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MADRAS RECORD OFFICE

GOVERNMENT OF MADRAS

Revenue DEPARTMENT

G.O. No. 1176 Press

~~B.P. No.~~ ~~Mis.~~

Dated 14.9-1874 ~~196~~ .

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Form 111.

II. SECRETARIAT PERSONAL REGISTER OF

Serial number. (1)	Current number. (2)	Date of receipt by Assistant. (3)	Title. (4)	From whom. (5)	Outside number and date. (6)	Submitted to Officer. (7)

No. 144. Read the following de from ARTHUR HOWELL, Esq., Deputy-Secretary to the G ndia, Department of Revenue, Agriculture, and Commerce, ( ) to C. G. MASTER, Esq., Acting Secretary to the Govern nt of M ated Calcutta, 1st September 1874.

I AM directed to forward h with s of a summary of the information obtained from local Governments ns on the cultivation of flax and other fibre-producing plants in Ind information therein contained may tend towards the improvement or exten cultivation of these plants.

No. 145. ORDER THEREON, 14t ber 1874, No. 1,176.

Forest, No. 9. MUNICATED to the Board of Revenue the Officiating Inspector of Forests.

(Tru t.)

gned) C. G. MASTER,
Acting Secretary to Government.

To the Board of Revenue.
„ the Officiating Inspector of Forests.

Erd. F. B. Bantleman.

Govt. of India.

REVENUE.

To

THE BOARD OF REVENUE,

&c., &c., &c.

Dated September 14th.

SEPTEMBER.

Nos. 141-146.

Précis on the Cultivation of Flax and other fibre-producing Plants in India.—Communicating to Revenue Board and Officiating Inspector of Forests — received from the Government of India.

1176

THE cultivation of flax in view to the manufacture of the fibre—a subject to which the attention of Government was first directed in the beginning of the present century—after having given encouraging results during the few years when it was supported by Government, was suddenly deprived, on the ground that the experiment was no longer doubtful and did not require stimulation, of the aid which it had received, and seems at once to have dwindled into insignificance, until it was lost sight of altogether (see Mr. D'Oyly's report, paragraphs 5 and 10).

About the middle of last year, Mr. W. H. D'Oyly, Collector and Magistrate of Howrah, revived the subject, and brought forward in a report the advantages which Government might reap from the extended cultivation of flax, pointing out at the same time the national importance of India as a flax-producing country. This report was communicated to the Government of India by the Lieutenant-Governor of Bengal, with copy of a circular in which the attention of local officers was directed to the subject. His Honor remarked in this circular that he had no doubt that flax and Russian hemp (the latter growing wild in the utmost profusion about the foot of the hills) were both products to which attention should be directed in the Government model farms in Bengal, and that he believed that the cultivation of the flax plant for fibre ought to be successful in the well-watered provinces of Bengal. His Honor did not see why in Bengal, where the plant was being grown so much for seed, it should not be grown for fibre also, if only experiments were followed out with sufficient perseverance. If the cultivation could once be well started and made profitable, the Lieutenant-Governor had no doubt that the natives would not only grow but also prepare the fibre. His Honor further stated: "It should always be remembered in experimenting that flax requires a heavy soil, a rich, stiff, clayey soil—not the light soil on which so many other things grow well. Wherever experiments can be tried in advantageous circumstances, the Government will be prepared to grant assistance."

The Soane and the Cuttackdand Midnapore Canals were suggestet as likely places for the cultivation, here being some very stiff soil on the Midnapore Canal in particular.

The Government of India thanked Mr. D'Oyly for his report, and in order to

investigate the capabilities of the country in the production of flax, as also to elicit further information on the culture of the plant, the local Governments and Administrations were supplied with copies of the report for distribution to district officers, with a request for any further information which they might be able to furnish, or which might be already in the possession of the Governments and Administrations.

MYSORE.

The Chief Commissioner of Mysore was the first to report, forwarding information supplied by Colonel Boddam, in whose opinion no part of the Mysore plateau was suited for growing flax, either for fibre or linseed-oil, because it required a colder climate and more copious dews to bring it on than they have in Mysore. He also stated that he had not seen *ulsee* (the native name for flax) grown anywhere south of Nagpur;* that there it was sown at the beginning of the cold season, about November, in fields at the same time as the wheat crop, on rich black cotton soil; and that slight showers, which usually fall in that locality in November, start the crop, which is fostered by the heavy dews of that part of the country, while the cold is greater than in Mysore. He also observed that heavy rain ruins the crop, stripping off all the delicate leaves; and continued—"Knowing the value of linseed-oil for cattle fodder, I tried some two years ago in my garden; in the rains the leaves were stripped off, and the plants perished; in the cold weather it grew stunted, and after giving a few flowers died prematurely." Colonel Boddam concluded by suggesting that if an experiment were to be undertaken at the Lall Bagh, the seed should not be sown before the middle of November, to avoid the heavy rain usual in October and early in November.

* Nevertheless it is grown in Madras districts, a good way south of Nagpur.

MADRAS.

The Government of Madras submits copy of its proceedings, containing the information supplied by the Board of Revenue of that Presidency from the reports of the district officers under its control. In these proceedings more space is devoted to ganja or hemp and sunn than to flax. That portion of the communication which concerns flax is given below:—

Flax.—This plant is not cultivated in any of the districts marginally noted, and is not mentioned in the reports from Coimbatore and Tinnevelly. It is grown most extensively in Bellary* and the Kistna. Linseed-oil is extracted from the seed and used by painters as well as medicinally; the seed, not the oil, is also exported to England. The plant is not used for its fibre, but the leaves when young are used in curries.

Vizagapatam, Nellore, Madras, Tanjore, Trichinopoly, Salem, South Canara, and the Nilgiris.

* Bellary ... ... about 9,980 acres.
Kistna ... ... „ 593 „

Exports from Madras to Foreign Ports.

	1871-72.		1872-73.	
	Quantity.	Value.	Quantity.	Value.
	Cwt.	Rs.	Cwt.	Rs.
Linseed ...	1,233	6,120	1,084	5,426

The Resident at Hyderabad transmits reports by the local officers of the Assigned Districts.

The Officiating Commissioner of West Berar (Major J. G. Bell) writes:—

"In this division last year it was estimated that 162,693 acres of land were under oil-seeds, of which a large proportion may be taken to be linseed.

"An acre of good land in a good season is estimated to produce 250 seers of linseed, and the average price in 1869-70 was from Rs. 18 to Rs. 20 per candy of 540 seers. In 1872-73 the prices, it is said, rose to Rs. 65 per candy.

"Linseed is chiefly grown for the sake of oil, for the purpose of extracting which it is mixed with the kurdee seed (*Carthamus tinctorius*). The stalks of the linseed plant are thrown away or burnt, though occasionally they are used for thatching huts."

The Assistant Cotton Commissioner, East Berar, reports that the rich and loamy soils in the Purna valley will be best adapted for cultivating flax, and also such lands as are subject to inundation by the waters of the Purna and Wurdha rivers. He adds that *ulsee* is now grown on the best and cleanest lands, but that he is unable to say whether flax would pay better than *ulsee*,* and he is therefore desirous of growing some seed on an acre or two of land in the Purna valley.

The Resident states that it appears that although flax is cultivated to some extent in those districts, it is chiefly for the object of extracting oil rather than for the manufacture of fibre.

This preference of the people for the extraction of oil is attributed to the shortness of the stems, as well as the greater expense and trouble of converting them into flax as compared with hemp. The Resident states, moreover, that cotton, jowaree, and wheat are the staple products, and that so long as the ryots find these more profitable than any other, there is but little hope of flax being taken up by them willingly for more extended cultivation than at present obtains. On the receipt of our circular, a plot of land in the model farm at Akola was sown with flax by way of experiment, and a communication on the result of this trial was promised in due course. But as the farm has since been abolished, it may be inferred that the experiment came to nothing.

The Resident expresses his readiness to give effect to any general measure which

the Government of India may direct in view to the extension of the cultivation and manufacture of flax in this country.

The Government of Bombay submits a summary of information supplied by the Commissioner in Sind and the Revenue Commissioners of the Northern and Southern Divisions of that Presidency :—

BOMBAY.

In Sind, no flax is grown except in the Upper S[i]nd frontier district, where flax alone is grown to a very limited extent for local use only, th[e] zemindars making ropes from it. T[w]o acres would cover the whole area grown annually for t[he] whole district.

The Collector of Kurrachee, in 1869, obtained 11 maunds and 3 seers of linseed from Fleming & Co., and distributed it among 53 differe[nt] zemindars in the Sihwan taluk. The result was not very successful : the average produce w[as] [fi]vefold; in some cases it was thirty-one times the amount of seed. The Collector attribut[ed] failure of the crop to inattention and ignorance on the part of the zemindars, but cons[i]dered that an experiment conducted at the Hola Government farm could not but have good resul[ts].

