



A Review on Herbal Remedies for Sexually Transmitted Infections (STIs) from Melghat Region of Maharashtra State, India

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Authors' contributions

This work was carried out in collaboration between both the authors. Author NMA designed the study under the supervision of corresponding author DDK. The statistical analysis, protocols and literature searches were managed by NMA. Both the authors analyzed the study and prepared the first draft of the manuscript. After critical thought and agreement in both the authors, the final manuscript was submitted.

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ABSTRACT

Melghat means "meeting of ghats" region well known for "Melghat Tiger Reserve (MTR)" located in the north-western compact block of Amravati district in Maharashtra state, India. This literature review aimed to compile and document the herbal remedies for Sexually Transmitted Infections (STIs) as Gonorrhoea, anti-HIV Leucorrhoea, Sexual Transmitted Diseases (STDs), and Syphilis in Melghat region. A total of 167 medicinal plant species from Melghat distributed among 137 genera, and 66 families have complied for Gonorrhoea (103), Syphilis (85), Leucorrhoea (84), anti-HIV (10), and STD (01). Plant families like Lythraceae (17 species), Malvaceae (11 species), Moraceae (8 species), Euphorbiaceae (8 species), Acanthaceae (6 species), Amaranthaceae (6 species), Verbenaceae (6 species), were most frequently occurred in the study. Trees represented 34.13% of species, followed by Herbs (32.33%), Shrubs (20.95%), Climbers (10.17%), Grasses (1.19%),

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Orchids (0.59%) and Aquatic (0.59%). Leaves were the most commonly used plant parts; it accounts 19% followed by roots (18%), whole plant (13%), bark (13%), seeds (7%), fruits (6%), stem (5%), flowers (5%), etc. Curated data presented as botanical names, families, local names, habitat, floristic area (in Melghat), ailments, part used with relevant ethnobotanical citations were documented and thus offers scope for researchers engaged in herbal drug discovery and development.

Keywords: Medicinal plants; Melghat Flora; Gonorrhoea; Leucorrhoea; Syphilis; HIV; STIs.

1. INTRODUCTION

Melghat is a unique ecological niche situated in the north-western part of the Amravati district from the Vidarbha region of Maharashtra state in India. Melghat means 'meeting of the ghats', lies in the south-western Satpura mountain ranges on the border of Madhya Pradesh state. Melghat comprising of two blocks, Dharni and Chikhaldhara, situated in Amravati district, is home to the "Melghat Tiger Reserve (MTR)" of Maharashtra. The tribal population lives in over an area of 4212 sq.km, out of which 77% area is under forest. It is a hilly area spreading across 320 villages comprising mainly of the Korku tribe [1]. The tribal population mainly includes Korkus, Gond, and Nihals. Both floristics and ethnobotany of the Melghat area are well studied.

Over the period, many changes in vegetation are expected. Floristic documentation of Melghat started with the administration of Melghat Forests being transferred to Britishers by Nizam of Hyderabad. Mostly the angiosperms have been studied. However, some efforts are also made to document the biodiversity of lower plants, especially bryophytes, ferns, and mushrooms. The first detailed account of the "Flora of Melghat" was published by Patel RI in 1968 [2], who himself was a forest officer. The notable published work is by Dhore MA and Joshi PA in 1988 [3], Bhogaonkar and Devarkar in 1999 [4], Bhogaonkar and Devarkar in 2001 [5], Devarkar in 2001 [6], Londhe et al. in 2002 [7], Bhogaonkar and Devarkar in 2002 [8], Sakarkar et al. in 2004 [9], Shirsat in 2008 [10], Bhogaonkar et al. in 2010 [11], Yeotkar et al. in 2010 [12], Devarkar in 2010 [13], Rothe et al. in 2011 [14], Ingole in 2011 [15], Kokate and Muratkar in 2012 [16], Zade et al. in 2013 [17], Khedkar and Oke in 2013 [18], Birdi et al. in 2014 [1], Talapalliwar and Garg in 2014 [19], Kashyap et al. in 2016 [20], Bhogaonkar and Dhole in 2018 [21] and Khedkar and Atre in 2019 [22]. Their works make few passing references to mention ethnobotanical, medicinal, edible, or

otherwise use of plant species from Melghat.

