NDC E-BIOS (Online) Volume 5, pp 85-97 (2025) ISSN: 2583-6447
DOI: https://doi.org/10.5281/zenodo.19304733

ORIGINAL ARTICLE

MINOR PLANT FIBRES OF WEST BENGAL STATE AND THEIR ABORIGINAL USAGES

Sunit Mitra
Raja Peary Mohan College Uttarpara, Hooghly, West Bengal
Correspondence: drsunitmitra.1@gmail.com

ABSTRACT

Meet up the basic need man always depends on the nature. Fiber is needed in human society mainly for making of cloths, cordages, ropes, paper and other households' materials. Human being always used a few selective plants species as the source of fibers. In this paper an attempt has been taken to find out some other plant species which can be supplemented as the source of plants fibers. Here 50 such species were enumerated which may use for making of ropes, cordages, papers, and other house hold materials including mats; from 11 – different tribal communities of state. Among these 50 – species though none of the species are threatened or endangered condition at present time, but, due over exploitation and habitat destruction they entered in this list in near future. So, positive effort should be taken for conservation of these plant species. Based on these minor fiber yielding plants socioeconomic upliftment may possible for different tribal communities of the state.
Key Words: Plant fibres, aboriginal usages, West Bengal.

Communicated: 2.12.2025 Revised: 14.12.2025 Accepted: 20.12.2025

INTRODUCTION

Man, for its primary needs 'Food, Cloths and Shelter' (*'Roti, Kapda aur Mokan'*) entirely depends on Plants from the first day of its civilization. The word *'fibre'* has various meanings, considering the logic in which it is applied. "*Fibres may be defined as – are hairlike materials that are discrete group or continuous pieces"*. They can be matted into fabric, paper or any other form/product.

Fibres may be natural, synthetic or semi-synthetic. The significance of a plant to yield fibres is considered as second only to food. In fact, diverse utilization of fibres for humans is directly related to progression in civilization and technological advancement. It is well known reality that for clothing, primitive human was not only dependent on skin and hide but also on plant leaves and other plant parts. Further, in modern world, with expansion of human needs and desires their dependency on plant fibres greatly multiplied. Realizing the Importance of fibres

and to promote natural fibres, United Nations General Assembly observed 2009 as the "International Year of Natural Fibres".

Fibers are classified variously, like based on their source of Origin, their nature, the plants from which they originate, etc.

Due its easy availability and durability use of the plant fibres preferred from time immemorial. The use of cotton fibre and silk is known to occur since 5000 BC. Many fibers yielding plants, including *Boehmeria nive*a Gaud. (Ramie), *Crotalaria juncea* L. (Sunhemp), *Corchorus capsularis* L. (Jute), *Gossypium arboreum* L. (Cotton), *Hibiscus cannabinus* L. (Kenaf), *Linum usitatissimum* L. (Flax) are the best-known commercial plants which provide durable and flexible fiber. Besides these there are some plants which also acts as the source of fibers. The utility of plant fibres is manifested in a diverse range of products which includes making ropes, paper, Cordages, Mats, and various household materials. The fibre production also contributes significantly to the economy of a region in various ways, including agricultural, clothing, small scale industry and products for other household operations. It has been estimated that over a thousand species of plants are yielding fibers in America alone, over 800 in Philippines and about 790 species in India (Pandey & Gupta, 2003). Though in this list of Fiber yielding plants the major participation found to be by the Jute, Cotton, etc. besides these there are several such plants which are produced fibers and their fiber is widely used traditionally by different tribal population of the state as well as in various parts of the globe. These plants are remaining under underutilized because these uses are either need based or site specific.

Different Workers (Gillah *et al.* 1998*;* Islam, 1984; Kulkarni & Kumbhojkar, 1992; Palni, 2010; Negi, 1992*;* Royle, 1955; Sahu *et al.,* 2010) worked on the fibers yielding plants and information of different fibers yielding plant is provided. These information on various fibers yielding plants is needed for maximum utilization and this would help in improving the socio-economic status by supporting livelihood and income generation opportunity.

The main reason of this present study is to collect information regarding the utilization of these minor fibers yielding plants by different tribal communities of the states and based on this information to prepare a road map of socio – economic upliftment of these tribal societies.