In Belgaum and Kanara, flax is grown to a very [li]mited extent.

It is reported by the Collectors of Poona, Dharw[ar] Belgaum to be used in making cords and ropes; oil is extracted from its seed, and th[e] is turned into cakes for cattle.

Northern Division.—In this division flax is grown to a limited extent, oil being extracted from the seed for local use. But nowhere is it grown for the sake of the fibre.

The following statement shows the extent of land which was under flax during 1872-73 in certain districts of the Southern and Northern Divisions :—

District.	Flax.	
	Acres.	Guntas.
Panch Mahals	464	...
Surat	114	15
Tanna	...	...
Colaba	...	...
Nasik	6,241	...
Khandesh	18,500	6
Ahmednagar	648	10
Poona	722	31
Kaladgi	8,234	...
Dharwar	141	22
Sholapur	13,170	9
Satara	601	21

The Government of Bombay also forwarded two letters from Mr. W. F. Sinclair, C.S., Assistant Collector, Kolaba, containing his observations on the possible development of the production of flax in that Presidency and the preparation of the fibre. In acknowledging the receipt of these letters, which are given below, the Government of India expressed a hope that His Excellency the Governor in Council might find it practicable to extend some encouragement to Mr. Sinclair in carrying out the experiments he proposed to undertake.

From Mr. Sinclair, dated 9th January 1874.

* * * * * * * *

2. The flax plant (*Linum usitatissimum*) is very largely cultivated in Khandesh, and also, I believe, in Násik and Nuggur. The linseed alone is used; the fibre, which is useless as fodder, is thrown away. It is obvious that since it pays to cultivate the crop for the sake of the seed alone, a very small success in utilizing the fibre now wasted would be profitable. I may remark *aliter* that hemp also is much cultivated here without regard to the fibre, but that of our Indian variety (*Cannabis sativa, var. Indica*) has been, I believe, proved by experiment to be of little value. The contrary, I think, is the case with the flax. The plant is short and branchy, unlike the long single stem of that raised in Europe from seed chiefly furnished by Russia and Belgium. (Ireland produces no linseed; England little for agricultural purposes, the climate being unfavourable.) The Indian flax, therefore, is what cotton merchants call

short in staple; but it is not deficient in tenacity, and would be worth, if properly prepared, at least £25 per ton in the Irish market. The present lowest price is £35 to £40 per ton, so I have allowed a good margin.

3. It may be worth while to describe the Irish process of preparing flax. The plant is pulled up by the roots when the seed is nearly ripe, steeped in water for some time, and then rolled or beaten to break up the [wo]od. It is next scutched, *i.e.*, submitted to an action like that of loosely set scissor-blades, whereby the fibre is cleared of the broken refuse, called "showes." It is now "flax," and ready for the market, where it is purchased by the spinners. These, by processes which I need not describe, convert the finer sorts into "line" for the manufacture of cloth, and the coarser into "tow," which is made up into cordage and sacking. To the latter class the fibre now produced in this Presidency would belong.

4. The object which I have in view is the production of coarse "flax," *i.e.*, the article "scutched," and ready for the manufacture of tow. We require first, water; secondly, the means of breaking and scutching. These operations are performed by steam, water, or hand-power. The very transformation which I wish to effect, *viz.*, that of the production of linseed alone into a combined trade in lint and flax of inferior quality (for it has not been found possible as yet to save the seed, when the plant is plucked early to secure the finest fibre), is now going on in parts of England by means of small sets of machinery, which cost about £2,000 to set up there, and could have, I suppose, be brought into operation here under a cost of Rs. 40,000. But after a careful [in]quiry into the history of the attempt made to set up a flax trade in the Punjab, I am decidedly of opinion that the use of extensive machinery is in our case to be avoided.

5. In the Punjab, first rate machinery, skilled labour, and Riga seed were imported. The article produced was at the top of the market, but the production was insufficient to keep the machinery going. The Belfastmen got tired of waiting for profits, and the Government of advancing subsidies; the chief manager died, I think, and the whole concern rotted away, after a fashion not unfortunately outside of our own experience in industrial enterprise. The matter had been pushed too fast, and without regard to the caution of the ryot in venturing upon any new thing before he feels the ground firm under his feet.

6. Upon understanding these things, I turned my attention during my leave, which was spent in the flax districts of Ulster, to the processes of hand-beating and hand-scutching. These are chiefly performed by women; the former with the "beetle" used in cookery (which would be efficiently replaced by its Indian representative, the *musal* or rice-pestle), and sometimes, where horse-power is available, the flax is rolled in a machine exactly like our Indian *chunamchakar* or lime-mill. The hand-scutching is done with tools that any village carpenter could make out of a two-dozen claret case, and so small that I brought the most important out with me in my portmanteau. The fibre, however, is inferior to that which is machine-scutched.

7. I am certain that at a slight expense in tuition the ryots could be taught to use these tools and prepare an article saleable in Belfast and Dundee at remunerative prices; and that when at the end of a few years the trade had taken root, the time would come for the importation of seed and the erection of machinery, which could in many cases be set up in the cotton-ginning mills already in existence. No steam machinery is better fitted for use in India, because scutchers can "fire up with showes," *i.e.*, depend chiefly upon their own refuse for fuel. I should add that they are more in danger from fire than most other trades, and can seldom effect an insurance.

8. The process of production would be shortly as follows:—After pulling, the flax would be rippled, *i.e.*, stripped of its seed by hand or by pulling it through a "rippling comb," which consists of a set of iron teeth set upright in a block. The seed would then be laid out to finish ripening, and the "reed" or stalk stacked till the monsoon (flax is a rabi or cold weather crop), when it would be steeped with proper precaution against the pollution of rivers by the poisonous "flax broth" broken and scutched by the cultivators' wives, and pressed or half-pressed, like cotton, for export to Belfast or Dundee, from both of which places I have valuable assurances of interest in the matter.

9. At present the flax supply is diminishing in Ireland, from the high price of labour and the rapid conversion of arable land into pasture, which is the main feature in the phase of agricultural progress through which that country is now passing. I have the high authority of M. Emile de Laveleye for the fact that the former cause is producing a similar effect in Flanders. Of Holland I do not know. Russia produces much fair flax; Egypt some very bad and some very good. I am promised details with regard to the last-named country, and shall in the meantime be glad to answer any reference Government may please to make upon the subject, and to put my information and materials at the disposal of any officer who may feel inclined to take the matter up. I should propose the despatch of samples of this year's crop to England for examination, and the engagement of hands to teach the scutching for a couple of years.

Further letter from Mr. Sinclair.

* * * * * * *

The [te]chnical vocabulary of the flax trade is as follows :—

"Flax"—[me]ans firstly, the whole crop; secondly, the fibre after it has been scutched, in which state the spinners buy it.

"Linseed" or "seed,"—the seed.

"Reed,"—the stalk, of which the fibre is the outer part.

"Rippling,"—the separation of the seed from the reed.

"Scutching,"—the separation of the fibre from the pith.

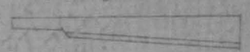
"Breaking," "rolling," or "beating" is the operation of preparing the flax for scutching, which is done either by mere pounding or by passing between rollers at a high pressure.

"Showes" are the broken refuse of pith and bad fibre which remains after scutching. In Ireland this refuse is generally used as fuel; but the [illegible]ndee men work it up into sacking, and it is also much used in making roofing-felt.

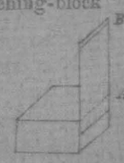
"Retting" is the steeping of the flax in w[illegible] to facilitate the separation of fibre from pith.

"Beets" are the bundles or sheaves in which [illegible] tied up for the retting.

"Scutching-handle" is a wooden tool of this [illegible]re, about 28 inches long, 4 inches wide and 1lb in wei[illegible]. It is bevelled off at the edge. One which I have br[illegible]out is at the service of any officer who cares to use it.



"Scutching-block" is a plank set up on edg[illegible]elled above at B as to correspond to the scutchin[illegible]. It is nailed to a block, stool, or table to keep it [illegible]at A. The bundle of broken flax is held in the le[illegible]r its edge, and turned and exposed to sharp drawing[illegible]e scutching-handle, which separate showes from the [illegible]e bevelled edges of the block and handle are turn[illegible]om each other during this operation.



So effective are these simple instruments that [illegible]ked by steam differ from them very little in shape or application.

