

A Promising Drug Review on Ethanomedicinal Plant of *Salix tetrasperma* Roxb.

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Abstract :Plants have been used in medicine throughout the world for more than 5000 years and still continue to occupy an important place in traditional as well as modern system of medicine. The herbal drugs are used in India as household remedy for common ailments since time immemorial. Since long, the people of India especially those who are residing in villages, tribal pockets and such places where there are no proper medical facilities are provided, they use local medicinal herbs to cure the common ailments. The reported ethnomedicinal claims of *S. tetrasperma* leaves internally in rheumatism, epilepsy, venereal diseases, bladder stone, piles and swellings. Bark decoction in fever. Bark in febrifuge. Leaves externally as poultice in wound. Leaf juice externally in ear pain. Root in cold and cough. Root internally in type 2 diabetes. Stem & flower in wound have been reported. Present review includes ethanomedicinal review and uses of *Salix tetrasperma* Roxb.

Key words- Ethanomedicinal, Epilepsy, Rheumatism

INTRODUCTION: Traditional healing methods are still in prevalence in every culture. Traditional medicine is widely

used in India, particularly in rural areas, where 70% of the population lives. Use of medicinal plant in

traditional health care systems is still a living tradition. The health-related practice learned informally by word of mouth, through observation and demonstration is known as ethno-medicine. Many people in the world are still depend on herbal medicines and considerable amount of information on plants is still available with the tribes. The popularity of ethnomedicinal plants all over the world in recent years is a significant contribution of ethno medicine¹.

The World Health Organization (WHO), has estimated that 80% of the global populations rely chiefly on traditional medicine². India has more than 550 tribal communities which have acquired considerable knowledge on uses of plants for their livelihood, healthcare and other purposes through their long association with the forest, inheritance, practices and experiences. It is necessary to collect all information from the tribe for the use of human kind¹. *Jalavetasa* (*Salix tetrasperma* Roxb.) of Salicaceae family is a traditional and folklore medicinal plant with promising ethnomedicinal claims. Information about the ethnomedicinal uses of the *S. tetrasperma* is scattered

over the multiple years, different platforms (i.e. journals, reports, book and web-based sources) and in different presentation formats (i.e. surveys, glossaries, reviews and notes amongst other). This makes the exploitation of this species for pharmaceuticals leads near impossible. Hence, in the present article, an attempt has been made to congregate the currently available data in one treatise.

AIMS AND OBJECTIVES:

To review the ethno medicinal uses of *Jalavetasa* (*Salix tetrasperma* Roxb.)

MATERIALS AND METHODS:

Data collection

Available literature pertaining the plant *S. Tetrasperma* were compiled from 14 different floras and 2 floras in printed format (The flora of the presidency of Bombay and The Flora of British India) and 10 floras in e version, 73 books on ethnobotany and ethno medicinal research articles from library sources as well as from Google scholar, Shodhganga and Researchgate web-based search engines, journals and presented in systematic manner.

Study Selection

Inclusion criteria

Publication that pronounced the use of *S. tetrasperma* (alone or with any combination of other herbs) to treat any diseases condition either human or animal or used as food i.e. having any economic value were included in the review. This includes both external and internal application with no language restriction and date limitation.

Exclusion criteria

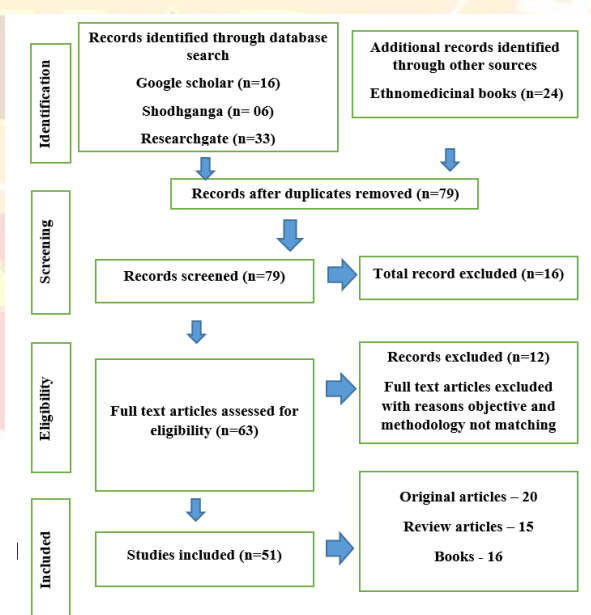
Other species of *Salix* were excluded from the present review. The obtained data are arranged in a tabular form, with regard to various local names, as known by different tribes across India, name of the tribe and their area of