The state West Bengal was borne with the Independence of India on 15th August 1947, by paying the price of Partition. The then Bengal Province of British India was partitioned East – West direction by Radcliff's Line and the Eastern part gone under the rule of Pakistan as East Pakistan (Presently independent Country Bangla Deash) and the Western part included in India as a state West Bengal.

Geographically the West Bengal lies between 21°45' N and 27°16' N latitude and 85°55' E and 89°56' E longitude, covering an area of 87, 676 Km^2. which is about one third in area of the pre-partitioned Bengal province. Not only that, partitioned by the arbitrary Radcliff's Line, the five districts of the Northern halves of the state viz., Alipur Duar, Kalimpong, Darjeeling, Jalpaiguri, and Koch Bihar more or less isolated from the rest Southern part of the state except a narrow corridor through Uttar Dinajpur. Administratively at present the state of West Bengal

is divided in to 23 districts comprising of more than 400 blocks and over 4300 villages (Figure 1.).

Except the Western districts (Purulia, West Bardhaman, and Jhargram, & part of the West Medinipur) which are the extension of the Chota Nagpur Plateau, the residual part of the state geographically can be divided in to three natural geographical region viz., the northern Himalayan region included the Darjeeling Himalaya and the Northern Plain land extended from the South of the Darjeeling district up to the Malda District and the Southern massive Gangetic plain extended from the South of the Malda District to the creeks of the Sundarban Delta of the South 24 Parganas (Randha,1964). Different workers study the ethnobotany of the state and thousands of papers has been published. But perusal of literature (Mitra *et al*, 2010), it has been found that, no comprehensive works on the ethnic and traditional usages of the plants fibres has been carried out in the past. So, this present work is considered to enumerate the plants which can be utilized as the potent sources of Plant fibres.

The state can be divided into five geographical regions (Chakravarty *et al*., 1999) viz., (a) Darjeeling Himalayan region, (b) Terai region, (iii) Western undulating high land and Plateau, (iv) North and South Bengal plain and (v) Gangetic delta.

This varied geological, geographical and climatological conditions help to differentiate 5-well defined Phyto-ecological zones covered by the forest having a complete physiographic and ecological continuum between the tropical and temperate forest zones. About 13 % of the total area of the state, which is 11,548 km^2, is under forest cover, showing wide variation from place to place.

Like its diverse vegetation, the state also possesses a well-diversified population. Due to its pleasant climatic condition and availability of every facility of livelihood, the state with its 91, 347,736 people becomes the 4th populated state of the country and it is the most dens state of the country with 1029 persons/km^2 area (Anonymous, 2011) of these, 44, 06,794 people belong to schedule tribe category which are alternatively known as the tribal people of the state.

These tribal peoples are again differentiated into 42 different categories of which only except Toto, others are the migratory people from the adjoining states like Assam, Tripura, Sikkim, Bihar, Odisha, as well as from the Madhya Pradesh and from neighbouring countries like Bangladesh, Nepal, Bhutan and Tibet (Anonymous, 2011). Of them, some important tribal groups on the basis of their population are Asur, Adhikari, Bediya, Bhumij, Bhutia, Chikbarik, Kharwar, Kissan, Korwa, Lepcha, Lohara, Magh, Mahali, Malpahariya, Mech, Munda, Oraon, Pahariya, Rabha, Santal, Savar etc.

MATERIALS AND METHODS

The present work is carried out based on extensive field work on different tribal people infested areas of districts of the state in different seasons of the last 6 years since 2008 to 2013, and also from the perusal of published literature and scrutiny of the herbarium specimens of different herbaria in West Bengal (Figure 1) to authenticate the documented information.

During ethnobotanical field trips, Santal, Oraon, Rabha, Munda, Kheria, Mech, Asur, Lepcha etc. tribes were interacted for the study and documentation of their traditional knowledge about plants used for the treatment of snake bite directly or indirectly. Two other groups viz. Polia/ Polley and Rajbanshi, though they are not recorded as schedule tribes, but they are also included in the present study, because these two groups from North Bengal plains are regular forest dwellers and possesses profound knowledge about the plants and their usages.

