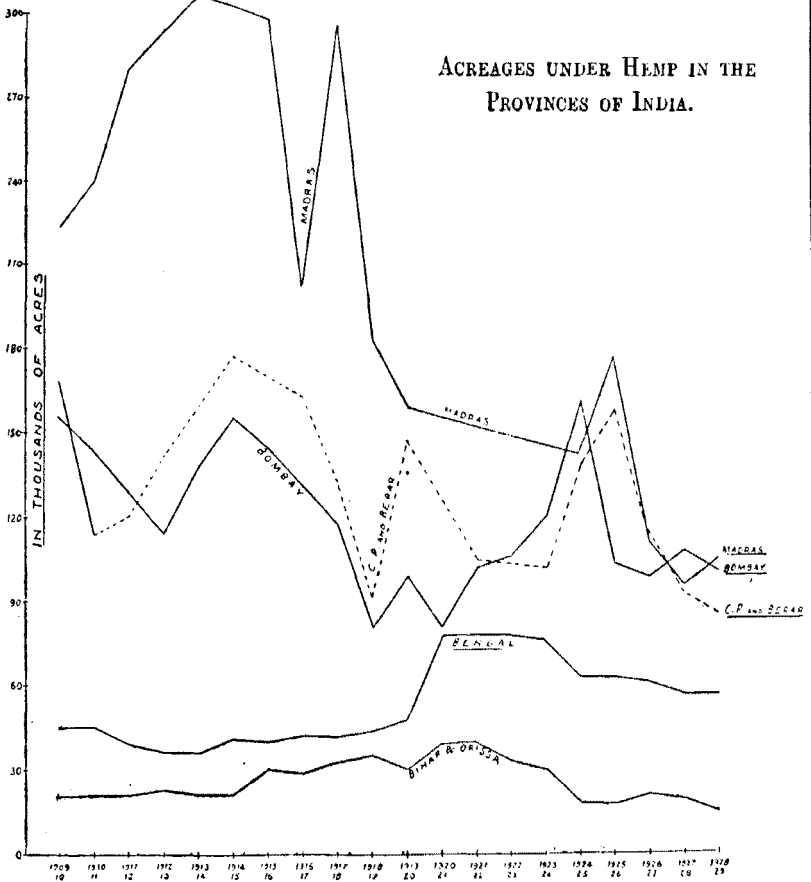
APPENDIX II.

THE TOTAL CROPPED AREA (IRRIGATED AND UNIRRIGATED) IN ACRES, IN THE FOLLOWING PROVINCES, WITH THE AVERAGES FOR THE YEARS SHOWN AND ALSO THE QUINQUENNIAL AVERAGE AREA UNDER HEMP CULTIVATION, WITH ITS PERCENTAGE TO THE AVERAGE TOTAL CROPPED AREA.

(*Figures taken from the Provincial Season and Crop Reports.*)

	Total Cropped area 1924-25.	Total Cropped area 1925-26.	Total Cropped area 1926-27.	Total Cropped area 1927-28.	Total Cropped area 1928-29.	Quinquennial average.	Quinquennial average area under hemp cultivation.	Percentage of area under hemp to total cropped area.
Bengal . . . . .	27,747,200	28,308,800	27,469,200	26,060,900	28,702,700	27,656,760	60,580	.22
Bihar and Orissa . . . . .	30,456,500	30,214,800	29,749,300	29,589,600	30,057,100	30,012,260	18,780	.06
Bombay . . . . .	33,001,783	31,286,312	31,823,918	32,272,040	32,113,022	32,009,216	115,984	.35
Central Provinces and Berar . . . . .	27,383,100	27,110,461	27,084,901	27,376,295	27,513,844	27,284,920	117,706	.41
Madras . . . . .	37,923,617	36,788,493	37,367,132	38,568,078	38,779,144	38,283,202	126,209	.32
Punjab . . . . .	31,721,487	29,709,855	30,406,941	29,472,581	31,961,745	30,654,521	3,077	.001
United Provinces of Agra and Oudh . . . . .	42,903,910	41,942,174	41,591,542	42,776,307	42,403,894	42,328,553	203,625	.48

## APPENDIX 3.

ACREAGES UNDER HEMP IN THE  
PROVINCES OF INDIA.

APPENDIX IV.

EXPORTS OF "HEMP" (CHIEFLY SANN HEMP), ACCORDING TO THE REVIEW OF TRADE OF INDIA.

		1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.	
Share of—*									
Bengal . . . . .	. Cwts. £	214,775 169,193	248,757 196,041	293,256 244,785	324,110 306,372	429,469 376,050	353,425 311,783	327,666 352,010	
Bombay . . . . .	. Cwts. £	229,060 199,699	208,852 178,916	192,771 186,339	254,892 238,749	224,790 243,396	270,172 302,766	233,585 279,192	
Sind . . . . .	. Cwts. £	.. ..	.. ..	1 10	.. ..	.. ..	675 612	6 20	
Madras . . . . .	. Cwts. £	36,860 28,236	42,578 34,862	44,921 46,082	44,267 47,252	57,289 62,873	45,955 47,728	47,010 52,361	
TOTAL		. Cwts. £	480,695 397,128	500,187 409,819	530,949 477,216	623,269 642,373	711,548 682,319	670,227 662,889	608,267 683,583

\* Shipments from ports in the different provinces.

EXPORTS OF "HEMP" (CHIEFLY SANN HEMP), ACCORDING TO THE REVIEW OF TRADE OF INDIA.