I would suggest that the model farms mi[illegible] if they conveniently can, send in each six samples of 1lb a-piece, *viz.*, three of unt[illegible]ed straw and three of flax cleaned, the best way they can. A chattyfull of any water [illegible] containing lime in solution) would steep 3lb of flax very easily. A few blows of a rice [illegible]under, or passing it under a chunam-mill or garden-roller, would break it, and some pri[illegible]ive attempt might be made at scutching so small a quantity. If the model farms think the[illegible]annot manage it, and will send me the flax I will try it. The test of sufficient steeping is a [illegible]een slime which comes off easily between finger and thumb. That of sufficient dryness after steeping is the "bowing" of the fibre, *i.e.*, its beginning to separate from the reed and form loops or bights along it. It is then ready to break and scutch.

If we had these samples, they could be examined by proper authorities, and some estimate (though very rough) might be formed of the improvability of the native crop. Any particulars as to the average yield per acre of seed would be valuable, as tending to show what effect the importation of seed might have upon the oil trade.

I can, if these views meet with concurrence, at any time furnish the addresses of firms who will be glad to examine samples, or answer any further reference that may occur to Government or to any officer concerned.

PUNJAB.

The Government of the Punjab submits an abstract of the replies received from the district officers, from which it seems that flax is not cultivated in the Delhi and Gurgaon districts, while in Karnal only 17B. 10B. of land is devoted to the production of that fibrous plant, which gives a produce of 52 mds. 20 srs. The cost for preparing one biga of flax is Rs. 3; this produces 3 maunds, and the price per maund is Rs. 2-8. In 1855-56 flax was sown, but it appears that the results were far from satisfactory. The zemindars in these districts do not seem to appreciate the culture of this plant.

The Deputy Commissioners of Rohtak and Sirsa state that flax is not grown in their districts, but the former thinks that if cultivated in the lands irrigated by the Western Jumna Canal it would thrive and be profitable to the grower.

In the Umbala district, the zemindars pay very little attention to the growth of flax, but occasionally sow it along the borders of their fields; the total area so cultivated is 2,000 acres. The straw is burnt, and its ashes are used as manure. No use is made of the fibre. The height

of the plant is from 1½ to 2 feet. [illegible] seed is used as food for cattle, and the oil extracted from it serves for burning or for medicinal purposes.

In Ludhiana, a very inconsiderable quantity of flax is grown. In 1872-73, 300 acres were under cultivation, and the outturn is said to have been 1,100 maunds. In Jagraon tahsil experiments were made in 1854, but the results were not favourable.

The Deputy Commissioner of Simla says that there is no flax cultivation in his district; and the reports from Jalandhar and Hushiarpur show that this crop is grown to a very limited extent in those divisions. In Kangra, however, an area of about 4,432 acres is under cultivation, and the average produce per acre is 1 maund 21 seers 8 chittacks; but the oil extracted from the seed alone is used, both as food and medicine.

The Deputy Commissioners of Amritsar, Lahore, and Rawalpindi report that flax is not a staple of their districts, only a little being sown here and there. In Rawalpindi the plant attains the height of 3 feet, and ripens with the wheat and barley crops.

In Gujarat, flax was cultivated in 1863 on account of the Indian Flax Association of Belfast, but no notes of the produce were made.

In Jehlam, the zemindars do not consider this crop profitable; and in Shahpur it is not a favourite produce, though a little is grown for the sake of the seed, from which oil is extracted.

In Multán the cultivation of flax is hardly known, while in Jhang and Montgomery it is quite unknown.

The Deputy Commissioner of Muzaffargarh, however, reports that an experiment was tried at Alipur in 1856 with some seed supplied by Government, and that a crop of 4 maunds was obtained, which was sold at the rate of 4 annas per maund.

In Derah Ismael Khan, Derah Ghazi Khan, and Banu little or no flax is grown; but in the Peshawur district it is cultivated to a small extent, and ropes are manufactured from the fibre for domestic use.

OUDH.

The Chief Commissioner of Oudh submits copy of a memorandum drawn up by Dr. McReddie, Superintendent of the Oudh Central Jail. The practical information contained in this memorandum will render it valuable to those who may wish to undertake the cultivation of flax. It may be quoted *in extenso*.

1. Soils, and preparation of [illegible]. The finest flax is grown on deep soils, argillaceous, sandy and on the sandy clay commonly called loam.

In strong [illegible] damp soil flax will reach to a great height, but is always coarse.

On light fertile soil it is shorter, but fine and silky.

Deep ploughing is necessary, at least 11 inches. Fresh manure should not be used, but the manure, solid or liquid, added to previous crops made to answer.

Newly broken-up pasture land does well for flax.

All land must be perfectly pulverized and cleaned of all roots of every sort.

Five different ploughings are necessary with an interval of fourteen days between each, so that ploughing must begin at least two and a half months before sowing. After each ploughing, all clods must be broken up, and the ground made quite even. In fact, as flax is a *rubbee* crop, the ground on which it is to be sown should be prepared in the same way as for wheat.

If manure must be added, it should be done before or at the beginning of the rains. The manure should be spread evenly on the soil. Sheep manure should not be used.

2. Quantity of seed per acre, and how seed is sown.

2. Flax is invariably sown broadcast; when sown for good fibre it is sown thick—230 or 240lb (3 maunds) seed per acre.

When sown for inferior fibre and seed 140 or 150lb per acre will answer. It is never sown by drill.

3. Three months for sowing precautions.

3. From 15th or 20th October to the 20th November, according to season, *i.e.*, late continuance of rain, as flax will not stand much rain; hard rain soon after sowing would destroy the crop, hence the best time in Oudh would be the first week of November.

For sowing, a calm day is chosen, if possible; if wind prevail, the sower must move with the wind on his side, not on his face or back. A uniform distribution of the seed would be insured by going over the ground twice and sowing half the amount of seed each time. The sowing is not to be done as for wheat, that is, not after the plough, as it were in drills, but, as stated above, broadcast by sowers walking over the field. The progress of the sowing may be marked by a seed harrow going over the field in the line of the sower. When sown the seed is harrowed into the soil, and a light hand-roller drawn by a man is passed over it; this last operation should not be omitted. Care must be taken not to bury the seed too deep.

To get the seed to germinate quickly, it is well to sow immediately after a shower of rain.

4. What is to be done after sowing.

4. When the plants are 2 inches high, the ground must be carefully weeded. This is done by a number of men kneeling amongst the flax and carefully removing by hand all the weeds; they must work facing the wind, so that the young plants may raise themselves with greater facility. If one weeding is not sufficient, the operation must be repeated.

If not feasible earlier, the weeding must not be delayed beyond the time when the flax has obtained a height of 6 inches.

Three or four waterings, not too copious, are necessary, according to season. In fact, water as often as you water wheat.

5. Harvesting.

5. Flax must be torn up by the roots, not cut down. The harvesting is to begin *before* the seed is quite ripe. Directly the bottom leaves of the stalk begin to fall off, and the last blossoms have disappeared, the time of pulling has come. A *good test* is to cut a capsule right across, horizontally. If the seeds have changed from a milky whiteness to a green color, and are pretty firm, the time to pull has come. By not allowing the seed to ripen on the ground, a better fibre is obtained, while, at the same time, the value of the seed is not lessened; for "it is well known that most seeds, though not quite mature when gathered, ripen sufficiently after being plucked, provided that they be not detached until dry from the parent plant, all the sap which this contains contributing towards further nourishing and perfecting the seed." Pulling is done by *catching the plants by the heads* and drawing rather obliquely; a handful is taken up each time, and the root-ends of the handful are kept as even as possible. Six handfuls are made into a sheaf. The sheaves are set up slightly, inclining to and leaning against each other with the root-ends downwards, and allowed to stand for five or six days. In pulling, the long stalks are laid by themselves, and the short separately, so as not to mix good and bad flax together. When plucked as directed above, the flax must be stored away under cover for three or four weeks, and then the seed is to be thrashed out.

If, however, the grower thinks that he risks the quality of the seed by plucking before the seed has ripened, he may delay the process of plucking till the stalk is yellow up to the top, and all the leaves have fallen and the seed vessels begin to open in the sun. The plants are then to be *pulled up by the roots* and laid on the ground. Clean grassy soil answers best in not too thick rows, in order to let the sun penetrate it thoroughly. At the end of four or five days it is turned, so that the underneath plants may be dried.

Two plans of harvesting are given above; the latter probably is the one preferable in this country.

The thrashing out the seed must be done as soon as possible after harvest. Thrashing is done by striking the plants with smooth round sticks. When the capsules have been removed from the plants, the seed is to be treated with bullocks, the same as is done with wheat. After removal of the seed, the flax is to be tied up in bundles of about 6lb each; it is now ready for the process of retting or watering to be next described.

Preparation of flax for spinning. A. Retting.