During field survey information regarding the plants able to produce fibres, their collection process and the processing of the fibre is collected. Besides these the information about the socioeconomic potentiality of the fibres is also been collected from the local tribal populace served as the informants. All the information collected is cross checked with the information provided by other informants of the same tribal group. The collected information is also compared with the published literature to trace if any similarity of usages is found.

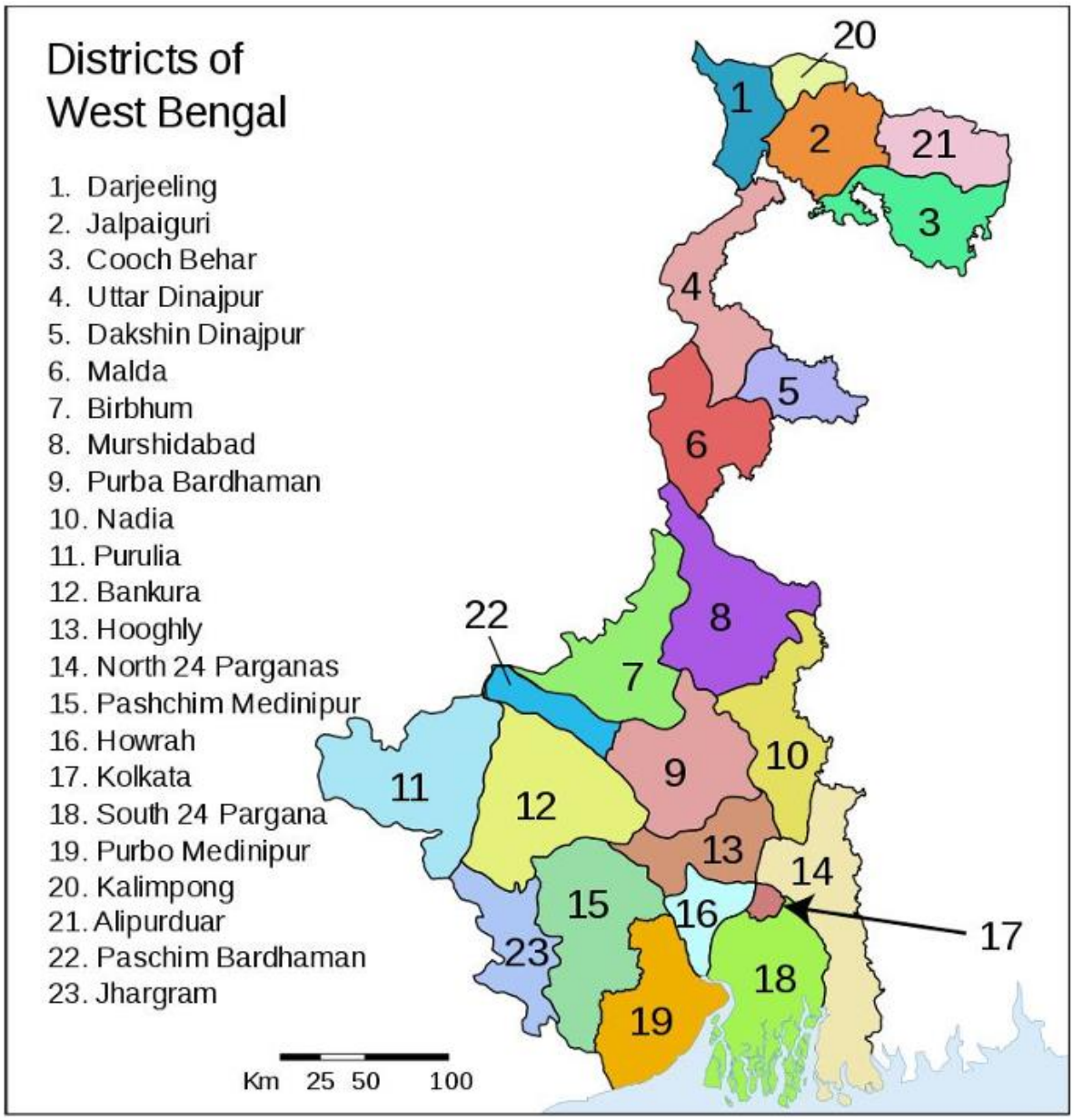

Figure 1. Political map of the state of West Bengal, India, showing its districts.