The older terminology of "Venereal Diseases" (VDs) largely has been superseded in the past 50 years by "Sexually Transmitted Diseases" (STDs), and more recently by "Sexually Transmitted Infections" (STIs) [23]. STIs are more powerful than different contaminations winning in the community. "Leucorrhoea" or "Leucorrhoea" or "vaginal release" is a typical grievance among ladies. It generally denotes thick whitish, yellowish, or greenish vaginal discharge in females that might be normal or a symptom of infection. It is almost mucus discharge, which exhibits exfoliation of vaginal epithelial cells due to estrogen influence on the vaginal mucosa [23]. The amount of vaginal discharge may increase due to vaginal infection and due to STIs, and the discharge may disappear or reappear from time to time. The common causes of this disease are excessive coitus, abortion, high parity, lower socioeconomic status, poor hygiene, faulty dietary habits, excessive workload, etc. Mainly two types of leucorrhoea appear: first physiological leucorrhoea is due to the stimulation of estrogens leads to changes in vaginal epithelium, changes in healthy bacterial flora and pH of vaginal secretion; second pathological leucorrhoea, different pathogens like *Candida albicans*, *Neisseria gonorrhoea*, *Trichomonas vaginalis* are exclusively involved, and some other potential agents like *Candida-like organisms (CLO)*, *Chlamydia trachomatis*, *Streptococci*, and *Ureaplasma urealyticum* are responsible [23].

"Gonorrhoea" or "gonorrhoea" or "the clap" is the second most common sexually transmitted disease (STD) worldwide, caused by the bacterium *Neisseria gonorrhoeae*. It is most common in young adults. The bacteria grow in warm, moist areas of the body, i.e. urethra. In women, the bacteria may be found in the reproductive tract. The bacteria can also grow in the eyes. The bacteria can infect the mouth,

genital tract, or anus. Generally spreads during a vaginal, oral, or anal sexual encounter with an infected partner. Syndromes include cervicitis in women and urethritis, proctitis, and pharyngitis in both men and women [24]. Although infection is often asymptomatic, it is the main cause of infertility nowadays, and if untreated, it can develop into more infectious diseases known as Pelvic Inflammatory Diseases (PIDs). As it's a sexually transmitted disease, but it can be passed from a pregnant woman to her baby lead to the newborn baby having an infection of the eyes, and if untreated may lead to blindness. *Gonorrhea Opg protein*, belonging to the Opg/CgtA GTPase subfamily, is identified as a molecular target for the development of drugs with new mechanisms of action against gonorrhea [25]. Drug resistance, especially for gonorrhea, is a significant threat to reducing the impact of STIs worldwide.

Syphilis, known in India as "*Portuguese disease*" or "*firanga*" or "*firangi roga*," reached the subcontinent in the early 16th century and soon became widespread [26]. Syphilis is caused by bacteria *Treponema pallidum*. Syphilis can cause neurological, cardiovascular, and dermatological diseases in adults, and stillbirth, neonatal death, premature delivery, or severe disability in infants [27]. The primary route of transmission of STIs is through sexual contact and mainly caused by bacteria, viruses, or protozoa. In the developed world, viral STIs have become increasingly common and important, whereas, in developing countries, bacterial STIs are more common [28].

World Health Organisation (WHO) in 2017 said, the data from 77 countries revealed that antibiotic resistance is making gonorrhoea difficult, and sometimes impossible, to treat. Recently, the World Health Organization (WHO) estimated that 80 percent of people around the world depend on herbal medicines for primary health care needs. WHO also estimated that more than 21,000 plant species have the potential for being used as medicinal plants (WHO, 2004). In India, around 20,000 medicinal plants have been recorded; however, traditional practitioners use near to 7500 plants for curing different diseases [29].

2. MATERIALS AND METHODS

2.1 Data Retrieval

The traditional uses of medicinal plants used for the management of STI for Melghat plants were collected from different research literature conducted. The published literature was

searched on journal articles using international scientific databases such as Google Scholar, MEDLINE, NLM, PubMed, PubMed Central, Research Gate, Science Direct, Scopus, Web of Science, etc.