A. *Steeping, retting, or watering.*—This may be done either while the flax is green immediately after the grain has been thrashed out, or, when flax of superior quality is required, the plants must be perfectly dry and at least a year old before steeping. In this country

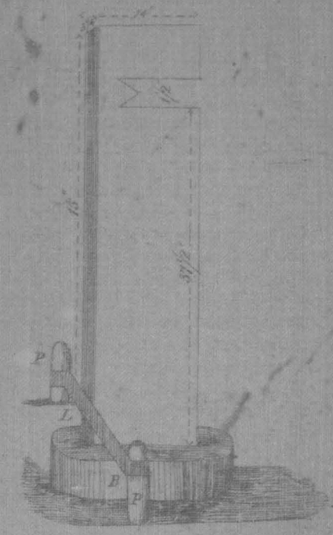
as the flax will be plucked by the end of March, it must be stacked until the rains—August—before steeping.

Steep in ponds or tanks in which rain-water has collected, or ponds may be dug during the rains 10 feet wide, 4 feet deep, and any length desirable, and rain-water allowed to fill in them. The flax tied in bundles, as previously described, is to be thrown into the ponds. The bundles or sheaves are not to have stones or weights on them, but every day each sheaf is turned with a pole to make the uppermost side change to the undermost. The water used must be pure, soft, and clear; well water generally does answer. The retting takes six or seven days, or only four, if the weather be hot.

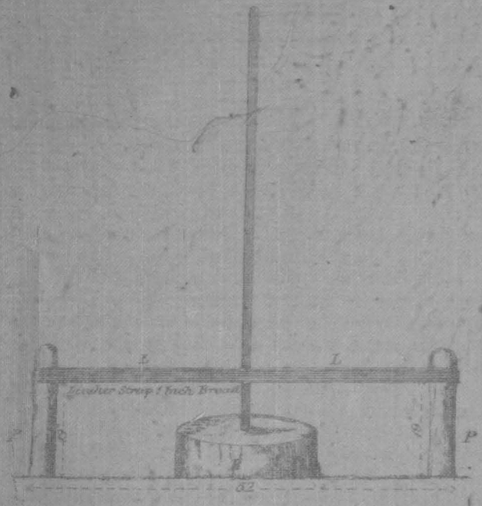
To know whether the flax has been sufficiently steeped, the following test must be applied. Crack the stalk across the root, without breaking the fibre, and draw the latter towards the head of the stem, stripping it upwards. The fibre ought to come away easily, and should, moreover, hold together in ribbons; narrow and separate fibre would indicate the steeping to have gone too far. In short, when the skin peels easily along the stalk, the flax has been sufficiently steeped. The steeping now never be entirely completed in the water. It is best to finish by the agency of the dews. The process is to be carefully watched, and requires a little experience, so as not to under or overdo it. After removal from the water, each sheaf is set on end and allowed to stand for a day or two; the sheaves are then spread out on a field, pasture land, in very thin layers, to complete by the dews the retting process. This should be continued for about fifteen days. During the time the flax is spread out, it is frequently turned in hot damp weather at least once a day. If heavy rain threaten when the flax is spread, it is gathered into conical sheaves until the weather gets fine; rain soon causes it to rot. After steeping flax should be kept five or ten months tied up in bundles, about 6lb weight each; the best qualities may be kept two or three years. When dressed (the process to be next described) immediately after steeping, it is heavy; it seems to get finer by keeping. It is stalked like a heap of grass or hay with the root ends outwards in circular fashion, with a light thatch of grass and bamboos at the top; a pucka flooring, or simply a layer of pucka bricks, will ensure safety from white-ants; of course high ground is to be selected for stacking.

B. Dressing the flax. Breaking.

B. *Breaking flax.*—The flax having been prepared for the last processes (after steeping and [illegible]), it is subjected to these either by hand or by machine. It may be broken either with wooden mallets or it may be still better subjected to the action of Brasier and Hodgkins' (Liverpool) patent "shamrook" hand-breaker. This machine will break—that is, extract—a very large proportion of the woody matter, leaving the fibre uninjured and ready for the last or scutching process. A drawing of the machine is appended.



Front View of Scutching Board.



Side View of Scutching Board.

Three men are required to work it; one to work the handles, one to feed, and one to receive the broken material. It is necessary to pass each handful of fibre twice through the rollers; one and a half maunds of fibre can be worked in one day. A machine costs at Liverpool £18. All charges included, it will cost £20 (Rs. 200) to any part of India.

The fibre is now ready to be *scutched*, or made ready for spinning by this final process. There is a scutcher attached to the breaker previously described, but I find that the scutching blades get too brittle and soon get useless by working; this may be either due to the extreme dryness of the atmosphere during the cold season in this country, or to some fault inherent in the manufacture of the blades. At all events, I found that I could not scutch by the machine. Hand-scutching

was then resorted to. A scutch is a wooden kn[illegible] inches long, 3½ inches deep, and half an inch thick, tapering to an edge. It is best m[illegible] of *seesum wood*. A *scutching board* is required on which to work the flax. This is an up[illegible] plank 51 inches high, 14 inches broad, 1¼ inch thick, firmly fixed in a solid block of wood [illegible] the height of 37½ inches from the foot is a horizontal slit 1½ inch broad. With his left [illegible]he scutcher introduces into the slit a handful or tuft of broken flax, so that it hangs [illegible]n on the side of the scutching board; with his right hand he scrapes and chops at th[illegible] with the scutch till all the remaining woody matter and all the broken pieces of fib[illegible]ve been removed. The *long fibre* left in the hand of the scutcher is the marketable [illegible]; the shorter fibre is the tow fit for packing, &c., but not for spinning into thread. [illegible] scutcher after he has learnt his work turns out 5 seers or 10lb of flax per diem.

NOTE.—This memorandum on flax cultivation [illegible] drawn up by me from, *first*, some papers given me for perusal by Mr. E. C. Bradford, who h[illegible]ain[illegible]0 for the information contained in them at the British Consulate in Brussels; *second*, fre[illegible] work [illegible] "Flax and Hemp," by Sebastian Delamer (Publishers—London: Routledge, Warne, a[illegible] Routledge). I acted strictly in accordance with the instructions given in my experimental cultivation of flax. I sowed imported (Riga) seed and country seed; of the former 300lb were used; this quantity cost, inclusive of freight, inland carriage, Rs. 90. Of country seed 20½ maunds were sown. This quantity of seed, 20 maunds and 10 seers, sowed 8 acres of land. Four acres were rented land, which was sown, ploughed, watered, &c., at my own expense. Four acres were sown for me by a talukdar. I gave him the seed; all other charges were his, and he took the seed produced, giving me the straw (fibre). The seed produce of the four acres cultivated by myself was 29 maunds, equivalent in money value to about Rs. 57. The quantity of flax produced and exported as the produce of 8 acres was only 11 maunds and 28 seers, less than half a ton (the ton being 27 maunds and 10 seers); this was valued and sold in London at £23 per ton for £9. and 12*s*. The produce of Riga seed, if sufficient in quantity, would have fetched at the rate of £29 or £30 per ton; the produce of only country seed was not worth more than £23 per ton.

		Rs.	As.	P.
The experimental cost	...	663	0	0
The return was	...	253*	0	0
Loss	...	410	0	0

The rail carriage from Hurdui to Bombay was Rs. 37-14, or about Rs. 70 per ton. Freight from Bombay to England is from £2 10*s*. to £3 10*s*. per ton, according to season. There are besides charges for pressing into bales, inland charges on landing in England, &c. The produce of 8 acres, if all the seed had been imported, would have been 2 tons, which would have fetched a higher net value in England; but as a set-off against this, there would be the higher price paid for imported seeds (*i.e.*, country seed is from Rs. 2-4 to Rs. 2-8 per maund; 300lb. Riga seed cost Rs. 90, or at the rate of nearly Rs. 30 per maund), and of course increased carriage and freight on the larger quantity. The linseed as ordinarily sown and plucked by natives is *useless* for fibre, *i.e.*, from which to extract flax fit for spinning. It makes good *tow*, which, if it could by *machinery* be utilized for ropes and canvas, might, I think, prove of great value. Nor do I think pure country seed, even sown thickly in order to make the plant rise to a good height, of much value. I sowed in good land, carefully attended to all the processes, but still the plants did not obtain a height of more than 19 or 20 inches; the plants from Riga seed were 2 feet 6 inches to 3 feet. The length of flax is of great importance, hence I believe that the flax from country seed will never be of any commercial value in *England*. What may be still worth trying is to import sufficient seed to sow about 50 or 100 acres of good land; part of the land to be sown for fibre, part only for seed; then in the next season to sow a larger area with acclimatized seed, that is, seed the produce of the previous year's importation. The straw of two years' sowings may be worked into fibre, but not by manual labor. Machinery and steam-power are necessary, as a matter of economy, on the long run. The machinery are simple and not expensive, and I think it would be worth the while of a capitalist to try the experiment as indicated above.

The Chief Commissioner does not afford any information as to the present state of flax culture in the province under his administration.