		1916-17.	1917-18.	1918-19.	1919-20.	1920-21.	1921-22.	1922-23.
Share of—*								
Bengal . . . . .	Cwts. £	341,197 464,740	126,735 166,709	268,597 378,786	507,929 Rs. 1,09,10,620	298,739 54,63,900	197,412 26,93,313	269,487 36,67,678
Bombay . . . . .	Cwts. £	344,956 545,836	151,797 320,697	174,812 530,228	216,134 Rs. 75,97,090	96,123 28,18,160	49,825 10,51,488	113,598 19,35,014
Sind . . . . .	Cwts. £	.. ..	45 82	.. ..	.. ..	20 1,040	.. ..	.. ..
Madras . . . . .	Cwts. £	46,060 63,548	28,139 42,114	46,011 69,628	18,046 Rs. 4,33,260	13,069 3,32,390	8,966 1,90,959	29,358 4,82,032
TOTAL . . . . .	Cwts. £	732,213 1,074,124	306,716 529,602	489,420 978,642	742,109 Rs. 1,89,40,970	407,951 86,15,490	256,203 39,35,760	412,443 60,84,724

\* From 1919-20, the value is given in Rupees and previously in £.

EXPORTS OF "HEMP" (CHIEFLY SANN HEMP), ACCORDING TO THE REVIEW OF TRADE OF INDIA.

		1923-24.	1924-25.	1925-26.	1926-27.	1927-28.	1928-29.	1929-30.
Share of--								
Bengal . . . . .	Cwts. Rs.	342,228 54,74,598	454,363 1,10,03,941	419,995 1,04,87,730	319,043 59,36,339	341,801 53,67,027	453,913 68,06,640	315,689 47,10,885
Bombay . . . . .	Cwts. Rs.	102,085 18,92,151	184,426 54,93,018	180,010 48,16,465	96,384 18,58,056	112,314 22,00,600	87,726 16,38,341	103,572 18,58,387
Madras . . . . .	Cwts. Rs.	14,534 2,75,933	29,951 7,90,165	23,944 6,13,115	24,405 4,82,100	30,031 5,15,486	19,458 3,06,778	15,698 2,63,811
TOTAL	Cwts. Rs.	458,847 76,42,682	668,740 1,72,87,124	623,949 1,59,17,310	439,832 82,76,495	484,146 80,83,113	561,097 87,51,879	434,959 68,33,083

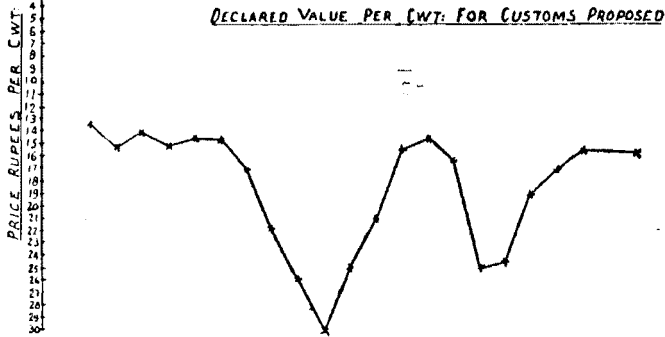
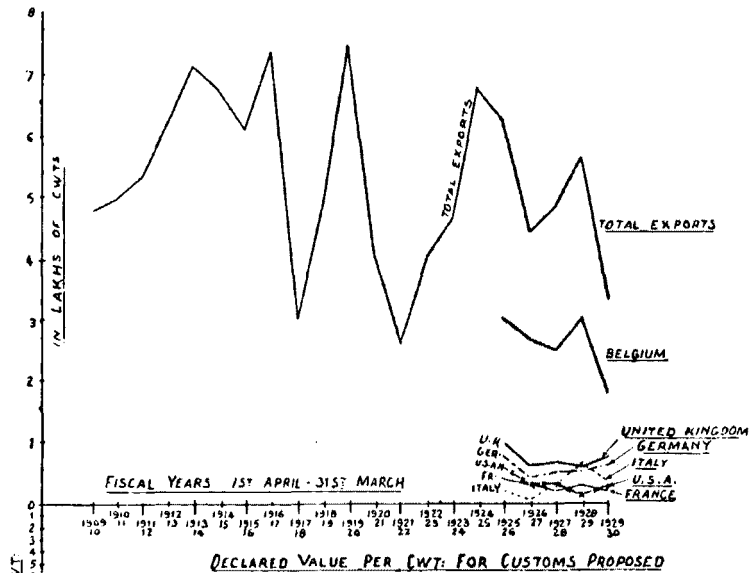
STATEMENT OF THE AVERAGE EXPORTS FOR SUCCESSIVE PERIODS.

Years.	Bengal.	Bombay.	Madras.	Total.
1909-14 . . . . . Cwts. £	3,02,073 2,58,488	2,22,073 2,19,410	45,183 43,861	5,69,330 5,21,771
1914-19 . . . . . Cwts. £	2,83,524 3,12,768	2,35,064 3,95,744	42,635 55,074	5,61,369 7,85,768
1919-24 . . . . . Cwts. Rs.	3,23,159 56,42,022	1,15,553 30,58,781	16,795 3,42,915	4,01,511 90,43,925
1924-29 . . . . . Cwts. Rs.	3,97,823 79,20,335	1,32,172 32,01,296	25,558 5,41,509	5,55,553 1,16,63,184
1929-30 . . . . . Cwts. Rs.	3,15,689 47,10,885	1,03,572 18,58,387	15,698 2,63,811	4,34,959 68,33,083

APPENDIX 5.

EXPORTS OF HEMP FROM INDIA.

QUANTITY.



APPENDIX VI.

QUANTITY AND VALUE OF EXPORTS OF HEMP (RAW) BY MONTHS, ACCORDING TO THE SEA-BORNE TRADE AND NAVIGATION OF BRITISH INDIA, FOR THE YEARS 1927-28, 1928-29 AND 1929-30.