presence, part used, therapeutic indication, external (E) and internal (I) usage of the drug are also noted in a separate column with individual references.

1.2.1 OBSERVATION AND RESULT:

Literature acquired

In the present study covers 79 publications (24 from ethnomedicinal books and 55 abstracts from electronic search). The search identified 55 articles, 16 from Google scholar, 06 from Shodhganga and 33 from Researchgate. After the removal of repetition, as well as screening from relevant titles and abstracts, a total of 51 articles underwent a full text review (Graph.1.2.1a).



Graph 1.2.1a: Graphical presentation collecting Ethnomedicinal data

Availability

Salix tetrasperma Roxb. belongs to Salicaceae and is a native of Southeast Asia, India. It is commonly known as Indian willow in English, Neeruvanji in Kannada and Jalavetasa in Sanskrit. The plant is distributed in India, China, Nepal, Afghanistan, Laos, Cambodia, Vietnam, Singapore, Myanmar, Malaya Peninsula and Archipelago. In Karnataka of India, the plant is found distributed in Bangalore, Kodagu, Hassan, Mandya, Mysore, Shimoga, Tumkur and Uttara Kannada³. It is commonly found along the banks of rivers and streams upto 1200m., throughout tropical and subtropical India from the Punjab eastwards to Mishmi, Assam and Munnipore, ascending the Himalaya to 7000ft., and southwards to Travancore, Sumatra, Java and Singapore^{4,5}.

Plant Description

Salix tetrasperma Roxb. (family-Salicaceae), deciduous shrub or small tree upto 9 m high, flowering after leafing. **Bark** is greyish-brown, rough with vertical fissures and branchlets often pubescent. **Leaves** 2-5 by 5/8 – 1 1/2 in., petioled narrowly or broadly ovate-lanceolate acuminate serrulate

rarely entire, lanceolate or ovate-lanceolate, upper surface green and glabrous and lower surface covered with white blooms, glabrous or the young as well as the branchlets more or less softly tomentose or silky. **Flower** appearing after the leaves; catkins hairy, 2-5 in. long; peduncles silky-villous, leafy at the base. Male flower sweet-scented, sessile; bracts ovate, concave, subacute, silky villous, veined. Disk of 2 yellow glands. Stamens 5-10; filaments free, of various lengths, the longest about twice as long as the bract; anthers yellow. Female flowers pedicellate; bracts smaller than those of the male oblong or obovate-oblong, hairy. Disk small, 1/2-annular, yellow, clasping the pedicel at the side opposite the bract. Ovary fusiform, glabrous; ovules 4-6 (usually 4); stigma sessile, 2-branched, each branch 2-lobed. Capsule glabrous, 1/8 – 1/6 in. long on a long slender stalk. **Fruits:** hard and 7mm long, each fruit bears 4-6 seeds. **Seeds** 4-6. Flowering and fruiting is during September-December^{4,5}.

Used by tribes

S. tetrasperma is used in 9 states of India and 4 countries across the globe by 22 different tribes/communities to combat various diseases conditions or disorders (Table 2.1.a – 2.1.b)

Local name

S. tetrasperma known by 12 names in 9 language. In eastern part of India, it is known as. **Bihar:**

Bod. **Meghalaya:** Jamynrei.

Mizoram: Tuipuisuthlah.