The Government of the North-Western Provinces forwards copy of a letter from the Superintendent of the Botanical Gardens at Saharunpore, in which Dr. Jameson

NORTH-WESTERN PROVINCES.

		Rs.	As.	P.
* Seed	...	57	0	0
Flax	...	96	0	0
Sale of machine at half cost	...	100	0	0
Total	...	253	0	0

gives an account of the endeavours made up to 1861, in February of which year the letter was written, to extend the cultivation of flax in those provinces, relates how those trials proved fruitless, shows the causes of the failure, and suggests the means which should, in his opinion, be adopted to ensure a lasting and profitable extension of the cultivation of the plant. The letter is appended.

No. 98, dated Sah[illegible]pur, the 15th February 1861.

From—Surgeon Major W. JAME[illegible]N, *Supdt. of Botanical Gardens, Saharunpur,*

To—*The Under Secretary to the Government of the North-Western Provinces.*

BEFORE replying to your letter No. 1472A., dated 22nd October last, with enclosures, I deemed it necessary to examine what had been done regarding the cultivation of flax in India, and particularly in the Punjab, preparatory to submitting a full and detailed report. To do this I found would only be going over a subject which had been fully investigated and exhausted by the late Dr. Royle in his work styled the "Fibrous Plants of India," and by Mr. Cope in a paper lately published in the Journal of the Agricultural and Horticultural Society of India, Part I, Vol. XI of 1859.

2. In these two publications full details will be found regarding all the experiments made in flax cultivation throughout the country.

3. In the Punjab the subject had been taken up with energy and activity, and good results had been gained. But in my late tour I ascertained that in almost every district where the plant had been cultivated, unless that of Sealkote, it had been discontinued; the experiment therefore so successfully begun was too prematurely abandoned.

4. No doubt the question that flax fibre can be raised in the Punjab fitted for the home market has been solved, and has thus passed from speculation to fact. But still, as far as the natives of the country are concerned, nothing has yet resulted. The cultivation, instead of extending, has diminished, and had not the Deputy Commissioner of Sealkote taken up the subject with energy and activity, the experiment would have been fruitless, or, as remarked by Mr. Cope, would have died out in the Punjab from sheer inanition, and that too originating in three causes—want of perseverance on the part of the local Government; second, want of enterprise on the part of British manufacturers; and third, want of activity, energy, and interest on the part of the native cultivators in the welfare and progress of the country.

5. In a country like India, Government, when desirous of introducing a new product, or of rendering an old one, by a process of cultivation unpractised, valuable in the arts, must take the initiative, in order to overcome the prejudices of the ignorant, indolent, and slothful cultivators. There is no active and energetic middle class to direct and encourage the labours of the native farmers, and it is a well-known fact that even in Britain there is no class more difficult to persuade to adopt new and improved processes of cultivation and new ideas regarding farming than agriculturists; and had not the policy lately introduced opened up the country to free trade, the old and routine system of cultivating the land would have by thousands been continued to this day in Britain.

6. The British farmer is now compelled by the free importation of grain to resort to high and scientific cultivation and the best manures in order to enable him to hold his own.

7. Mr. Mechi and others, through means of their private experimental farms, have shewn to their tenants and tenant-farmers how to maintain their position, even though the British markets be extensively supplied with untaxed bread stuff from abroad. In this country such spirited individuals are unknown, and therefore anything to be introduced for its improvement must, I respectfully beg to state, be initiated by Government. The system at present followed by native farmers in cultivating flax for its seed is miserable in the extreme; the showe or straw from whence the fibre is obtained being only used as fuel, or broken up and mixed with other substances and given to cattle. Let natives be shown that substantial advantages would occur to them by cultivating the flax properly, and that good marketable fibre can be obtained from it, for which there is always a ready and immense market, and I doubt not but they would soon take to the cultivation. But though the cultivation in the Punjab has in most places retrograded, yet still beneficial results have ensued from the experiment instituted by Government, which may ultimately be of immense importance to the country.

8. By the exertions of Mr. D. MacLeod and others the experiment was prominently brought to the notice of the flax manufacturers in Britain, where for years the supply of flax from home cultivation and foreign importation has been far short of the demand, and samples of the fibre laid before them, which were pronounced worth £55 per ton; and so satisfied were they by the specimens exhibited that the Punjab was fitted to grow flax suited to the home market, that they formed a company, an "Indian Flax Company, Limited, of the Punjab," in order to carry it on, and their agent, Mr. Wightman, has now settled in the Sealkote district, and has commenced operations. By him advances have been made to zemindars to cultivate flax, which they will repay him back in kind. He too has distributed acclimated seeds, and has

applied to me for a large supply to extend his operations, which, however, I cannot meet. Land of his own he has none, and he is therefore entirely dependent on native cultivators. The system introduced is an admirable one, and will continue to be so as long as the company consider the interests of the native cultivators as well as their own, or in other words, give him a fair remuneration for his labour. If this be done, and if the superintendence be confined to advice in the manner of cultivating the plant, properly and preparing the fibre, and the distribution of acclimated seeds, and, above all, in a merely acquired country like the Punjab, where the inhabitants look to the district officers as their best advisers, if the countenance of Government through their district officers be continued, flax cultivation will rapidly spread, and the fibre become an important article of exportation.

9. But the as yet small success gained in the Punjab is not, in my humble opinion, sufficient to stimulate private enterprise to seek a field for operations in the North-Western Provinces.

10. The services of Mr. Cope are not available, or if they were, they could only be procured at a rate which Government would not be prepared to meet. By him extensive mercantile transactions are carried on at Umritsur, and thus his time is fully occupied; nor is he acquainted with the methods of preparing flax.

11. To grow the plant assistance is not required. This we can do. What are wanted are, 1st, good scutchers and hecklers—men intimately acquainted with the processes of manufacture, and fitted to teach the natives of the country; 2nd, the best kind of machinery used in preparing flax; 3rd, a large supply of acclimated seeds; 4th, the directions for the proper management of the flax crop, compiled by the Committee of the Royal Society for the promotion and improvement of the growth of Flax in Ireland, with a few alterations and modifications to suit the climate of the North-Western Provinces, might be translated into Hindee, printed, and distributed to native cultivators through district officers with much advantage.

12. In the works alluded to all the information required on flax cultivation is to be found. The Agricultural and Horticultural Society of Calcutta, by publishing the most important information to be found in the reports and transactions of the "Royal Society for the promotion and improvement of the growth of Flax in Ireland," have done all that is required to popularise the cultivation, so far as that can be done by the press, and in Dr. Royle's work on the fibrous plants of India the cultivator will find the same information condensed. To him, therefore, I would recommend this work as a text-book.

13. Prizes have already been offered by the Punjab Government for the best samples of prepared fibre, and for the largest quantity of land brought under cultivation with flax, but with no beneficial results, as they remain unclaimed by any one. Such an inducement held out appears to be of doubtful utility, though it might with much advantage be done on a small scale by district officers.

14. In the magnificent system of canal irrigation, the North-West Provinces has the means for flax cultivation far superior to that possessed by the Punjab, and to encourage it, therefore, and meet the demands for acclimated seeds on an extensive scale, I would respectfully recommend that an experimental farm of from 50 to 60 acres be formed in the Saharunpore district, adjoining the garden, where irrigated land can be procured at a reasonable rate, that the incidental expenses, such as land rent, water, &c., be met by the sale of the seeds, a certain quantity being reserved for district officers for distribution to zemindars.

That if European instructors from regiments be available in this country, two men be obtained from the ranks of any regiment for a short time to prepare the fibre, and teach natives how to scutch and heckle. That the fibre be sold when prepared to meet the wages of the parties who prepare it, a large sample being reserved for exportation and examination by British manufacturers. That acclimated seeds be given to district officers, particularly those whose districts are in part irrigated by canals, to distribute to zemindars. That zemindars repay in kind with the showe or straw the value of the seeds received, and that small rewards, such as those distributed by the Deputy Commissioner of Sealkote, be given to such cultivators as present the best samples of flax plants for scutching. These rewards were received with the greatest satisfaction by cultivators of Sealkote, as they were distributed publicly to the recipient by their own district officers.

15. For the plants raised by zemindars, and fitted for preparing fibre, there might at first be difficulty in procuring a market.

The finest samples, however, might with advantage be purchased by Government, and from them fibre prepared for the market as an encouragement to the best cultivators. This of course could only be done to a limited extent. But when the field became extensive, it would be high time for Government to discontinue the experiment and hand it over to private capitalists. But the seeds alone would ensure the zemindars against any loss. In fact, he would only be doing, though with better seeds, what he is now doing; flax of inferior quality and quite unfitted for preparing fibre being cultivated everywhere.