Q = Quantity in tons.  
V = Value in Rupees.

	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.
<b>Total—</b>												
1927-28 . . . Q	66,746	41,233	34,844	24,667	24,409	40,601	15,337	23,701	49,099	54,638	46,125	62,756
V	10,63,145	9,01,333	6,24,743	4,21,565	3,95,854	6,45,588	2,59,662	3,57,084	7,70,524	8,58,557	7,80,961	10,04,097
1928-29 . . . Q	45,686	48,639	54,969	32,075	24,891	14,855	14,038	37,919	68,162	84,966	71,258	63,639
V	7,59,491	8,06,037	9,21,831	5,13,690	3,90,872	2,47,554	2,16,075	5,73,601	10,14,610	11,63,884	11,72,254	9,71,980
1929-30 . . . Q	56,740	26,509	20,298	24,950	25,578	21,021	12,895	32,266	50,396	46,585	64,230	63,491
V	10,25,265	4,12,381	3,27,301	3,93,233	4,09,175	3,04,635	2,02,522	5,28,895	8,00,900	6,81,047	8,02,177	9,46,812
<b>To United Kingdom--</b>												
1927-28 . . . Q	10,296	9,690	7,455	5,034	4,130	5,261	5,010	3,596	3,017	4,963	7,303	11,423
V	1,53,053	3,54,411	1,36,595	99,435	63,054	98,614	84,885	65,150	55,580	78,155	1,52,595	1,77,146
1928-29 . . . Q	9,187	6,144	3,848	4,426	6,579	1,864	622	877	3,983	8,820	8,755	7,041
V	1,60,442	1,00,816	64,547	70,299	97,938	28,250	10,638	15,845	59,580	1,14,606	1,24,285	1,16,627
1929-30 . . . Q	8,601	8,202	4,214	1,767	1,706	2,590	699	8,445	5,669	8,395	8,424	14,087
V	1,63,790	1,46,672	70,550	29,150	33,943	41,430	13,479	99,160	1,20,992	1,19,732	1,23,546	2,22,730
<b>To Germany—</b>												
1927-28 . . . Q	4,307	3,723	3,696	5,867	4,699	3,193	2,212	1,470	4,500	5,873	3,352	7,180
V	85,137	72,490	65,845	94,640	74,895	56,950	33,350	20,680	73,210	93,338	55,170	1,12,796
1928-29 . . . Q	9,962	4,141	7,804	1,809	1,469	2,403	1,140	6,171	6,051	3,805	4,182	5,735
V	1,55,492	73,697	1,46,472	36,410	26,521	47,677	18,625	1,15,085	86,245	57,525	60,225	99,889
1929-30 . . . Q	2,489	2,795	2,383	6,630	7,127	1,687	653	8,233	11,293	4,503	9,885	4,119
V	43,732	36,610	35,210	97,355	1,13,385	29,645	13,674	1,37,695	1,54,720	80,511	1,41,401	61,346



To Belgium—															
1927-28	.	.	Q	42,630	21,325	17,876	10,420	11,655	25,886	4,810	12,078	25,176	28,461	25,627	22,281
			V	6,78,653	3,62,837	3,28,721	1,72,743	1,93,717	3,83,099	92,218	1,73,812	3,99,160	4,46,574	4,09,420	3,42,743
1928-29	.	.	Q	16,641	23,687	34,239	14,990	13,249	3,615	7,587	17,248	37,759	52,534	33,585	41,990
			V	2,78,938	3,99,447	5,76,913	2,26,320	2,11,906	67,502	1,11,975	2,41,923	554,293	7,07,746	6,24,390	5,91,691
1929-30	.	.	Q	23,700	9,289	4,151	10,110	11,224	9,780	8,575	11,280	19,039	19,554	23,956	29,080
To France—															
1927-28	.	.	Q	885	639	587	532	1,026	2,220	..	..	2,079	7,209	371	1,874
			V	19,425	14,690	15,780	10,610	19,000	38,320	..	..	33,020	1,16,370	8,944	26,750
1928-29	.	.	Q	1,713	1,140	1,797	2,155	1,935	..	..	3,508	5,189	1,900	4,325	1,954
			V	26,655	20,152	23,040	32,800	9,100	..	..	43,369	78,970	28,475	75,720	34,375
1929-30	.	.	Q	1,376	87	24	..	32	264	1,867	1,075	4,616	3,538	1,343	5,816
			V	26,750	2,500	700	..	1,316	3,500	27,885	19,380	98,195	33,840	19,500	69,910
To Italy—															
1927-28	.	.	Q	..	30	2,461	255	..	..	642	..	11,032	1,043	5,155	7,852
			V	..	600	36,750	3,606	..	..	9,616	..	166,005	17,520	77,518	1,13,102
1928-29	.	.	Q	1,913	9,638	1,824	7,584	1,053	5,763	2,171	4,624	9,211	9,350	10,674	1,416
			V	26,950	1,43,187	26,124	1,23,066	..	85,480	32,550	69,539	1,38,502	1,34,001	1,46,010	92,499
1929-30	.	.	Q	2,961	2,421	2,924	1,839	..	4,598	..	1,275	2,062	3,274	3,004	4,973
			V	43,720	34,922	40,400	31,796	..	51,022	..	19,400	30,380	47,570	44,000	70,875

\*QUANTITY (FIGURES IN CWTS. IN THOUSANDS) OF HEMP (RAW)  
EXPORTED FROM INDIA.