Nagaland: Indian willow. Western part in **Maharashtra:** Jalabetas. Northern part in

Uttarakhand: Bod, Gad-bhains, Jalmalya. **Jammu and**

Kashmir: Beesan. Southern part in

Kerala: Vanchi. Other countries in

Nepal: Bod. **Pakistan:** Harola, Harwala, Bed-i-laila, Beesan.

Burma: Tuipuisuthlah^{6,7,8,9,10,11,12,13,14,15},¹⁶ (Table 2.1.a -2.1.b).

Area of reporting

S. tetrasperma available in various countries of the world, but being used as medicine in 5 countries i.e. India, Nepal, Pakistan, Burma and Bangladesh. It is observed that *S. tetrasperma* being used as medicine in 9 states of India, namely Bihar, Meghalaya, Mizoram, Nagaland, Uttarakhand, Jammu and Kashmir, Himachal Pradesh, Kerala and Maharashtra. (Table 2.1.a-2.1.b).

Therapeutic uses:

Various parts such as leaf, root, bark, stem, flower, seed, aerial part and unspecified plant part are observed to be used in 15 different disease condition (Table 1.2.a).

Table 1.2.a: Reported uses of *S. tetrasperma* in various disease conditions

Sr. No.	No. of claims	Diseases condition	Area of reporting (part used)
1	5	Fever	Himachal Pradesh (Ap); Bihar (Bk), Uttarakhand (Bk), Nagaland (Bk), Pakistan (Bk), Nepal (Bk)
2	5	Febrifuge	Mizoram (Bk), Jammu and Kashmir (Bk), Pakistan (Bk), Burma (Bk), Bangladesh [(-)].
3	4	Rheumatism	Bihar (L), Uttarakhand (L), Kerala (L),

			Meghalaya (L), Pakistan (L), Nepal (L).
4	4	Epilepsy	Bihar (L), Uttarakhand (L), Nepal (L), Kerala (L), Meghalaya (L).
5	4	Piles	Bihar (L), Uttarakhand (L), Nepal (L), Kerala (L), Meghalaya (L), Pakistan (L).
6	3	Bladder stone	Bihar (L), Uttarakhand (L), Nepal (L), Kerala (L), Meghalaya (L).
7	3	Swelling	Bihar (L), Uttarakhand (L), Nepal (L), Kerala (L), Meghalaya (L).
8	3	Wound	Maharashtra (St, Fl), Pakistan (L)
9	2	Venereal diseases	Bihar (L), Uttarakhand (L), Nepal (L), Kerala (L).
10	1	Ear Pain	Pakistan (L)
11	1	Anodyne	Jammu and Kashmir (Bk), Pakistan (Bk)
12	1	Cold	Pakistan (Rt)
13	1	Cough	Pakistan (Rt)
14	1	Type 2 diabetes	Kerala (Rt)
15	1	Dysentery	Pakistan (Sd)

Aerial part (Ap); Root (Rt); Stem (St); Leaf (L); Seed (Sd); Bark (Bk); Flower (Fl);

(-)-Unspecified plant part

Parts used

It was observed that various parts of the plant are claimed for ethnomedicinal uses. Among them the highest claim was reported for bark followed by leaf, root, stem, seed, flower and aerial part of *S. tetrasperma*, alone or along with other drugs in the management of 15 diseases conditions either through

external applications or internal administration. About 2 external applications and 5 internal administrations are reported, among them the highest in claims are for bark (8) (internal 1); leaf (6) (internal 3, external 2); root (2) (internal 1); stem (1); seed (1); flower (1); aerial part (1) diseases condition, but for various plant parts, it was reported that the application or administration method

external or internal are not reported.

In some study plant parts are not specifically noted i.e., unspecified plant part (1) (external 1) (Table 1.2.b).