RESULTS AND DISCUSSION

Information about the plants producing fibres were collected from the different tribal communities and are enumerated in Table 1, in alphabetical order of their scientific names of the plants, followed by their family, vernacular name, useful parts and specific usages of the extracted fibres. For easy documentation and identification in each case, voucher specimens are collected against specific field number.

Table 1. Enumeration of fiber yielding plants by the tribal people of the state of West Bengal, India.

Sl. No.	Scientific Name & Family	Habit & Phenology	Local Name	Fibre Yielding Plant parts	Use
1	*Abelmoschus crinitus* Wall. (Malvaceae)	H	*Birkapas* (Santl.)	Bast fibers	The fibres are twined into string, used in making of local Cot (*Chaupai*). The ropes made from it used to tied cattle.
2	*Abutilon indicum* (L.) Sweet. (Malvaceae)8/	H	*Jhum-jhumi* (B)	St. bk.	Strong silky fibers obtained from the stem bark are made into ropes and sold in the villages for domestic work.
3	*Agave cantala* Roxb. (Agavaceae)	Sh	*Murobba* (Sant.)	Lf.	The fibres extracted from the leaf are twined into ropes. The wound fibrils are used to catch fishes.
4	*Ambroma augusta* (L.) L.*f.* (Sterculiaceae)	Sh.	*Chuil* (Lep.)	St. Bk.	Fibers are twined to made ropes used in rough domestic work.
5	*Ampelocissus sikkimensis* (Lawson) Plachon (Vitaceae)	Cl	*Bitte – Lahara* (Nep.)	St	Ropes are prepared from the vertically splitted mature stem used in various house hold work.
6	*Bauhinia purpurea* L. (Caesalpiniaceae)	Tr	*Sing – ara* (Sant.)	St. bk.	The fibers extracted from the stem bark are made into ropes, used in various domestic works.

7	*Bauhinia vahlii* Wight & Arn. (Caesalpiniaceae)	Cl	*Chihor – nati* (Mu)	St. bk.	The fibers extracted from the stem bark are used to making ropes. These ropes are sold in the markets for various work.
8	*Bauhinia variegata* L. (Caesalpiniaceae)	Tr	*Konar* (Or.)	St. bk.	The fiber extracted from the stem bark are made into ropes and used for tying materials.
9	*Boehmaria macrophylla* D. Don. (Urticaceae)	Sh	*Kamla* (Lep.)	St. bk	The fiber yields from the stem bark are used for preparation of fishing nets.
10	*Boehmaria malabarica* Wedd. (Urticaceae)	Sh	*Thulo – kamle* (Lep)	St. bk.	Fibers obtained from stem bark are used in making of cordages.
11	*Boehmeria nivia* Gaud. (Urticaceae)	Sh	*Sedeng* (Lep)	St. bk	Ropes are made from the stem bark fibers
12	*Borassus flavelifer* L. (Arecaceae)	Tr	*Taal* (B)	Lf. Sheath	Fibers obtained from the leaf sheath are used for making brush and it is sold in the market for painting purposes.
13	*Butea monosperma* (Lam.) Kuntze (Papileonaceae)	Tr	*Paras* (Bh)	Rt. bk	Fiber obtained from the root bark are used to make cordages.
14	*Butea superba* Roxb. (Papileonaceae)	Tr	*Lat – palash* (Bj)	Rt. Bk	Fibers obtained from the root bark are used for preparation of ropes and rough cordages.
15	*Calotropis gigantea* (L.) R. Br. ex Ait. (Asclepiadaceae)	Sh	*Akonda* (Bir)	Bast fibre	Used to make strings
16	*Cannabis sativa* L. (Canabidaceae)	H	*Bhang* (or)	Stem	Fiber obtained from the stem are used to make rough cordages.
17	*Careya arborea* Roxb. (Lecythidaceae)	Tr	*Kumbher* (Sant.)	St. bk.	The bark fibers are used for the preparation of rough ropes.