	Pre-war average.	War average.	Post War average.	—	—	—
	509	561	455	..	..	..
		1925-26.	1926-27.	1927-28.	1928-29.	1929-30.
TOTAL EXPORTS (CWTS. IN THOUSANDS).	..	624	440	484	561	435
<i>Exports by countries.</i>						
To United Kingdom . . . .	..	104	70	77	62	73
To Germany . . . . .	..	75	34	50	55	62
To Belgium . . . . .	..	302	268	248	207	181
To France . . . . .	..	43	18	18	25	20
To Italy . . . . .	..	24	6	28	65	29
To United States of America .	..	55	17	30	16	23
To Other countries . . . .	..	21	29	33	42	47
<i>Exports from Provinces (ports in three provinces).</i>						
Share of—						
Bengal . . . . .	..	420	319	342	454	316
Bombay . . . . .	..	180	96	112	88	104
Sind . . . . .	..	..	..	..	..	..
Madras . . . . .	..	24	24	80	20	16
Burma . . . . .	..	..	..	..	..	..

\* According to the annual statement of the

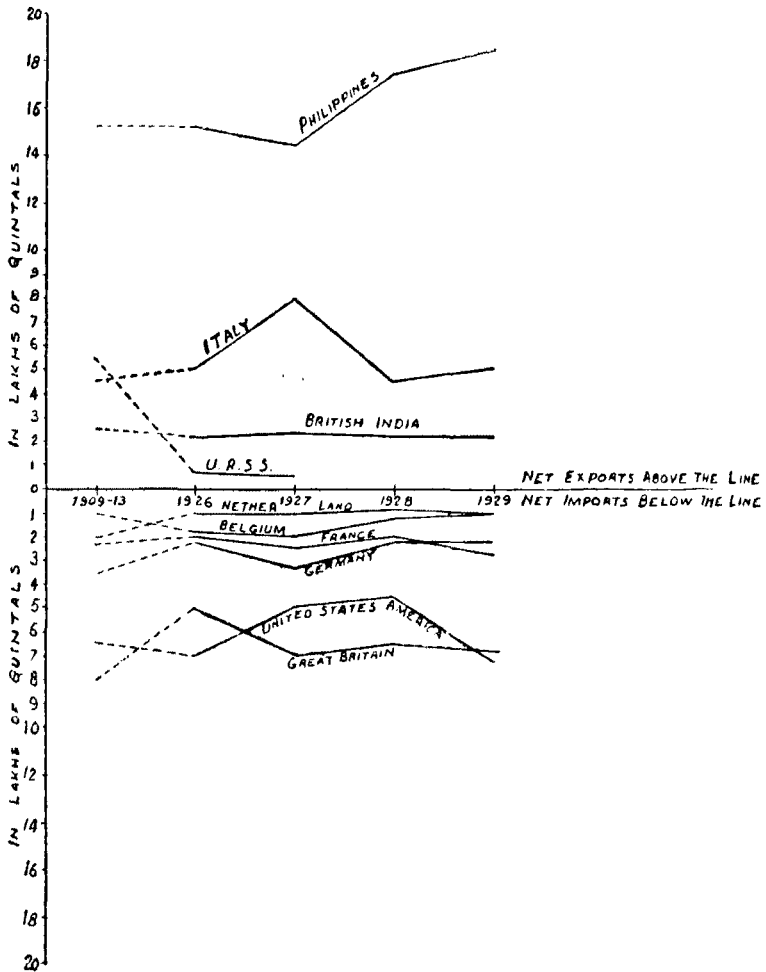
## DIX VII.

\*VALUE (FIGURES IN RUPEES IN THOUSANDS) OF HEMP (RAW)  
EXPORTED FROM INDIA.

Pre-war average.	War average.	Post War average.	1927-28.	1928-29.	1929-30.	—
7,827	11,787	9,044	..	..	..	
	1925-26.	1926-27.	1927-28.	1928-29.	1929-30.	
..	15,917	8,276	8,083	8,752	6,833	TOTAL EXPORTS (RUPEES IN THOUSANDS).
						<i>Exports by countries.</i>
..	2,765	1,449	1,520	970	1,194	To United Kingdom.
..	2,098	608	838	924	947	To Germany.
..	7,224	4,779	3,979	4,593	2,765	To Belgium.
..	1,249	410	303	378	323	To France.
..	625	120	414	962	415	To Italy.
..	1,349	351	465	219	428	To United States of America.
..	607	559	563	706	760	To Other countries.
						<i>Exports from Provinces (ports in three provinces).</i>
						Share of—
..	10,487	5,936	5,367	6,807	4,711	Bengal.
..	4,816	1,868	2,201	1,638	1,658	Bombay.
..	..	..	..	..	..	Sind.
..	613	482	515	307	264	Madras.
..	..	..	..	..	..	Burma.

Sea-borne Trade of British India.

## APPENDIX 8.

NET EXPORTS OR IMPORTS OF HEMP IN PRINCIPAL COUNTRIES  
OF THE WORLD.

## APPENDIX IX.

## TRADE DESCRIPTIONS AND GRADES EXPORTED.

The following are the principal trade descriptions of the fibre exported to over-seas markets :—

## I.

1. *Benares*.—White quality from the United Provinces and Bihar and Orissa. 3-4½ feet long, white or whitish brown in colour, well cleaned, weak, tangled, fine in fibre and with varying amount of stick.

2. *Bengal*.—White quality from the Pabna district in Bengal. 3-4½ feet long, very white in colour, well cleaned, of moderate length, fine in fibre, with a very small amount of stick.

3. *Pilibhit*.—Green hemp from the United Provinces and inferior hemp in this quality from the Central Provinces. 3-5 feet long, dull green to dirty green in colour, badly cleaned, matted, impregnated with dust and dirt, of moderate strength.

4. *Itarsi*.—Green hemp from Betul in Central Provinces. 4-6 feet long, green to brownish green, well cleaned, fine in fibre, strong and without dust.