Pieces of literature were searched on databases comprising information on medicinal plants used for the management of STI for Melghat plants were browsed using the following main search terms: 'Melghat Flora / Melghat medicinal flora'; 'Medicinal plants for sexually transmitted infections/diseases,' 'Leucorrhoea / Leucorrhea / Anti-Leucorrhoea / Anti-Leucorrhea,' 'Medicinal plants for Leucorrhoea / Leucorrhea'; 'Gonorrhea / Gonorrhoea / Anti-Gonorrhoea / Anti-gonorrhoea,' 'Medicinal plants for 'Gonorrhea / Gonorrhoea,' 'Anti-Gonorrhoea plants in Melghat'; Syphilis / Anti- Syphilis', 'Medicinal plants for Syphilis'; 'Ethnobotanical study of medicinal plants,' 'Ethnomedicinal study in Melghat / Melghat tiger reserve (MTR), 'Traditional knowledge and Traditional medicinal plants in Melghat,' 'Ethnobotanical study of medicinal plants', 'Ethnopharmaceutical and Ethnopharmacology.

Data on Ethnobotanical study of medicinal plants used for STI collected from the web-based literature were included the scientific and local names, the habit of the plant in Melghat, medicinal parts used with relevant references and compiled after assessing all available ethnobotanical documents in Melghat. A literature search was also done to document the pharmacological activities of the documented plant species.

2.2 Data Analysis

Ethnobotanical literature data was entered in an Excel spreadsheet analyzed through statistical analysis. Quantitative literature data were compiled and analyzed by using descriptive statistics to identify the number and percentage of species, genera, and families. The analyzed data were expressed in table and graphs. The yield of this survey can fill in as a reason for future pharmacological examinations on restorative plants establishes in Melghat plants utilized for the administration of STI.

3. RESULTS AND DISCUSSION

A total of 167 plants from the Melghat region belonged to 137 genera, and 66 families were compiled within this review. Both published and unpublished research reports were used for compiling the review.

Table 1. Medicinal plants used for Sexually Transmitted Infections (STIs) from Melghat region

Sr. No.	Botanical names	Families	LN	Ha	FA (in Melghat)	Ailments	PU	References
1.	<i>Abrus precatorius L.</i>	Lythraceae	Gunj; Gunchi;	Shrubs	Throughout	Gonorrhea	Whole plant; Roots;	[3,21,28,30]