18	*Cissumpelos pareria* L. (Menispermaceae)	Cl	*Ekladi* (Or) *Tamshaprip* (Lep.)	St. bk	The strip stem bark or the entire stem is used for tying. The entire stem is used for tying wood logs in the jungle.
19	*Cissus repanda* Vahl. (Vitaceae)	Cl	*Hatikana* (Mu0	St. bk	Fiber obtained from the stem bark are used for the preparation of cordages.
20	*Cochliospermum religiosum* (L.) Alston (Cochliospermaceae)	Sh	Galgal (Bh)	Bast fibre	The fibers collected from the stem, process and sold in the local market as Silk.
21	*Cryptolepis buchanani* Roem & Schult. (Asclepiadaceae)	Sh	*Baraduhi* (Bh)	St. bk	Fibers obtained from the stem bark are used to prepare '*ghunia'* a type of fish catching device and it is sold in the local market.
22	*Cynanchum auriculatum* Royle (Asclepiadaceae)	Cl	*Kongar* (Santl.)	St. bk	The stem bark is stripped into threads and used for fishing.
23	*Daphne bholua* D. Don (Thymeliaceae)	H	*Dhenok* (Lep.)	St. bk	Stem bark fibers are used for making paper locally and this paper is called as '*Pahare kagoj'* It is very popular in Kalimpong areas due to its low price.
24	*Dendrocalamus hamiltonii* Nees. & Arn. *ex* Munro. (Poaceae)	H	*Choya – bans* (Nep.)	St.	The fibers obtained from the stem are used for the preparation of ropes and for making Baskets, flower vases, etc.
25	*Debdrocnide sinuate* (Bl.0 Chew. (Urticaceae)	H	*Bichut* (Nep.)	St. bk.	Fibers obtained from the stem bark is used for the preparation of ropes used for tying cattle.
26	*Dillenia pentagyna* L. (Dilleniaceae0	Sh	*Korkot* (Sant.)	Stem bak.	Stem bark strips are used for the preparation of baskets, rough cordages, and string which are sold in the local markets.

27	*Edgeworthia gradneri* (Wall.) Meisnen	H	*Dhenok* (Lep)	St. bk.	The fibers is used for making ropes and used as strap to Carrey load.
28	*Erythrina variegata* L. (Papilionaceae)	Sh	*Kantamadar (Bj)*	Bk	The fiber obtained from the bark are used for the preparation of cordages.
29	*Ficus hispida* L. (Moraceae)	Tr	Dumar (Or)	Bk	The bark fibers are used to make string.
30	*Firmiana colorata* (Roxb.) R.Br. (Sterculiaceae)	Tr	*Palakaur* (Or)	St. bk	Stem bark yields strong fibers used for different house building work and for tying materials carrey loads, etc.
31	*Helicteris isora* L. (Sterculiacerae)	Sh	*Atmochra* (Or.)	Bast fibers	The bast fibers are used for making cordages.
32	*Hibiscus cannabinus* L. (Malvaceae)	Sh	*Najra* (Mu)	Bast fibre	Used for preparation of cordages.
33	*Holostemma annularis* K. Schum. (Asclepiadaceae)	L	Teetpungi (Ra)	Bk. Fb	The fibers are used for string to catch fishes.
34	*Ichnocarpus frutiscens* R. Br. (Apocynaceae)	Cr	*Dudhlata* (Rj)	St	The plant is much used for tying materials. Often the stem is knitted to a netted structure used at the mouth of cattle to prevent them to eat the agricultural crops at the time of ploughing or others job in the field.
35	*Imperata cylindrica* Beauv. (Poaceae)	H	*Chiru* (Or)	Lf	Fibers obtained from the leaf are used for making brush and others household items.
36	*Ischaemum angustifolium* Hack. (Poaceae)	H	*Sabai* (Rj)	Culm	It is very important grass from the economic point of view many items like the rough cordages, ropes etc. are prepared from it. In Northern Bengal mats are prepared from it is called as *Shitalpati* and it