5. *Sewnee*.—Green hemp from the Central Provinces, 4-6 feet long, light green to pale brown, well cleaned, of moderate length, moderately fine in fibre and with very small amount of dust.

6. *Jubbulpore*.—Green hemp from the Central Provinces. Indifferently cleaned, 4-6 feet long, greenish to greenish brown, of moderate strength, with small amount of stick and dust.

7. *Deoghuddy*.—From Devgad and Rajapur talukas in the Ratnagiri district. Very well cleaned, 5-7 feet long, golden in colour, strong and fine in fibre and without dust.

8. *Salsi*.—Green quality from Belgaum. 4-5 feet long, badly cleaned, a little matted, dirty green in colour, of moderate strength, coarse, with varying amount of dirt and dust.

9. *Godhra*.—Green hemp from Panchmahals. A little superior to Salsi, with a large amount of sand.

10. *Khandesh*.—Green hemp from Khandesh. Superior to Godhra, with an admixture of sand and stick.

11. *Gopalpur*.—Green hemp from Ganjam district. 5-6 feet long, pale green, well cleaned, of moderate strength, fine in fibre, with very small amount of stick.

12. *Upper Godavari*.—Green hemp from Dummagodum and Srivansa. 4-5 feet long, green to greenish brown, fairly cleaned, of moderate strength, moderately fine in fibre and with a small amount of stick.

13. *Cocanada*.—Green hemp from East Godavari. 4-5 feet long, badly cleaned, of moderate strength, dirty green to greenish brown in colour, a little matted, impregnated with dirt and dust, with a large amount of stick.

14. *Warangal*.—Green hemp from Nizam's territory. Butt ends much matted and black resembling Cocanada hemp in other characters.

## II.

## GRADES EXPORTED.

*Calcutta.*

Benares hemp . . . . .	Nos. 1, 2 and 3.
Green hemp . . . . .	„ 1, 2, 3 and tow.
Bengal hemp . . . . .	„ 1, 2, 3 and 4.

*Bombay.*

Pilibhit . . . . .	Fine and Nos. 1 and 2.
Itarsi . . . . .	Fine.
Sewnee . . . . .	Fine and No. 1.
Jubbulpore . . . . .	Fine and No. 1.
Deoghuddy . . . . .	Extra or double fine and No. 1.

## Madras.

Cocanada hemp.  
Gopalpur hemp.  
Upper Godavari hemp.  
Warangal hemp.

## APPENDIX X.

## I.—HANDLING CHARGES AT THE UP-COUNTRY MARKETS.

## United Provinces.

	Per maund.
	Rs. A. P.
<i>Chandausi</i> (Moradabad district)—	
Weighing . . . . .	0 0 3
Dalali . . . . .	0 0 1½
Labour . . . . .	0 1 3
Weighing of bales . . . . .	0 0 1½
Pressing . . . . .	0 1 3
Cartage . . . . .	0 0 3
Station charges . . . . .	0 0 6
Dharmada and miscellaneous charges . . . . .	0 1 3
<b>TOTAL</b>	<b>0 5 0</b>

	Per maund.
	Rs. A. P.
<i>Pilibhit</i> —	
Paledari . . . . .	0 0 4½
Pressing . . . . .	0 1 9
Loading into carts, watch, and weighing . . . . .	0 0 4½
Cartage and station charges . . . . .	0 0 11½
Dharmada and Arhat . . . . .	0 0 9
Establishment . . . . .	0 0 9½
<b>TOTAL</b>	<b>0 5 0</b>

	Per maund.
	Rs. A. P.
<i>Chililla</i> (Partabgarh district)—	
Pressing and rope . . . . .	0 1 5
Hire of press . . . . .	0 0 10
Paledari . . . . .	0 0 4
Cartage . . . . .	0 0 6
Station charges and loading . . . . .	0 0 8
Dharmada and establishment charges . . . . .	0 2 3½
<b>TOTAL</b>	<b>0 6 0</b>

	Per maund.
	Rs. A. P.
<i>Seogarh</i> (Allahabad district)—	
Pressing and rope . . . . .	0 1 3
Hire of press . . . . .	0 1 0
Weighing . . . . .	0 0 6
Cartage to station . . . . .	0 1 0
Station charges . . . . .	0 0 8½
Arhat . . . . .	0 1 1½
Establishment charges . . . . .	0 1 10
	<hr/>
TOTAL . . . . .	0 7 5

	Per maund.
	Rs. A. P.
<i>Shivpur</i> (Benares district)—	
Pressing charges and press hire . . . . .	0 0 9
Palhedari (coolly charges) . . . . .	0 0 3
Cartage from godown to station . . . . .	0 0 2
Cartage from bazaar to press . . . . .	0 1 1
Establishment charges . . . . .	0 6 7
	<hr/>
TOTAL . . . . .	0 7 0

	Per maund.
	Rs. A. P.
<i>Raniki-Sarai</i> (Azamgarh district)—	
Weighing . . . . .	0 0 1
Pressing, rope, and rent of press . . . . .	0 2 2
Cartage to station . . . . .	0 0 2
Station charges . . . . .	0 0 6½
Warehouse charges . . . . .	0 1 6½
Establishment . . . . .	0 3 1½
	<hr/>
TOTAL . . . . .	0 7 7½

	Per maund.
	Rs. A. P.
<i>Cawnpore</i> —	
Arhat . . . . .	0 5 0
Bundhai . . . . .	0 0 9
Cartage . . . . .	0 0 3
Dharmada . . . . .	0 0 9
Gowshala . . . . .	0 0 9
Marking . . . . .	0 0 9
Station charges . . . . .	0 0 9
	<hr/>
TOTAL . . . . .	0 9 0