2.	<i>Abutilon indicum (L.) Sweet</i>	Malvaceae	Tepari; Kanghi;	Shrubs	Semadoh	Gonorrhea	Seed, Leaves; Root bark;	[3,13,21,31]
						Leucorrhoea	Roots;	[32,33]
						Syphilis	Leaves, Seed;	[28]
3.	<i>Acacia catechu (L.f.) Willd.</i>	Lythraceae	Khair	Tree	Harisal, Dhargad	Gonorrhea	Whole plant;	[3,21,28]
4.	<i>Acacia nilotica (L.) Delile</i>	Mimosoideae	Tepari; Kanghi;	Tree	Semadoh	Gonorrhea	Leaves;	[21,30]
						Leucorrhoea	Bark, Roots; Leaves, Bark, Gum;	[32,34]
						Syphilis	Flowers;	[34]
5.	<i>Achyranthes aspera L.</i>	Amaranthaceae	Aghada;	Herbs	Very common	Gonorrhea	Roots; Fruits, Seed; Root, Leaves;	[3, 8,21,28]
						Syphilis	Leaves;	[35]
6.	<i>Aegle marmelos L.</i>	Rutaceae	Maika; Bela;	Tree	Common	Leucorrhoea	Leaves;	[3,21,32]
7.	<i>Aerva javanica (Burm. f.) Juss.</i>	Amaranthaceae	Buee	Herbs	Harisal	Gonorrhea	Roots;	[7,8,21]
8.	<i>Aerva lanata (L.) Juss. Ex Schult.</i>	Amaranthaceae	Polpala; Chaya;	Herbs	Fairly frequent in diverse habitats	Gonorrhea	Flowers;	[3,21,31]
						Leucorrhoea	Whole plant; Roots;	[37,38]
9.	<i>Ageratum conyzoides L.</i>	Asteraceae	Gha buti; Bhakumba;	Herbs	Common	Gonorrhea	Roots; Leaves;	[3,21,39,40,41]
						Leucorrhoea	Leaves;	[32,42]
						Syphilis	Whole plant;	[41]
						HIV / AIDS	Leaves; Whole plant;	[40,41, 42]
10.	<i>Albizia lebbbeck (L.) Benth.</i>	Lythraceae	Siris; Bhingri;	Tree	Planted	Gonorrhea	Bark, Seed, flower, pods;	[3,21,35,43]
						Leucorrhoea	Leaves, seed, bark;	[43]
11.	<i>Albizia procera (Roxb.) Benth.</i>	Leguminosae	Kinhai	Tree	Chikhaldara	Gonorrhea	Seed;	[3,21,44]
12.	<i>Ailanthus excelsa Roxb.</i>	Simaroubaceae	Maharukh	Tree	Planted	Gonorrhea	Bark;	[3,21,45]
						Leucorrhoea	Bark;	[45]
13.	<i>Alternanthera pungens Kunth</i>	Amaranthaceae	Khaki weed	Herbs	Occasional	Gonorrhea	Tubers; Whole plant; Whole plant;	[3, 21,46,47]
14.	<i>Amaranthus spinosus L.</i>	Amaranthaceae	Kate-Math;	Herbs	Frequent	Gonorrhea	Roots, Stem; Whole plant; Leaves;	[3,28,35,40,44,48]
						Leucorrhoea	Roots; Whole plant; Tender shoot;	[32, 48, 49, 50]
15.	<i>Anacardium occidentale L.</i>	Anacardiaceae	Kaju;	Tree	Occasionally planted in forest	Gonorrhea	Leaves; Leaves;	[21, 28, 51]
						Syphilis	Fruits;	[52]
16.	<i>Andrographis paniculata</i>	Acanthaceae	Kalmegh;	Herbs	Makhala plateau	HIV / AIDS	Leaves;	[4, 53]
17.	<i>Argemone mexicana L.</i>	Papaveraceae	Killai; Pivla Dhotra;	Herbs	Common	Gonorrhea	Roots, Seeds;	[3, 28]
						Leucorrhoea	Whole plant; Roots, Seeds;	[44, 54]