					is sold in the markets. Many tribal families earn their breads from this industry.
37	*Leea guineensis* G. Don (Leeaceae)	Sh	*Galeni* (Nep.)	St.	Fibers obtained from the stem bark are used for making cattle huts by the village people.
38	*Luffa cylindrica* (L.) M. J. Roem (Cucurbitaceae)	Cl	*Ghangra* (T)	Fr.	The vegetable sponge collected from the dried ripen fruits are used as bath sponge and sold in the market. Tribal people collect it from the jungle and sold it for earning.
39	*Phoenix acaulis* Buch. – Ham. (Arecaceae)	Tr	*Khejur* (Sant.)	Lf	The leaf fibers are used for making *telai* a type of mat used in the tribal houses for sitting purposes.
40	*Pueraria tuberosa* DC. (Papilionaceae)	L	*Pataldingla* (Or)	Bk	Fibers obtained from the bark are used for preparation of cordages.
41	*Sensuveria roxburghiana* Schult. & Schlut. *f.* ()	H		Lf	Leaf fibers are tied on the right arm for the adult male and on the left arm for the adult female to reduce the rheumatic pain.
42	*Sida veronicifolia* (Lam.) (Malvaceae)	H	*Ladjakha* (Sant.)	Bk	The fibers obtained from the bark are used for making of ropes and cordages and it is sold in the market as it is a good in quality.
43	*Spatholobus roxburghii* Benth. (Papilionaceae)	L	*Bandu (Mu)*	Bk	The fibers obtained from the bark are used for the making ropes for using in Well to pick water from it.
44	*Sterculis foetida* Roxb. (Sterculiaceae)	Tr	*Badam* (Po)	Bk	Fibers extracted from the stem bark are used for the preparation of rough cordages.

45	*Sterculia urens* Roxb. (Sterculiaceae)	Tr	*Telhe* (Sant.)	Bk	Fibers obtained from the stem bark are made into ropes and that ropes is used for making cots.
46	*Sterculia villosa* Smith. (Sterculiaceae)	Tr	*Jangli Badam* (Sant.)	Bk	The fibers collected from the inner portion of the bark are used for making of ropes which are used for prepare cow or others cattle shades.
47	*Stephania glabra* (Roxb.) Misra	Cl		Bk	Fibers obtained from the stem bark is used for making fishing nets.
48	*Tetrastigma bracteolatum* (Wall.) Planchen.	Sh	Tundorrik *(Lep)*	St	Stem are used as ropes for making various household materials.
49	*Thysonolaena maxima* Kitz. (Poaceae)	H	Phuljharu (Nep.)	Cl.	Used in minor fibers for industry.
50	*Urena lobate L* (Malvaceae)	H	Kuray (Lep.)	St. bk.	Stem bark produces strong fibers used for prepare ropes.

Abbreviation used: [H: Herb, Sh: Shrub, Cl: Climber, L: Liana, Tr: Tree; Bh: Birhore, Bj: Bhumij, Nep: Nepali, Lep: Lepcha, Sant: Santali, Mu: Mundari, Or: Oraon, T: Toto, Ra: Rabha, Rj: Rajbanshi, P: Polley; Rt. Bk: Root bark, St. bk.: Stem bark, Bk: Bark, Cl: Clum, Lf: Leaf.]

After a critical perusal of the data provided in the Table 1, it reveals that, there are 50 species belonging to 43 genera under 21 families are used for the extraction of minor plant fibers. A detail conspectus of the family, genera and species are given in the Table 2.

Table 2. Conspectus of different taxa

Sl. No.	Category	Family	Genera	Species
1	Dicotyledons	18	40	47
2	Monocotyledons	3	3	3

Among these 50 species of fiber yielding plants the shrubs member is dominating by their numbers there are 14 species, 28% of Total species collected are shrubs followed by 13 Species is herb, 26% of Total collected species and 12 species of tree members. A detail statistical analysis is given in the Table 3, Figure 2.

Table 3. Statistical analysis of collected plant species habit

Sl. No.	Category of Habit	Representative numbers
1	Herb & Under Shrubs	13
2	Shrub	14
3	Tree	12
4	Climber	07
5	Lianas	03
6	Creeper	01