## Central Provinces.

	Per maund.
	Rs. A. P.
<i>Chappara</i> (Seoni district)—	
Weighing . . . . .	0 0 6
Pressing . . . . .	0 2 0
Cartage Seoni station . . . . .	0 2 0
Ārhat . . . . .	0 1 9
Establishment charges . . . . .	0 3 9
	<hr/>
TOTAL . . . . .	0 10 0
	<hr/>

	Per maund.
	Rs. A. P.
<i>Jubbulpore</i> —	
Weighing, rope and press charges . . . . .	0 2 6
Cartage and loading into carts . . . . .	0 1 6
Loading into wagons and station charges . . . . .	0 0 9
Ārhat and Dalali . . . . .	0 1 9
	<hr/>
TOTAL . . . . .	0 6 6
	<hr/>

	Per maund.
	Rs. A. P.
<i>Chhindwara</i> —	
Dharmada and Ārhat . . . . .	0 1 9
Pressing charges . . . . .	0 1 11
Carriage from godown to station . . . . .	0 0 3½
Weighing charges . . . . .	0 0 1½
Loading in wagons . . . . .	0 0 3
Establishment charges . . . . .	0 0 11
	<hr/>
TOTAL . . . . .	0 5 3
	<hr/>

	Per maund.
	Rs. A. P.
<i>Betul</i> —	
Ārhat . . . . .	0 0 6
Dharmada and Gowshala . . . . .	0 1 6
Weighing and Hamali . . . . .	0 0 3
Pressing . . . . .	0 2 0
Loading in cart and Kautcharis . . . . .	0 1 6
Cartage to station . . . . .	0 0 8
	<hr/>
TOTAL . . . . .	0 6 2
	<hr/>



*Bihar and Orissa.*

	Per maund.
	Rs. A. P.
<i>Bihar Sharif (Patna district)—</i>	
Arhat . . . . .	0 2 0
Hire of press . . . . .	0 0 6
Dharmada . . . . .	0 0 3
Pressing charges . . . . .	0 0 7½
Station charges . . . . .	0 0 3½
Cartage . . . . .	0 0 4
Establishment . . . . .	0 1 5
<b>TOTAL</b>	<b>0 5 5</b>

	Per maund.
	Rs. A. P.
<i>Bargarh (Sambalpur district)—</i>	
Dalai and cleaning . . . . .	0 0 5
Pressing and river tax . . . . .	0 1 7
Cartage by motor to Sambalpur station . . . . .	0 5 3
Arhat, Dharmada, etc. . . . .	0 1 0
Establishment . . . . .	0 0 9
<b>TOTAL</b>	<b>0 9 0</b>

*Bengal.*

	Per drum- about 1 md.
	Rs. A. P.
<i>Serajganj—</i>	
Bosta making . . . . .	0 1 0
Station charges . . . . .	0 0 7
Boat charges and inspection . . . . .	0 1 1
Export charges . . . . .	0 0 8
Establishment . . . . .	0 0 9
Arhat . . . . .	0 1 0
<b>TOTAL</b>	<b>0 5 1</b>

	Rs. A. P.
<i>Serajganj—</i>	
Delivery . . . . .	0 1 6 per bale.
Handling (morahing overhead) . . . . .	0 1 6 "
Rope making . . . . .	0 0 3 "
Marking and ticketing . . . . .	0 1 0 "
Pressing . . . . .	0 2 3 "
Workmen's compensation fund . . . . .	0 0 6 "
Despatching . . . . .	0 4 9 "
Freight . . . . .	2 0 9 "
Establishment . . . . .	0 7 0 "
<b>TOTAL</b>	<b>3 3 6 "</b>

Exchange . . . . .	$\frac{3}{16}$ per cent.
Fire Insurance . . . . .	$\frac{1}{2}$ "
Interest . . . . .	$\frac{1}{2}$ "
Marine Insurance . . . . .	$\frac{1}{16}$ "
Calcutta Brokerage . . . . .	$\frac{1}{2}$ "
Short weight . . . . .	1 "
Charges per maund . . . . .	Rs. 1 4 10
Difference on every Rs. 2 per maund . . . . .	„ 0 0 11

*Madras Presidency.**Coconada—*

	Per maund.	
	Rs.	A. P.
Carriage from production place to the port . . . . .	0	2 6
Cleaning . . . . .	0	2 10
Full pressing and tying with iron hoops . . . . .	0	4 5
Public charities . . . . .	0	0 7
Labour (loading and unloading in boat, and boat charge to the steamer) . . . . .	0	2 6
<b>TOTAL</b> . . . . .	<b>0</b>	<b>12 10</b>

*Bombay Presidency.**Devgad (Ratnagiri district)—*

	Per kandy.		
	Rs.	A. P.	
Dalali . . . . .	1	0 0	
Tolai . . . . .	0	1 6	
Tying . . . . .	0	8 0	
Hamali to bunder . . . . .	0	3 0	
Padavi . . . . .	0	2 0	
Custom charges . . . . .	0	1 0	
Phatemari charge to Bombay . . . . .	2	8 0	
Bombay charges (labour, cartage and warehouse) . . . . .	2	8 0	
<b>TOTAL</b> . . . . .	<b>6</b>	<b>15 6</b>	per kandy or about 15 annas per maund.