Variation observed in the external application and internal administration and part used, as in some claims the

mode of administration and part used was not vividly explained (Table 1.2.b)

Dosage form

Aerial part, leaves, bark, root, stem, seed and flower of *S. tetrasperma* are used 2 dosage form i.e. Decoction (2) and juice (1) (Table 1.2.b)

Table 1.2.b: Ethno-medicinal claims of *Salix tetrasperma*

Sr. No.	Parts	Local names	Tribes/Areas	Dosage form Internal (I)/ External (E)	Therapeutic claims
1	Aerial part	-	Lahaul valley, Himachal Pradesh	-	Fever ¹⁷
2	Leaves	Bod	Tharus / Himalayan Terai (Champaran district of Bihar to Nainital district of Uttarakhand and in the adjacent Terai area of Nepal)	Leaves with sugar (I)	Rheumatism, epilepsy, venereal diseases, bladder stone, piles and swellings ⁶
3	Leaves	-	Bannu, Khyber Pakhtunkhwa, Pakistan	Poultice (E)	Wound ¹⁸
4	Leaves	-	Bannu, Khyber Pakhtunkhwa, Pakistan	Juice (E)	Ear Pain ¹⁸
5				Leaves with	Rheumatism,

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	Leave s	-	Pathanamthitta, Kerala	sugar (I)	Antiepileptic, Swelling, Piles, Venereal diseases, Stones in bladder ¹⁹
6	Leave s	Harola, Harwala	Swabi, Pakistan	-	Piles and rheumatism ⁷
7	Leave s	Jamynrei	Khasi and Garo / Meghalaya	Dried and powdered leaves with sugar (I)	Rheumatism, epilepsy, stone in bladder, piles and Swellings ⁸
8	Bark	Bod	Tharus / Himalayan Terai (Champaran district of Bihar to Nainital district of Uttarakhand and in the adjacent Terai area of Nepal)	-	Fever ⁶
9	Bark	Bed-i-laila	Central Punjab, Pakistan	-	Febrifuge ⁹
10	-	-	Bangladesh	-	Febrifuge ²⁰
11	Bark	Indian willow	Angami, Zeliang, Ao, Lotha, Sangtam, Konyak, Chakhesang, Rengma, and Khamniungam / Nagaland	Decoction (I)	Fever ¹⁰
12			Mizo, Lushai, Mara, Lai, Chakma,	-	Febrifuge ¹¹

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	Bark	Tuipuisuthlah	Bru/Riang, Pang, Bawm and Magh / Indo (Mizoram) - Burma		
13	Bark	Beesan	Sharda, Neelum Valley, Azad Jammu and Kashmir, Pakistan	-	Anodyne and febrifuge ¹²
14	Bark	Tuipuisuthlah	Mamit district, Mizoram	-	Febrifuge ¹³
15	Bark	Harola, Harwala	Karamar valley, Swabi, Pakistan		Fever ⁷
16	Bark	Gad-bhains, Jalmalya	Dehradun, Uttarakhand	-	Fever ¹⁴
17	Root	-	Bannu, Khyber Pakhtunkhwa, Pakistan	-	cough and cold ¹⁸
18	Root	Vanchi	Wayanad (Kerala)	Decoction: Take 10gm each of the dried crushed fruits of Tribulus and dried crushed roots of Salix in the fold of a clean cotton cloth and	Type 2 diabetes ¹⁵

				boil in 100 ml of water for 3 minutes. Three ml of prepared mixture is advised to take twice in a day after meal and continued (I)	
19	Seed	-	Bannu, Khyber Pakhtunkhwa, Pakistan	-	Dysentery ¹⁸
20	Stem	Jalabetas	Bhils / Jalgaon District, Maharashtra	-	Wound ¹⁶
21	Flower	Jalabetas	Bhils / Jalgaon District, Maharashtra	-	Wound ¹⁶

"-"Not Reported

It was observed that various therapeutic claims had been reported without noting the exact parts used of the plant. The same therapeutic claims made by different authors with specific parts used i.e. bark and this may be considered as the parts used.