16. In the Punjab both Mr. Wightman and Mr. Cope are prepared to purchase all fibre of good quality, and were it shewn that flax capable of producing good fibre could be grown in the North-West Provinces, capital and funds to work it would no doubt be forthcoming to take it up.

17. To do this it would be necessary to import some good seed from Courland and Livonia, and from which all the best Dutch seeds are forwarded. To the acre about 2 bushels or 1½ maunds are required. I would therefore recommend that a ton or 28 maunds

be imported, which, with the acclim[illegible]me to cultivate 50 acres of land, an[illegible]d which will be available this season, would enable extent to spread the seed over the coun[illegible]

18. When the Honorable the Li[illegible]ant-Governor visited the garden last season, he saw two fields under cultivation with flax, [illegible]with Russian seed, the other with indigenous seed, and the plants of the former from 3½ t[illegible]feet and the latter only from 2 to 2½ feet in height.

19. From the former seed a supply was [illegible]t to Mr. Cope, then Secretary to the Agricultural and Horticultural Society of Lahore, and fro[illegible]it dates the commencement of the experiment of flax cultivation in the Punjab.

The Government of the North-Western Provinces also submits a communication received from the local Board of Revenue, giving the results of the enquiries made by it as to the actual extent of the cultivation in those provinces. The substance of the papers forwarded is extracted below:—

* * * * * * * *

The broad results of the enquiries which [illegible]ve been made in regard to flax are these—

Flax (*Linum usitatissimum*) is not cultivated for fibre.

The Commissioner of Allahabad has suggested that the richness of soil and large outlay required for the production of good flax fibre form an effectual bar to the successful cultivation of the plant for this purpose at anything like a moderate price. This statement traverses the conclusions drawn in Mr. D'Oyly's report, but is supported by the fact that the cultivation of flax for fibre has been abandoned. It appears to the Board that the exhausting effect of flax on the soil should not be overlooked, and that first experiments cannot be accepted as a crucial test.

The Board recommend that a series of careful experiments should be instituted on a small area on the Bulandshahr Farm, both on ordinary land and on highly cultivated and manured land. The experiments, if carefully conducted, would prove whether flax could be profitably cultivated for fibre, and set the question at rest as regards the North-Western Provinces.

The Collector of Bulandshahr is the only officer who gives a circumstantial account of the cultivation of flax for fibre; but although he names the plant *Linum usitatissimum*, it appears to be improbable from his description that the plant is really flax. It is more probably *Hibiscus cannabinus*, which is grown precisely under the circumstances named, and the cultivation of which is as universally admitted as that of *Linum usitatissimum* is denied. The absence of any mention of *Hibiscus cannabinus* confirms this assumption.

Note by G. H. M. Ricketts, Esq., C.B., *Commissioner of Allahabad, dated the 18th December* 1873.

A little flax is grown in a few parts of the division for local consumption, for oil and cake. It is hardly ever grown as a field crop, but only in a row drilled in every here and there on the edge of a field, or in furrows 10 or 12 feet apart in wheat crops. The only soil suitable for flax in this division is a porous black soil, very like cotton soil, found only near the course of the Jumna.

Regarding the cultivation of flax, I can say that a great effort was made during the Russian war to introduce the cultivation of flax into the Punjab: good flax was grown with a long fibre fit for export to England for manufacturing purposes, but it was established that flax to be good requires a great deal of water, good soil, and plenty of manure, and that it is a very exhausting crop. These were obstacles to the extension of the cultivation, which can only be got over (as in the case of cotton a few years ago) by great demand at high prices, and a certain market, not a remote sea-port, of which the cultivators have never heard, but in the markets in their neighbourhood, to which they are accustomed to resort.

The native cultivator has no notion of growing flax for the sake of the fibre. It is only grown for seed. The same plant cannot produce both fibre and seed. If required for fibre, it must be forced in its growth with water and manure, be planted thick, and cut before the stalk gets hard, that is, before the seed begins to ripen.

When grown for seed, the plant is sown in drills far apart, and is preferred short in the stem, so short that the same plant could not produce fibre of a sufficient length to be of any use.

Central Provinces.

The Chief Commissioner of the Central Provinces reports that flax is cultivated exclusively for its seed, and that it is always short and bushy, seldom exceeding one foot in height.

Captain MacDougall, Honorary Secretary of the Nagpur Agricultural and Horticultural Society, says that wherever the plant

is raised in that locality, thick, indeed immoderately thick sowing is the rule, which is the reverse of the practice in North India, and that the exception will only be met with at headlands of fields, where the individual plant having air and room tillers out and becomes bushy.

"Again," he continues, "the inference to be gained from Mr. D'Oyly's wish to see thick sowing followed in order to gain fibre, namely, that the plant will run tall and thin, is refuted by the habit of the plant, as seen in our fields. Nowhere does the present system of thick sowing produce plants more than a foot in height with perhaps 5 or 6 seed capsules."

Captain MacDougall, moreover, differs from all the opinions expressed as to the kind of soil which is most suitable to the growth of flax. He observes that it is plain that there is a great want in the plants grown in the Central Provinces of that woody tissue (*Pleurenchyma*) which constitutes the strength of the bark, the portion from which the flax would be scutched; and he attributes the want of this tissue to the plant being grown in the stiff black clay of the cotton soil, which, unless well stirred up and rendered friable, would prevent its roots permeating downwards into the sub-soil and there gathering nourishment. He also gives another reason, *viz.*, that the plant is solely treated as a *rubbee* crop instead of as a late *khureef* one. "Treated as a *rubbee* crop," he argues, "the plant has not as good a chance of nourishment as a late *khureef* crop would ensure. If during the cold weather there are heavy dews and occasional sharp showers of rain, such as sometimes fall about the Dewali and Christmas, the crop gains something; but still this is hardly sufficient, for the soil does not absorb the quantity of water thus given to any great depth, and the roots (unless it is a good free soil) have still to struggle hard to get downward to meet the moisture stored up in the sub-soil. The result of the present system of cultivation is that the roots, from want of a nice, light, and free bed remain near the upper surface, and the life of the plant never exceeds four and a half months."

In order to gain a satisfactory result, this is what should, in Captain MacDougall's opinion, be done:—"If patient attempts are persistently made year by year to change the habit of the plant, and we could succeed in sowing it on well-ploughed and manured land in August with its life prolonged to February, I feel confident we should find a marked improvement both in flax and seed-bearing properties."

Captain MacDougall cannot quite see the cause of the alarm as to the effects of thin sowing expressed by Mr. D'Oyly in paragraph 4 of his report; and he says that a plant can tiller and yet give shoots. He compares the flax-producing plant to wheat, and observes that a single seed of the latter sown in good soil will give five and six (if not more) stalks, each of equal length, strength, and productiveness.

The Chief Commissioner, referring to the allusion made by Mr. D'Oyly in paragraph 13 of his report to certain experiments made by Mr. J. B. Williams in the Jabalpore District, says that they have been discontinued, and practically they did not result in much. This gentleman, it seems, who for many years was in charge of the Thuggy School of Industry in that district, prepared the fibre, but had no idea of its commercial value. His fibre attracted notice in Calcutta, thanks to his having to send some valuable glass-ware to the care of Messrs. Colvin, Cowie, & Co., which he packed with this fibre. It appears that Mr. Williams even received orders from a Calcutta firm to supply any quantity he could. But no account is given as to the particular manner in which these plants were cultivated, nor is it stated what the length of the flax was when prepared. Mr. Williams' business was subsequently purchased by Messrs. Maclean & Warwick, but it is not known whether this new firm still carries it on.

An ex-partner of Mr. Williams (a native) writes that the "gundy sunn" produced in Jabalpore used to be purchased by them in co-partnership and forwarded to Calcutta, and that sometimes a little used to be shipped to England.

British Burma.

The Chief Commissioner of British Burma reported that there was practically no flax cultivation in that province, but that it was grown to a very small extent here and there for the seed, and to a larger extent in Upper Burma. He asked for seed, so that he might be able to endeavour to introduce the cultivation of the plant into the province.

The request was complied with. Twelve maunds of good selected seed, purchased through Messrs. Moran & Co., were sent to him on the 6th instant, and it was suggested to him that he should try the experiment in four different localities, an acre being cultivated in each; that the ground should be selected at once, and properly prepared for the reception of the seed before the commencement of the sowing season, care being taken that the cultivation is conducted under such ordi-

nately favorable conditions as attend the growth of a crop by a cultivator interested in its success. He was also asked to note the cost of cultivation, and to submit a full report of the results of the experiment in due course.

A pound of flax seed imported from Melbourne was obtained from the Agricultural and Horticultural Society of India, and was also sent to him for trial in the garden of the local Society or in some other suitable locality, the result of the cultivation being compared with that of the indigenous seed.