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18.	<i>Argyreia nervosa</i> (Burm. F.) Bojer	Convolvulaceae	Ghav bel;	Climbers	Around villages	Syphilis Gonorrhea	Roots, Seeds; Leaves;	[28] [21, 55]
19.	<i>Arisaema leschenaultia</i> Blume	Araceae	Lily	Herbs	Rare; on road side	Syphilis Gonorrhea	Roots; Whole plant;	[55] [21, 56]
20.	<i>Asparagus racemosus</i> Willd.	Asparagaceae	Shatavari;	Shrubs	Frequent	Leucorrhoea	Roots;	[3, 32, 33, 38, 48]
21.	<i>Atylosia scarabaeoides</i> (L.) Benth.	Lythraceae	Ran Tur;	Herbs	Common, in forest undergrowth	Gonorrhea Syphilis	Leaves; Whole plant; Leaves; Whole plant;	[3, 44] [44]
22.	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Limbasi; Neem;	Tree	Planted; on foot hills of Melghat.	Gonorrhea Leucorrhoea	Leaves; Leaves, Bark; Bark	[21, 39, 40] [57]
23.	<i>Azanza lampas</i> (Cav.) Alef.	Malvaceae	Chichandur; Jangli kapas	Shrubs	Common	Gonorrhea Syphilis	Roots, Fruits; Roots, Fruits;	[3, 58] [58]
24.	<i>Bauhinia malabarica</i> Roxb.	Lythraceae	Kangali;	Tree	Common	Leucorrhoea	Bark;	[3, 32]
25.	<i>Bauhinia purpurea</i> L.	Lythraceae	Koilari;	Tree	Occasional	Leucorrhoea	Bark;	[3, 32]
26.	<i>Bauhinia variegata</i> L.	Lythraceae	Kachnar	Tree	-	Syphilis	Leaves, Bark;	[3, 44]
27.	<i>Biophytum sensitivum</i> (L.) DC.	Oxalidaceae	Lajalu	Herbs	Common	Gonorrhea	Roots;	[3, 31, 59]
28.	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Khaparkuoti;	Herbs	Common	Gonorrhea Leucorrhoea	Aerial part; Leaves; Whole plant	[3, 35, 40] [32,48, 57]
29.	<i>Bombax ceiba</i> L	Malvaceae	Semal; Auri;	Tree	Occasional	Gonorrhea Leucorrhoea	Seeds; Bark; Roots; Flowers;	[3, 60] [32, 38, 60]
30.	<i>Boswellia serrata</i> Roxb.	Burseraceae	Salai;	Tree	Outer hills	Gonorrhea Syphilis	Gum-resin oil; Gum-resin	[3, 61] [61]
31.	<i>Butea monosperma</i> Roxb.	Lythraceae	Dhak; Palas;	Tree	Hills of Melghat	Gonorrhea Leucorrhoea	Bark, Flowers; Bark, Flower, Gum;	[3, 31, 62] [32, 48]
32.	<i>Caesalpinia decapetala</i> (Roth)	Leguminosae	Chillari	Shrubs	Chikhaldara	Gonorrhea	Roots;	[3, 46, 47]
33.	<i>Calotropis gigantea</i> (L.)	Asclepiadaceae	Rui	Shrubs	On bunds fields	Leucorrhoea Syphilis	Roots; Bark;	[3, 48] [35]
34.	<i>Calotropis procera</i> (Aiton)	Asclepiadaceae	Rui	Shrubs	Occasional	Syphilis	Roots;	[3, 63]
35.	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Kapalphodi	Climbers	Hedges Fields	Gonorrhea Leucorrhoea	Plant Juice Roots;	[3, 31] [38]
36.	<i>Cassia hirsute</i> L.	Caesalpinaceae	Chakunda	Shrubs	Semadoh	Leucorrhoea	Roots;	[4, 13]
37.	<i>Cassia fistula</i> L	Caesalpinaceae	Rera;Banaka	Tree	Common	Syphilis	Bark;	[3, 64]