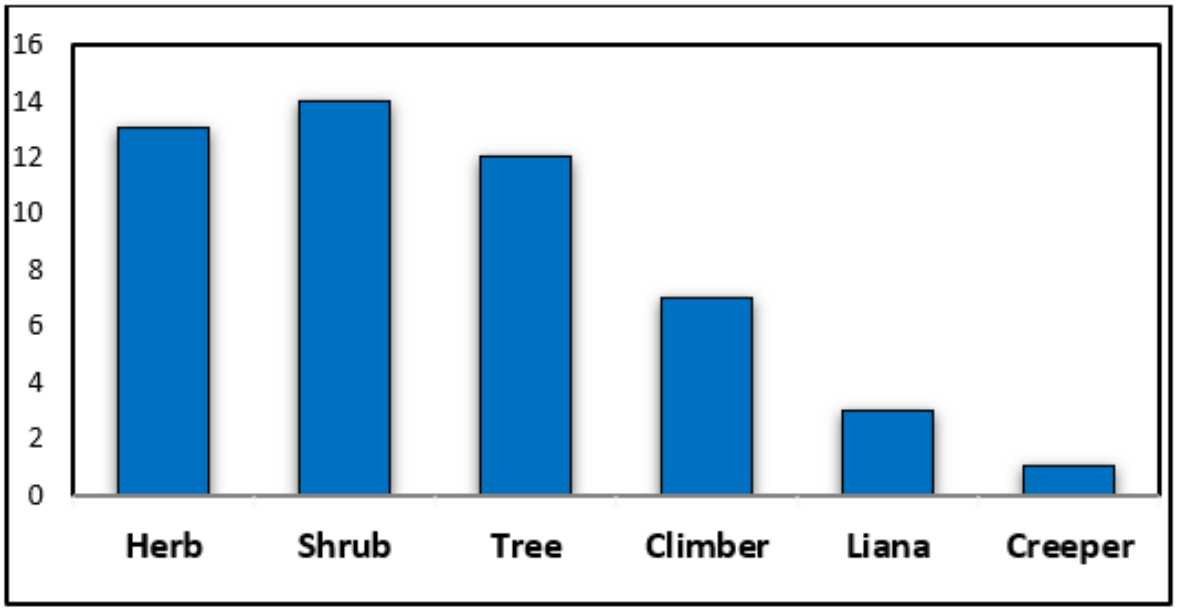

Figure 2. Statistical analysis of habit of collected plant species.

From the point of view of the most diversifies family based on the numbers of fibers yielding species, Sterculiaceae is the most diversified family with 6 Genera followed by Malvaceae and Papilionaceae with 5 genera each, Asclepiadaceae, Poaceae and Urticaceae with 4 Genera each Menispermaceae, Caesalpiniaceae with 3 – genera each in their credit. By the same way the on the view point of species diversity *Bauhinia*, *Boehmaria* and *Sterculia* are the most diversified genera each with 3 – species in their credit followed by *Butea* with 2 – species in it.

It is very interesting to note that all this information about 50 plant species were collected from 11 different tribal communities of the state of which the santal are provided the highest numbers of information 20% followed by Lepcha and Oraon tribe with 16% each respectively. A detail statically analysis is given in the Table 4, Figure 3.

Table 4. Information about plant fibres collected from tribal communities

Sl. No.	Name of Tribe	No. of Information
1	Birhore	2
2	Bhumij	2
3	Lepcha	8
4	Munda	5
5	Nepali	5
6	Oraon	8
7	Polley	1
8	Rabha	1
9	Rajbanshi	2
10	Santali	10
11	Toto	1