From the foregoing summary it may be concluded that the damp soils of Bengal and Burma—in fact, that all the low lands of the Lower Provinces, including Behar and Orissa, as well as Upper and Lower Burma—are the best localities for the production of good flax, the Central Provinces ranking next to these.

A copy of this précis, together with a copy of the reports received from the local Governments and Administrations, may perhaps be sent to the Government of Bengal for communication to Mr. D'Oyly and embodiment in a revised edition of his report.

L. L., 28-7-74.

Nos. $\frac{7}{197\text{-}207}$ dated 2nd September 1873.

MADRAS.

* About 1,100 acres under sunn and *Hibiscus cannabinus*.

About 500 acres under sunn in each of the four following districts—Ganjam, Kistna, Nellore, Bellary—and 350 in Tinnevelly.

Supplementary Précis of information concerning Hemp, Sunn, &c.

THE Government of Bengal having, previous to the issue of the circular from this Department, addressed the Governments of Madras, Bombay, the North-Western Provinces, and Punjab with a view to obtain some information on the production of the fibrous plants grown in the provinces under their administration, these Governments, in replying to our circular, have also forwarded the information which they had already collected for Bengal. The portion of their reports relating to the cultivation of flax has already been embodied in the précis called for by the Under Secretary; and this separate note will show what information is available with regard to other fibre-producing plants.

In the Madras Presidency, the following plants are grown :—

1*st*.—Hemp (*Cannabis sativa*), which is called in Tamil *ganjah*, and in Telúgú *ganjai*.

2*nd*.—Sunn (*Crotalaria juncea*), in Tamil *janappunar*, Telúgú *jannuran*.

There is another cordage plant very common in the northern districts and in parts of the south, *viz*., the *Hibiscus cannabinus* (Tamil *pulicchinar*, Telugu *gogu*), which some Collectors in their reports have mistaken for flax, and have so described.

Each of these plants may now be noticed separately.

Hemp.—This plant is grown in most districts in small quantities, and generally in backyards. It is extensively cultivated in Jaipur, and in Coimbatore is said to grow wild.

It is used for its narcotic and medicinal properties, but never for its fibre. It is prepared so as to be either smoked, eaten, or drunk, and the use of it is said to conduce to madness. The Collector of Cuddapah reports that the seeds and leaves of the plant are not used, but that the flowers are mixed with tobacco and opium and smoked. The Collector of Tanjore mentions that the part of the plant to be used is dried and then reduced to powder, but does not say which part is used.

Sunn.—This plant is grown to some extent in every district, and largely in Coimbatore.* It is used chiefly for fodder and for its fibre, which is much esteemed for making gunnies, ropes, and nets, and is very strong. Oil is sometimes extracted from the seed. The Collector of Tinnevelly thus describes the process by which the fibre is detached from the stem :—

"When cut the plant is steeped in water for some days, and the bark is then stripped

up the stalks, and allowed to dry in the sun, still adhering to the ends of the stalks. The bark is then beaten on stones in water several times, and eventually twisted into hanks for sale."

The fibre, however, cannot compete in length and cheapness, with Bengal hemp, which is consequently imported in large quantities at Tuticorin, and used in preference to the article manufactured on the spot. The stalks of the plant are used for thatching. On the Neilgherry hills the plant is reported to grow wild, and is used to a limited extent by the hill tribes for its fibre. In South Canara it is grown on the river banks periodically inundated by the monsoon, no care being bestowed on its cultivation.

In a memorandum† on the cultivation of sunn in the Godavery district by Mr. Sullivan, he states that the plant is cultivated for its fibre, for seed, and as fodder for cattle, the mode of cultivation varying according to the purpose for which it is destined. For fibre it is sown in June and July, and harvested by being rooted up three months afterwards. The stalks are tied in bundles and allowed to rot in pools for five or six days, after which the fibre can be easily separated. The produce is estimated at 500lb of fibre per acre from 20 seers of seed. Cultivation is carried on in November and December, but the yield at that season is estimated at one-half only, as compared with cultivation in June and July. When fodder is the object aimed at, the seed is mixed with varagoo in the proportion of one to five, and after the varagoo is reaped in February, cattle are turned in to graze down the varagoo straw and the sunn fodder. In the three preceding cases the crop is dependent solely on rainfall. A fourth method is described, where the cultivation of the plant serves two purposes, it produces fodder, and is a corrective to the "sourness" arising from the effects of stagnant water in irrigated rice-fields. In this case it is sown broadcast in November and December, 10 seers to an acre; it is trampled in by the reapers, and produces a fine crop of fodder in two months.

Hibiscus cannabinus (mistaken by many Collectors for flax) is common, and makes good fibre for ropes and gunnies, but is inferior to sunn; it grows from 6 to 8 feet high, with a straight reed-like stem, and bears flowers closely resembling the flower of the cotton plant—pale straw colour, with a dark eye.

An experiment was made by Colonel Benson with some New Zealand flax

nium tenax), but it appears that the ...aid not germinate, and the experiment ...sequently proved a complete failure.

...n the Kurrachee district, during the ... year 85 acres of land were under ... cultivation. This fibre is used solely ...king ropes, while the hemp plant in ... district is utilized in the manufac... of bhang, churrus, ganjah, and majoom. ...n the Hyderabad district, hemp is ...ivated solely for the manufacture of ...ja, which is used exclusively as an in...icating drink. A small experiment ...s tried in 1872-73 with the sunn plant, ... the result does not appear to have been ...cessful. It is now chiefly grown around ...lds containing cereals.

...In the Shikarpur, Belgaum, and Kanara ...icts, sunn is cultivated to a very ...ted extent.

...he Collector of Rutnagiri reports that ... extent to which this plant is annually ...n in his district is 1,960 candies, valued ...s. 80,255. Ropes, string, twine, nets ...shing, and gunny-bags are made from ... fibre, and the seed is used for the extraction of oil.

In the Northern Division of the Bombay Presidency, hemp is grown to a limited extent, chiefly for making ropes, thread for gunny-bags and sacks, and the drug (ganjah) which is fabricated from this plant is used as an intoxicating drink; while the oil extracted from the seed is retained in the district for local use.

The following statement shows the extent of land which was under hemp and sunn during 1872-73 in certain districts of the Northern and Southern Divisions:—

District.	Sunn.				Hemp.				Gania.				Abelmi.	
	Acres.	Guntas.	Acres.	Guntas.	Acres.	Guntas.	Acres.	Guntas.	Acres.	Guntas.	Acres.	Guntas.	Acres.	Guntas.
Panch Mahals	...	...	...	...	993	...	...	...	...	...	...	...	...	...
Surat	1,847	...	8	...	...	...	17	...	...	39	...	...	...	13
Tanna	...	...	...	...	1,152	6	...	...	...	...	...	...	807	...
Colaba	351	...	31	...	...	...	...	...	...	...	...	...	...	...
Nasik	...	...	...	...	865	...	...	...	...	...	...	...	...	...
Khandesh	399	...	26	...	...	0	68	...	18	...	...	...	...	...
Ahmednagar	34	...	...	...	...	...	348	...	23	...	...	...	...	...
Poona	...	...	...	...	...	...	13	...	...	...	...	...	7,959	...
Kaladgi	24	...	...	...	...	...	...	...	...	...	...	...	966	...
Dharwar	1,071	18	...	...	...	...	105	...	...	...	...	...	...	...
Sholapur	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Satara	...	...	...	...	...	...	...	...	...	...	...	...	...	...

PUNJAB.

The Deputy Commissioner of Hissar ports that the cultivation of sunn als is carried on, and that very partially. It sown in the months of July or August, an is generally planted on *dakar* or *rambi* lan under the influence of canal irrigation. T seed is sown broadcast by hand, and ve rarely along the borders of fields; the lan is not prepared in any way beforehand beyond ploughing. The annual cost of cultivation is Rs. 20 per biga, and the yield per biga is estimated at Rs. 40. The annual produce of sunn in this district is reckoned at not more than 300 maunds. The fibre is used in making ropes and twine, being much stronger and more durable than *munj* ropes.

He also mentions *put-sunn* as occasionally grown in the canal villages. It is sown in borders round *jowar* and *mo* the cost of its cultivation is half that sunn, and the yield also half. It sel cheaper, and is used for the same purpo as sunn, but the fibre is not considered strong.

The two notes quoted below give all the information available on the sunns and put-sunns of these provinces:—

NORTH-WESTERN PROVINCES.

Memorandum on some of the fibre-bearing plants of the North-Western Provinces, by DR. W. JAMISON.