Sr. No.	Botanical names	Families	LN	Ha	FA (in Melghat)	Ailments	PU	References
38.	<i>Cassia occidentalis L.</i>	Caesalpiniaceae	Chakwar	Shrubs	Around villages	Gonorrhea	Roots;	[3, 30]
39.	<i>Celastrus paniculatus Willd.</i>	Celastraceae	Malkangni;	Shrubs	Occasional	Leucorrhoea	Bark, Root; Root bark;	[3, 38, 65]
40.	<i>Celosia argentea L.</i>	Amaranthaceae	Kardu;	Herbs	slopes and fields	Leucorrhoea	Flower, Seed; Stem, Leaves;	[3, 35]
41.	<i>Ceratophyllum demersum L.</i>	Ceratophyllaceae	Jalaja;	Aquatic	Tapi, Dolar Pool	Leucorrhoea	Whole plant;	[3, 66]
42.	<i>Chlorophytum arundinaceum Baker</i>	Liliaceae	Musli Bhed; Biskandri;	Herbs	Semadoh	Gonorrhea	Tubers;	[7, 67]
						Leucorrhoea	Tubers;	[67]
43.	<i>Chlorophytum tuberosum (Roxb.)</i>	Liliaceae	Ganjagata;	Herbs	Common	Leucorrhoea	Tubers;	[3, 68]
44.	<i>Cissus quadrangularis</i>	Vitaceae	Kandvel; Had-	Climbers	villages in hedges	Gonorrhea	Whole plant; Roots; Whole plant;	[21, 28, 39, 51]
						Syphilis	Whole plant; Whole plant;	[28, 51]
45.	<i>Clerodendrum viscosum Vent.</i>	Verbenaceae	Bhant;	Shrubs	Chikhaldara	Leucorrhoea	Root, Leaves;	[3, 32]
46.	<i>Cocculus hirsutus (L.) Diels</i>	Menispermaceae	Wasan-vel, Paravel	Shrubs	Common	Gonorrhea	Leaves;	[3, 31, 69]
						Syphilis	Roots;	[69]
						Leucorrhoea	Leaves;	[32, 38]
47.	<i>Cochlospermum religiosum (L.)</i>	Bixaceae	Gongal; Ganai;	Tree	Belkund, Koha	Gonorrhea	Bark gum; Flower, Gum;	[3, 45]
						Syphilis	Gum	[45]
						Leucorrhoea	Gum	[45]
48.	<i>Coix lacryma-jobi L.</i>	Gramineae	Adlay	Grasses	-	Gonorrhea	Seed;	[16, 35]
49.	<i>Commiphora wightii (Arn.)</i>	Burseraceae	Guggul;	Shrubs	Rare	Leucorrhoea	Latex;	[21, 32]
50.	<i>Corchorus aestuans L.</i>	Malvaceae	Hade-ka-khet	Herbs	Hill slopes	Gonorrhea	Roots, Leaves;	[3, 70]
51.	<i>Cordia dichotoma Forster. F.,</i>	Boraginaceae	Chilu;	Tree	Occasional	Gonorrhea	Leaves, Stem bark;	[3, 71]
52.	<i>Costus speciosus (J. Koenig.) Sm.</i>	Costaceae	Cane-reed	Herbs	Harisal, Kolkhas	Gonorrhea	Leaves, Roots;	[3, 28]
53.	<i>Crotalaria calycina Schrank</i>	Leguminosae	Kesal tag	Herbs	-	Syphilis	Whole plant;	[3, 44]
54.	<i>Cryptolepis buchanani Roemer</i>	Asclepiadaceae	Kala bel	Herbs	-	Syphilis	Latex, Roots, Whole plant;	[3, 44]
55.	<i>Ctenolepis garcinii (Burm. F.)</i>	Cucurbitaceae	Kollankovai	Climbers	around on hedges	Gonorrhea	Fruits;	[21, 72]
56.	<i>Cucumis prophetarum L.</i>	Cucurbitaceae	Kharchvit;	Climbers	Semadoh,	Gonorrhea	Fruits;	[4, 39]
57.	<i>Cullen corylifolium</i>	Faboideae	-	Herbs	-	Leucorrhoea	Seed;	[21, 35]
58.	<i>Curculigo orchioides Gaertn.</i>	Hypoxidaceae	Kali Musali	Herbs	Fairly common in entire hilly tract	Gonorrhea	Roots; Rhizome;	[3, 28, 44, 59]
						Leucorrhoea	Roots; Tubers;	[32, 38]
						Syphilis	Roots;	[28]
59.	<i>Cuscuta reflexa Roxb.</i>	Cuscutaceae	Amarvel	Herbs	Not common	Leucorrhoea	Whole plant;	[3, 32]
60.	<i>Cynodon dactylon (L.) Pers.</i>	Poaceae	Hariyali;	Grasses	Belkund	Leucorrhoea	Whole plant;	[3, 32]