*Kharepatan (Ratnagiri district)—*

	Per kandy.		
	Rs.	A. P.	
Weighing . . . . .	0	0 3	
Tying . . . . .	0	8 0	
Hamali . . . . .	0	4 0	
Padavi . . . . .	0	8 0	
Phatemari charge to Vijaydurg . . . . .	0	1 3	
Custom charges . . . . .	0	1 0	
Phatemari charge to Bombay . . . . .	2	8 0	
Dalali . . . . .	1	0 0	
Bombay charges (labour, cartage and warehouse) . . . . .	2	8 0	
Dalali at Bombay . . . . .	1	0 0	
<b>TOTAL</b> . . . . .	<b>8</b>	<b>6 6</b>	per kandy or Rs. 1-2-0 per maund.

	Per kandy.
	Rs. A. P.
<i>Rajapur</i> (Ratnagiri district)—	
Dalali . . . . .	1 0 0
Tying . . . . .	0 8 0
Loading in Padav . . . . .	0 5 0
Padavi . . . . .	0 4 0
Custom charges . . . . .	0 4 0
Phatemari charge to Bombay . . . . .	2 8 0
Bombay charges (labour, cartage and warehouse) . . . . .	2 8 0
	<hr/>
TOTAL . . . . .	7 5 0 per kandy or Re. 1 per maund.

## II.—HANDLING CHARGES AT THE PRESSES.

	Per bale.
	Rs. A. P.
<i>Bombay</i> —	
Rates of expenses on account of shipment per bale—	
Railway yard to the press . . . . .	0 3 6
Pressing charges . . . . .	3 0 0
Packing and ropes . . . . .	0 12 0
Carriage from the press to the docks . . . . .	0 3 6
Mukadamage . . . . .	0 3 0
Loading and unloading . . . . .	0 1 6
Wharfage . . . . .	0 7 0
Measurement charges . . . . .	0 0 6
Sundries . . . . .	0 2 0
	<hr/>
TOTAL . . . . .	5 0 0 per bale or Re. 1 per maund.

	Rs. 20 per maund.
	Rs. A. P.
<i>Narayanganj Sub-division</i> —	
Fixed charges—	
Delivery . . . . .	0 2 6 per bale.
Handling . . . . .	0 15 0 "
Marking and ticketing . . . . .	0 1 3 "
Pressing . . . . .	1 12 0 "
Establishment . . . . .	1 5 6 "
Launch working . . . . .	0 12 3 "
Boat working . . . . .	0 4 3 "
Risk of Advance . . . . .	0 0 3 "
Workmen's compensation fund . . . . .	0 0 6 "
Despatching . . . . .	0 2 0 "
Freight . . . . .	1 9 8 "
Managing agent's allowance . . . . .	0 1 6 "
	<hr/>
TOTAL . . . . .	7 2 8 "

Percentage charges—		
Exchange . . . . .		1/8 per cent.
Fire Insurance . . . . .		1/2 „
Calcutta Brokerage . . . . .		1/2 „
Interest . . . . .		1/2 „
Marine Insurance . . . . .		1/2 „
Charges per maund . . . . .	Rs. 1 14 5	
Difference on every Rs. 2 per maund . . . . .	„ 0 0 8	
		Per bale of 400 lbs. Rs. A. P.
<i>Shivpur (Benares district)—</i>		
Expenses at Shivpur—		
Cleaning and assorting . . . . .		1 0 0
Pressing . . . . .		3 0 0
Cartage to station . . . . .		0 1 0
Station charges . . . . .		0 1 0
	TOTAL .	4 9 0 or As. 14-7 —————per maund.
Expenses at Calcutta—		
Port charges . . . . .		0 4 0
Shipping charges . . . . .		0 3 0
	TOTAL .	0 7 0 per bale or —————As. 1-5 per maund.
Total Rs. 5 per bale or Re. 1 per maund.		
<i>Calcutta—</i>		
Howrah to press . . . . .		0 8 0
Cleaning and assorting . . . . .		0 12 0
Pressing charge . . . . .		3 0 0
Carting from the pressing house to Kidderpore Docks.		0 5 6
Port charges . . . . .		0 4 0
	TOTAL .	4 13 6 per bale or —————As. 15-6 per maund.

## APPENDIX XI.

## WEIGHTS USED (FOR SANN HEMP) IN SOME OF THE SANN HEMP AREA.

<i>Azamgarh—</i>	
Seer . . . . .	105 tolas.
<i>Belgaum District—</i>	
Maund . . . . .	28 lbs. for sann. 38 lbs. for gur. 25 lbs. for sugar, oil.
Seer . . . . .	80 tolas.
<i>Bhagalpur District—</i>	
Seer . . . . .	101 tolas.
<i>Bihar Sharif (Bhagalpur district)—</i>	
Seer . . . . .	84 tolas.

*Dergad taluka* (Ratanagiri district)—

Seer . . . .	28 tolas.
Maund . . . .	40 seers.
Kandy . . . .	21 maunds.
	20 maunds $6\frac{1}{4}$ seers (for sann hemp).
Paili (measure) . . . .	= 4 seers (measure) = 7 lbs. by weight.

*Godavari (East)*—

Maund . . . .	25 lbs.
Kandy . . . .	20 maunds or 500 lbs.

*Haridatpur* (Benares district)—

Seer . . . .	88 tolas.
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*Jaunpur*—

Seer . . . .	96 tolas.
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*Moradabad district*—

Seer . . . .	100 tolas.
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*Pilibhit district*—

Seer . . . .	104 tolas.
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*Rajapur and Kharepatan*—

Kandy . . . .	21 maunds 10 seers (for sann hemp).
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*Seogarh* (Allahabad district)—

Seer . . . .	107 tolas.
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*Serajganj*—

Seer . . . .	60 tolas.
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*Shahabad* (Benares district)—

Seer . . . .	88 tolas.
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## APPENDIX XII.