THE plants cultivated for their fibre in the North-Western Provinces, and which take the place of the jutes of Bengal, are different species of sunns, put-sunns, and sunnee, which belong to the genera *Hibiscus* and *Crotalarea*. Much confusion exists in the native names, as in some districts the name sunn is applied to the produce of the *Hibiscus cannabinus*, and in others the same name is given to the fibre of the *Crotalarea juncea*. These two fibre-bearing plants take the place of the jutes of Bengal,—*Corchorus olitarius* and *Capsularis*—which are nowhere cultivated in Upper India. Nor are the sunns or sunnees cultivated in large quantity. The former is generally found forming boundaries to grain or other crops cultivated during the rains. The plant grows to a height of from 7 to 8 feet, and the fibre is easily removed after steeping the plant in water for three or four days. The fibre is of a greyish-white colour, and of a fine silky texture, and is equal in strength to the jutes of Bengal. The sunnees sometimes form field crops, or are grown in a similar manner to the sunns. The fibre too is prepared in a similar manner, and is stronger than the sunn, but it has not its fine silky texture. It is chiefly used for making ropes and tat puttees, a strong cloth used in packing cereals, cotton, &c. The species met with in the North-Western Provinces is the *Crotalarea juncea*. In the Central Provinces the sunnee or hemp is the produce of the *Crotalarea tenuifolia*. It is of great strength, and much used in making coarse cloth, also for packing purposes.

In the plains of the North-Western Provinces, the true hemp plant (*Cannabis sativa*) is met with, but nowhere is the fibre used, it being extensively cultivated for its leaves and young stalks, which are used in large quantities for smoking or in making an intoxicating drink, known under the names of bhang, sidhee, or subjee. The dried flowered plant, from which the resin has not been removed, is known under the name of gunjah. In Kumaon and Gurhwal the hemp plant, *Cannabis sativa*, is extensively cultivated both for its fibre* and resin, the former being considered far superior in strength to the Russian hemp.

* The Commissioner, Kumaon, however, states that only a small quantity is grown for local consumption.

The sunns and put-sunns of the North-Western Provinces are well worthy of attention, as they are superior to the jutes of Bengal, which now form an extensive export trade.

Note by E. C. BUCK, Esq., *Officiating Secretary to the Board of Revenue, North-Western Provinces.*

THE information supplied by Dr. Jameson agrees with my experience in the Cawnpur and Furruckabad Districts.

Put-sunn (*Hibiscus cannabinus*) is universally grown usually round the edge of a cane-field, or mixed with cotton in well-manured fields.

Sunn (*Crotalarea juncea*) is grown less universally, and was noticed by me to be most prevalent in soils of a silicious character.

From the information collected by Mr. Evans, Assistant Settlement Officer of Cawnpur, it appears probable that a second kind of *Crotalarea* is grown, perhaps the *Crotalarea tenuifolia* of the Central Provinces; but the questio requires further enquiry, which Mr. Evans has been asked to make. I doubt if any app quantity of North-Western fibre is grown for exportation. When a demand was lately m fibre to be exported to Bengal, it was found that very small quantities were procurable local markets.

It is sold at a higher price than Bengal e, although the fibre does not appear to me to be so good. But I am hardly qualified to p nounce an opinion on this subject.

Mr. Evans, Assistant Settlement Offic of Cawnpur, has drawn up a note on the cultivation in the Cawnpur district of sunn (*C alarea*) and put-sunn (*Hibiscus*), which is also appended.

Note by Mr. EVANS, *Assistant Settlemen fficer of Cawnpur, on the cultivation of sunn and t-sunn.*

Crotalarea, sunn or sannai (both nam s used for the same plant), is generally sown in a small patch by itself, or in a strip of gr nd along the edge of a jowar or cotton-field, but not as a mere border, as is done with put-sun It requires manure, and though not necessarily manured for that crop, the field is al ays e that was at any rate manured last year. It is sown very thickly, about some 50 seer a ere being used. At the first fall of rain the ground is ploughed twice, and the seed on as possible. If the rains are fairly regular, and do not clear off too soon, nothing eeded. If, however, the rain stop early, it becomes necessary to water the crop, whi h is way may be watered once or twice.

There are two kinds of "sunn" called aila and Katika, from the different times at which they ripen: they are sown at the same me, and are cultivated in all respects exactly in the same way. The former, Bhadalia, ripe Bhadon (August and September); the latter, Katika, a month later in Koar. The seeds somewhat different: the Bhadalia seed being greyish, while the Katika seed is black; t latter too is about 25 per cent. cheaper than the former. When cut, the tops are lopped and ven to the cattle for fodder, and any seed that has ripened is picked off, the stalks are b nd up in bundles, and left to soak in the nearest pond. It takes about four or five days thoro hly to rot them, the process taking longer if the weather is cold than if it is hot. When t stalks are ready, they are taken out and placed in the sun for a day, after which the fibre (called "sunn") is separated from the dry wood (called "silla"). The fibre is either separated by being torn off with the hand, or by being trodden out by cattle, as in threshing. Both kinds of sunn are worked up in the same way. The Bhadaila plant is generally shorter than the other, but not necessarily so; there is very little difference in the fibre; the Bhadaila is somewhat stronger and finer than the Katika, but the two are hardly distinguishable by any ordinary person; they are both used for exactly the same purposes—ropes, nets, and matting.

Put-sunn is only grown on the borders of fields, never by itself. It is sown with sugarcane in Chet, or with cotton and jowar in Assarh. In the former case it ripens by the middle of Koar, in the latter not until Katik. The stalks, when cut, require soaking from 12 to 15 days, or more than twice as long as sunn. When taken from the water, it is partly dried, and the fibres separated from the dry wood by the hand; the fibre is used for making ropes, but cannot be woven into matting. It is a much weaker fibre than sunn, and of much smaller value and use. The seed is quite different from that of sunn, and the plant also is quite different.

Hibiscus cannabinus.

BERAR.

Besides the above reports, drawn up with reference to a call from the Government of Bengal, the Assistant Cotton Commissioner, East Berar, and the Chief Commissioner of British Burma, in their letters replying to the circular of this Department on flax, notice some of the other fibre-producing plants, information on which is embodied in this précis; and the passages which relate to them may be extracted.

The Assistant Cotton Commissioner states that hemp is grown everywhere in East Berar, and that it thrives on low lands which retain moisture and contain limestone; but too black or too light soil does not suit the growth of hemp. Sone tág is cultivated by itself in separate fields; about 700 or 800 acres are planted with it yearly throughout the district. The average cost

of cultivation per acre, including cost of preparing the fibre, is about Rs. 22-8; the produce per acre is $3\frac{3}{4}$ maunds, or 300lb of fibre, of which the market value is Rs 30 (for $3\frac{3}{4}$ maunds). The seed is sown in June, and the crop cut in December.

The fibre is capable of being manu tured into linen, but the people only m cord and *tat-puttee* from it. Whate is produced is consumed in the distri and generally in the locality where grow

In the report furnished by the Chie Commissioner of British Burma mentio is made of the *Crotalaria juncea* as being well known to the Burmese. It appear that this plant grows like a weed, not on in Tavoy and Merguí, but in Myanoun Prome, and Sandoway; and the Agricu tural and Horticultural Society of th province believe that it will probably found in other localities as well.

Mr. Fowle had the plant growing to fection on his land north of the lakes* or three years ago. A quantity of s sown in the Society's garden grew fin the plants attaining an average hei of 8 feet, and yielding excellent s white, silky fibre.

L. L., 3-8-74.

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1874.

GOVERNMENT OF INDIA.

DEPARTMENT OF REVENUE, AGRICULTURE AND COMMERCE.

FIBRES and SILK.

1276

Summary of information obtained from local Governments and Administrations regarding the cultivation of flax in India, with a further summary of information concerning some other fibrous plants.

Ag. & R. 14 Septr 74
In B. No. 144.

O. S. G. P.—No. 1167, R., A., & C.—22-8-74.—100.

1419

To C. G. K. Esqre
&c &c Secretary to the Govt. of Madras

Dept. of Revenue, Agriculture and Commerce. *Fibres and Silk.*

Calcutta, the 1st September 1874.

DEAR SIR,

I AM directed to forward herewith 8 copies of a summary of the information obtained from local Governments and Administrations on the cultivation of flax and other fibre-producing plants in India. Possibly the information therein contained may tend towards the improvement or extension of the cultivation of these plants.

Yours faithfully,

Arthur Howell

Dep. Secretary to the Government of India.

INDIA.

ARTMENT OF REVENUE,
CULTURE AND COMMERCE.

FIBRES and SILK.

DEMI-OFFICIAL.

cutta, the 1st September 1874.

No 1176.

Communicated to
The Board of Revenue
and to the Superintendent
Inspector of Forests

14 Sept. 74

SUBJECT.

ORWARDING copies of a précis on the cultivation of flax other fibre-producing plants in India.

C. G. O.—No. 950 R—7-7 C.—5-9-74.—100.

Dec—21/9/74

144-145