Sr. No.	Botanical names	Families	LN	Ha	FA (in Melghat)	Ailments	PU	References
61.	<i>Dalbergia latifolia</i> Roxb.	Lythraceae	Shishum;	Tree	Occasional	Gonorrhea	Leaves;	[3, 30]
62.	<i>Dalbergia sissoo</i> DC.	Faboideae	Sissu	Tree	Was planted as avenue tree	Gonorrhea Leucorrhoea	Leaves, Bark, Roots; Leaves tender;	[21, 31, 48, 50] [32, 33]
63.	<i>Dalbergia volubilis</i> Roxb.	Faboideae	Alai	Climbers	Semadoh area	Gonorrhea	Roots;	[21, 73]
64.	<i>Dendrophthoe falcata</i> (L.f.)	Loranthaceae	Vanda;	Shrubs	Fairly common,	Leucorrhoea	Whole plant;	[3, 38]
65.	<i>Dichrostachys cinerea</i> (L.)	Mimosoideae	Yelatri;	Shrubs	At hill foots	Gonorrhea Syphilis	Roots; Roots, Stem Bark, Leaves;	[21, 74] [30, 74]
66.	<i>Dioscorea alata</i> L.	Dioscoreaceae	Goradu;	Climbers	Chikhaldara	Gonorrhea	Stem;	[21, 39]
67.	<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Gathalu;	Climbers	Common	Syphilis	Roots;	[3, 49]
68.	<i>Dipteracanthus patulus</i> (Jacq.)	Acanthaceae	Grandhi nayakam	Herbs	Occasional, on hill slopes of Dhargad	Gonorrhea Syphilis	Leaves; Leaves;	[3, 75] [75]
69.	<i>Dipteracanthus prostratus</i> (Poir.)	Acanthaceae	Pottakanchi	Herbs	Umarched	Gonorrhea	Whole plant;	[7, 76]
70.	<i>Dregea volubilis</i> (L. f.)	Apocynaceae	Harandodi	Shrubs	-	Gonorrhea	Leaves;	[3, 35]
71.	<i>Eclipta prostrata</i> (L.)	Asteraceae	Maka	Herbs	streams, river beds	Leucorrhoea Syphilis	Whole plant; Whole plant;	[3, 77] [77]
72.	<i>Ehretia laevis</i> Roxb.	Boraginaceae	Chamror	Tree	-	Syphilis	Root; Leaves;	[21, 44, 45]
73.	<i>Elephantopus scaber</i> L.	Asteraceae	Chhatre	Herbs	Drying ponds	Leucorrhoea	Root;	[3, 35]
74.	<i>Embelica officinalis</i> Gaertn.	Euphorbiaceae	Aola	Tree	Fairly common	Leucorrhoea Gonorrhea	Fruits; Fruits;	[3, 32, 33] [48, 57]
75.	<i>Ensete superbum</i> (Roxb.)	Musaceae	Jangli Keli	Herbs	Higher elevations	Leucorrhoea	Seeds;	[3, 78]
76.	<i>Eranthemum roseum</i> Vahl. R. Br	Acanthaceae	Dasmuli	Herbs	Chikhaldara	Leucorrhoea	Roots;	[3, 79]
77.	<i>Euphorbia hirta</i> L	Euphorbiaceae	Dudhi	Herbs	Common	Leucorrhoea Gonorrhea	Whole plant; Leaves; Aerial part	[3, 32, 38] [40]
78.	<i>Euphorbia neriifolia</i> L.	Euphorbiaceae	Thuar	Herbs	Chikhaldara	Gonorrhea	Latex;	[3, 80]
79.	<i>Evolvulus alsinoides</i> (L.) L.	Convolvulaceae	Shankhpushpi	Herbs	Common	Syphilis	Whole plant;	[3, 81]
80.	<i>Ficus benghalensis</i> L.	Moraceae	Wora; Wad	Tree	Fairly common	Gonorrhea Leucorrhoea Syphilis	Fruits; Bark and seeds; Latex; Root bark, Stem bark; Whole plant; Latex, bark, leaves; Seed;	[3, 45, 82] [32, 44, 48, 57] [45]
81.	<i>Ficus exasperata</i> Vahl	Moraceae	Karvat	Tree	Semadoh	Gonorrhea Leucorrhoea	Leaves, Bark; Leaves; Roots;	[7, 40, 51] [51]
82.	<i>Ficus hispida</i> L. f.	Moraceae	Kat- UMBER,	Tree	On mud flats	Leucorrhoea	Ripe fruits; Bark;	[3, 32, 45]
83.	<i>Ficus lacor</i> Buch-Ham	Moraceae	Pipri serilli;	Tree	All over Melghat	Leucorrhoea	Bark; Buds;	[21, 83]