RECENT RESEARCH:

Phyto-chemistry study

No researches have been reported on pharmacognostical characters of *S. tetrasperma*. Studies reported the presence of flavonoids, tannins and

saponins of bark extract of *S. tetrasperma*. Chemicals namely catechol and tremulacin were isolated from dichloromethane fraction of methanolic extract of leaves. Salicin and its derivatives tremuloidin and 2'-O-p-(E) coumaroyl salicin were isolated from the ethyl acetate fraction of the methanolic extract of leaves. The study revealed the presence of

phytochemicals viz. flavonoids, tannins, triterpenes, phenolic compounds, saponins, steroids and sterols in the leaves³.

Pharmacology study

Different parts had been reported for their anti-inflammatory, analgesic, antipyretic, antifungal, antioxidant, cytotoxic anti-bacterial etc. activities (Table 1.2.c).

Table 1.2.c: Research updates of *S. tetrasperma* Roxb.

Sr. No	Part Used	Ethnomedicinal claims	Extraction medium	Activity reported
1	Leaves	Rheumatism, Swelling	Acetic acid & Ethanolic and aqueous	Anti-inflammatory ²¹ & analgesic Activity ³
2	Leaves	Epilepsy	-	Central nervous system activity ³
3	Leaves	Stone in bladder	Aqueous extract	Diuretic activity ³
4	Leaves	Venereal diseases	Watery extract	Anti-fungal activity ³
5	Leaves, stem, flower	Wound, Piles	Ethyl acetate	Anti-oxidant & cytotoxic Activity ^{22,23}
6	Bark	Fever, febrifuge	Ethanolic and aqueous	Antipyretic activity ³
7	Root	cold, cough, ear pain	methanol-ethyl acetate (1:9)	Anti-bacterial activity ²³
8	Root	Type 2 diabetes	Aqueous extract	Hypoglycemic activity ³

Discussion-

Salix tetrasperma (Roxb.), is a folklore medicinal plant with encouraging ethnomedicinal claims belonging to the family Salicaceae.

Salix tetrasperma is a shrub or small tree upto 9 m high, with bark greyish-brown, rough with vertical fissures, leaves narrowly or broadly ovate lanceolate and possess peduncles silky-villous flowers and fruits hard each

fruits bears 4-6 seeds, which commonly found along the banks of rivers and streams upto 1200 m., throughout tropical and subtropical India from the Punjab eastwards to Mishmi, Assam and Munnipore, ascending the Himalaya to 7000ft., and southwards to Travancore, Sumatra, Java and Singapore. The plant also known by 12 names in 9 language and being used as medicine in 9 states of India, by 22 tribes to cure 15 disease condition such Fever, Febrifuge, Rheumatism, piles, Epilepsy, swelling, bladder stone, wound, etc. Various parts of the plant i.e. leaf, bark and root are being commonly used by tribes as 5 internal administration i.e. in 2 dosage form

i.e. decoction (2) and juice (1), and 2 external application. It was observed that the administration or application method i.e. internal or external and some plant parts are not specifically reported. Various therapeutic claims had been reported without noting the exact parts used of the plant, the same therapeutic claims i.e. Febrifuge made by different authors with specific parts used i.e. bark and this may be considered as the parts used. The plant reported presence of flavonoids, tannins, triterpenes, phenolic compounds, saponins, steroids and sterols. So, in the detection of the bioactive principles present in medicinal plants, phytochemical serves as a valuable tool. Hence, may help in drug discovery and development by pharmaceutical companies. The plant extract could be explored for its highest therapeutic efficacy in order to develop safe drugs for various diseases²⁴.

Flavonoids one of the most powerful watersoluble antioxidants and free radical scavengers, help in preventing oxidative cell damage²⁴. The phytochemical provides usefulness in

various pharmacological activities and these phytoconstituents are responsible for anti-inflammatory²⁵, analgesic²⁵, anti-bacterial²⁶, anti-diabetic²⁵, and anti-oxidant²⁷ activities.

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