## GLOSSARY OF TERMS.

Arhat . . . .	Brokerage.
Arhatiya . . . .	Broker.
Bandhai . . . .	} Tying.
Bandhani . . . .	
Bepari . . . .	Village dealer.
Bhajanaval . . . .	Burning the soil.
Blinda . . . .	Plait or hank.
Bidi . . . .	Ditto.
Bosta . . . .	A large bundle or drum of sann hemp.
C. I. F. . . . .	Cost, insurance and freight.
Chowki . . . .	Arranging hemp in the press.
Dandidhar . . . .	Weighman.
Dharmada . . . .	Public charities.
F. A. Q. . . . .	Fair average quality.
F. O. B. . . . .	Free on board the ship.
F. O. R. . . . .	Free on rail.
Gunchas . . . .	Plait or hank.
Hamali . . . .	Carrying charges.
Hirakashi . . . .	Vernacular name for sann hemp in Belgaum district.

Jokhnawal . . . .	Weighing.
Jethwa . . . .	Crop grown in May.
Jhari . . . .	Clearance charges at the market.
Kantekarai . . . .	Weighing.
Kashmira . . . .	Vernacular name for sann hemp in Bhagalpur district.
Katikia . . . .	Crop grown in July.
Kaval . . . .	Leafy branches and cow dung cakes.
Lachis . . . .	Plait or hank.
Ladai . . . .	Loading charges.
Laddering . . . .	Levelling the furrow tops after ploughing with a ladder-like frame of bamboos.
Solabhanja . . . .	Stick in the fibre.
Lundi . . . .	Plait or hank.
Muda . . . .	Ditto.
Nangarni . . . .	Ploughing.
Nikali . . . .	Clearance charges at the market.
Padav . . . .	Country boat.
Padavi . . . .	Country boat charge.
Palhedari . . . .	Carrying charges.
Pata . . . .	A plank—six to eight feet long, nine to twelve inches broad and about six inches deep—used to level the furrow tops after ploughing.
Pendi . . . .	Plait or hank.
Perni . . . .	Sowing.
Pharia . . . .	Village dealer who goes from house to house and collects the produce.
Phatemari . . . .	Country boat with a sail.
Pila . . . .	Plait or hank.
Ras . . . .	Sann hemp of average quality.
Rasband . . . .	Sann hemp containing various proportions of Dewghuddy grades.
Sukhavani . . . .	Drying.
Thakardwara . . . .	Temple charities.
Upatni . . . .	Harvesting by pulling.
Utarai . . . .	Unloading charges.

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## APPENDIX 13.

### EXPLANATION OF PLATES.

#### PLATE I.

1. Material being immersed in pools at Raja-ka-sahaspur.
2. Retting at Pilibhit.

#### PLATE II.

3. Extraction of fibre at Raja-ka-sahaspur.
4. Kutchā baling wooden hand press at Chandausi.

#### PLATE III.

5. Kutchā baling hand metal press at Pilibhit.
6. West Patent power press for kutchā and puccā bales at Chandausi.
7. Kutchā baling wooden hand press at Chandausi.

## PLATE IV.

8. Fibre being brought to the Vishwanathganj market.
9. Fibre being spread out for cleaning before kutchha baling at the Seogarh market.
10. Fibre being cleaned at the Vishwanathganj market.

## PLATE V.

11. Fibre being pressed into kutchha bales at the Seogarh market.
12. Kutchha bales at the Vishwanathganj market.
13. Wooden hand press at the Vishwanathganj market.
14. Wooden hand press at the Vishwanathganj market.

## PLATE VI.

15. Hackling of green hemp at the Parvati Press, Shivpur.
16. Hackling of green hemp at the Parvati Press, Shivpur.
17. Pressing Benares hemp into pucca bales at the Krishna Press, Shivpur.

## PLATE VII.

18. Sann hemp crop at Chappara.
19. Harvested crop being dried at Saliwara—Jubbulpore district.
20. Dried straw being made into bundles at Saliwara—Jubbulpore district.

## PLATE VIII.

21. Retting at Chappara—Stones indicating retting material.
22. Retting—stones indicating retting material—at Saliwara—district Jubbulpore.
23. Retted bundles being removed from water (the photograph borrowed from Mr. F. J. Plymen, Director of Agriculture, Central Provinces).

## PLATE IX.

24. Retted material—water being drained off (the photograph borrowed from Mr. F. J. Plymen, Director of Agriculture, Central Provinces).
25. Extraction of fibre at Sarkanda Farm, Bilaspur.
26. Extraction of fibre at Charaidongri, district Jubbulpore.

## PLATE X.

27. Fibre extraction and drying of fibre at Saliwara, district Jubbulpore.
28. Fibre being carried from Bergi to the Jubbulpore market.
29. Wooden hand press at Chappara.

## PLATE XI.

30. Metal hand press at Chappara.
31. Metal hand press at Keolari.

## PLATE XII.

32. The crop made into bundles for retting at Vaddiparru, East Godavari.
33. Extraction of fibre at Ubalunka, East Godavari.

## PLATE XIII.

34. Extraction of fibre at Vellicheru, East Godavari.
35. Fibre being dried at Ucheli, East Godavari.

## PLATE XIV.

36. Dry stick used for thatching the roofs of huts at Ubalunka, East Godavari.

## PLATE XV.

37. Bundles of straw being arranged in a rafter for retting at Rajapur.
38. The rafters being partially immersed at Rajapur.
39. The rafter being completely immersed—stones indicating the retting material.
40. Retting at Huttargi—Belgaum district.

## PLATE XVI.

41. Retted material being dried at Bhatwadi—Devgad.
42. Extraction of fibre at Hukeri—Belgaum district.
43. Frame for tying fibre into bundles at Rajapur.
44. Padav carrying sunn hemp from Kharepatan to Vijayadurg.

## APPENDIX XIV.

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