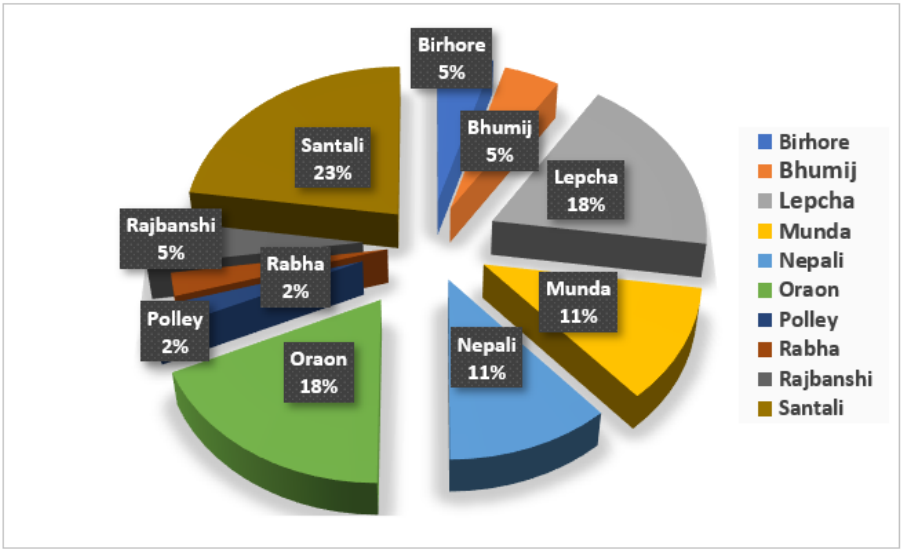

Figure 3. Information About Plant Fibers by Different Tribal Communities

Robinson (1947), has already been showed the usefulness of the minor fibers in comparison to the regular using fibers. In the above enumeration it has been found that these plants bear a potentiality as fiber yielding plants and regular use of these fibers may reduce the extreme pressures of the fibers like Jute, Cotton, etc. beside these, there are some plants which produces fibers with economic potentiality and by increasing the use of these fibers we can able to uplift the socioeconomic condition of the tribal people of those districts. Beside these all these minor fiber yielding plants are easily available in the forests and fibers production cost is very low in this case so these fibers are cheap and easily available. It also be kept in mind that though at present none of these 50 species are in the list of endangered and threatened plants but due to overexploitation and continuous habitat destruction may turns these species in the list of endangered plants.

ACKNOWLEDGEMENTS

Author deeply indebted to all the tribal informant of different districts of West Bengal for providing information during field survey based on which this present paper is built on. Words of indebtedness is also due to Dr. Sudip Kumar Chakraborty, Principal, Raja Peary Mohan College, Uttarpara for providing necessary facility for field survey. Author is indebted to UGC

for funding Minor Research Project and the information collected during the field survey of the MRP (2010 – 2012).

REFERENCES

Anonymous (2011). *West Bengal Census Report*. Directorate of Census Operations. West Bengal

Chakraborty, R.K., Srivastava, R.C., Mitra, S., Bandyopadhyay, S.& Bandyopadhyay S. (1999). West Bengal. In: Mudgal, V. & Hajra P.K. (eds.). *Floristic Diversity and Conservation strategies in India.* Vol – III. pp. 1575 – 1630. Botanical Survey of India. Calcutta.

Gillah P R, Irle, M. A. & Amartey, S. A. (1998). Sisal fibres as a potential raw material for medium density fibre board production in Tanzania. *Annals For.*, 6(2), 159-172.

Islam, M. (1984). Certain fibre yielding plants in the north eastern region. *India. J Econ Taxon Bot,* 5,767-783.

Kulkarni, D. K & Kumbhojkar, M.S. (1992). Ethnobotanical studies on Mahadeokoli tribe in western Maharashtra - Part I, Cordage Plants. *J Econ Taxon Bot,* Addl Ser 10, 111-115.

Mitra, S. Bandyopadhya, S. & Mukherjee, S. K. (2010) *Bibliography of Flora and Ethnobiology in West Bengal.* East Himalayan Society for Spermatophyte Taxonomy, Siliguri.

Negi, R. S. (1992). Economic forest resources of Garhwal-Kumaon Himalayas. *Indian For,* 118(8), 583-593.

Palni, L.M.S. (2010) *Promising Fibre-Yielding Plants of The Indian Himalayan Region.* G.B. Pant Institute of Himalayan Environment & Development. Almora, Uttarakhand.

Pandey, A. & Gupta, R. (2003). Fibre yielding plants of India Genetic resources, perspective for collection and utilization. *Nat Prod Rad,* 2(4),194-204.

Randha, R. Mitra, R. & Mehta, P (1964). Geology of the State West Bengal. *Bull Geo Survey of India* 23, 234 – 342.

Robinson, B.B. (1947). Minor fiber industries. *Econ Bot* 1, 47–56. https://doi.org/10.1007/BF03161458

Royle, J. F. (1955) *The fibrous plants of India.* Smith, Elder & Co. London.

Sahu, S. C., Rout, N. C. & Dhal, N. K. (2010). Ethnobotany of *Eulaliopsis binata* (Retz.) Hubbard - Poaceae in Orissa, Eastern India, Cultivation Practice, Economics and Prospects. *J Adv Developmental Res,* 1(2), 155-160.