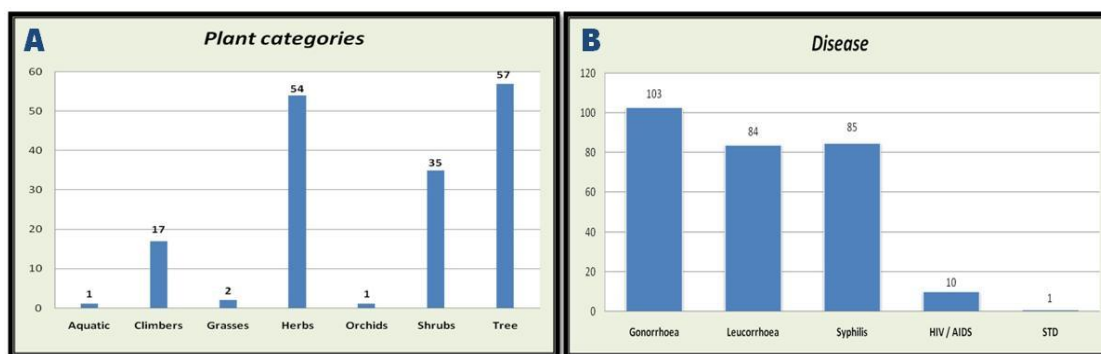
Sr. No.	Botanical names	Families	LN	Ha	FA (in Melghat)	Ailments	PU	References
84.	<i>Ficus racemosa L.</i>	Moraceae	Umber, Audumber;	Tree	Occasional	Gonorrhea Leucorrhoea	Bark; Fruits; Bark;	[3, 57] [45]
85.	<i>Ficus religiosa L.</i>	Moraceae	Pipri; Pipal; Pimpal;	Tree	Occasional	Gonorrhea Leucorrhoea	Leaves, tender shoots, Latex; Bark; Bark; Roots; Stem bark, Roots;	[3, 44, 57] [32, 38]
86.	<i>Ficus virens W. T. Aiton</i>	Moraceae	Pakri; Pakar;	Tree	Occasional	Leucorrhoea	Leaves; Bark;	[3, 33]
87.	<i>Flacourtia indica (Burm. F.) Merr.</i>	Flacourtiaceae	Kandai; Bhekal;	Tree	Common	Leucorrhoea Gonorrhea	Stem; Root bark;	[3, 38] [39]
88.	<i>Gloriosa superba L.</i>	Liliaceae	Kal-lawi,	Climbers	Common	Gonorrhea Syphilis	Whole plant; Aerial part; Tubers; Whole plant;	[3,28,35,40,44,82] [28,44]
89.	<i>Gmelina arborea Roxb.</i>	Verbenaceae	Kassmar;	Tree	Occasional	Gonorrhea Syphilis	Roots, Bark; Root bark, Leaves; Bark;	[3, 40, 49] [35]
90.	<i>Grewia tiliifolia Vahl.</i>	Malvaceae	Dhaman	Tree	Common	Syphilis	Roots, Bark, Leaves, Flowers;	[3, 44]
91.	<i>Heliotropium ovalifolium Forssk.</i>	Boraginaceae	Kunden	Herbs	Stream and river	Syphilis	Whole plant;	[3, 84]
92.	<i>Hemidesmus indicus (L.) R. Br.</i>	Apocynaceae	Anantmul;	Shrubs	At hill forests	Syphilis Leucorrhoea	Roots; Stems; Roots; Roots;	[3, 28, 48] [32, 48, 57]
93.	<i>Holarrhena antidysenterica L.</i>	Apocynaceae	Girchi;	Tree	Common	Leucorrhoea	Root bark;	[3, 38]
94.	<i>Hybanthus enneaspermus (L.)</i>	Violaceae	Sthalakamala;	Herbs	Occasional	Gonorrhea Leucorrhoea	Root; Whole plant;	[21, 85] [85]
95.	<i>Hygrophila auriculata</i>	Acanthaceae	Utkatar;	Herbs	streams and rivers	Leucorrhoea	Whole plant, leaves;	[3, 86]
96.	<i>Jatropha curcas L.</i>	Euphorbiaceae	Chandrajot	Shrubs	Occasional in villages	Gonorrhea Syphilis HIV / AIDS	Leaves; Leaves; Leaves; Leaves; Stem, Sap; Leaves;	[3, 28, 51] [28, 51] [87]
97.	<i>Justicia procumbens L.</i>	Acanthaceae	Ghati Pitpapad	Herbs	Common	HIV / AIDS	Whole plant;	[3, 88]
98.	<i>Lantana camara L.</i>	Verbenaceae	Raimuni;	Shrubs	Very common	Gonorrhea	Roots;	[3, 39]
99.	<i>Leptadenia reticulata (Retz.)</i>	Apocynaceae	Dudhkadi;	Shrubs	Rare	Gonorrhea	Roots;	[3, 39]
100.	<i>Limonia acidissima Linn.</i>	Rutaceae	Kaith	Tree	Around villages	Leucorrhoea	Fruits;	[21, 45]
101.	<i>Litsea glutinosa (Lour.) C. B. Rob.</i>	Lauraceae	Ranamba; Lenja;	Tree	In Chikhaldara range and Koktu	Gonorrhea Leucorrhoea	Leaves; Stem bark; Stem bark;	[3, 28] [38]
102.	<i>Luffa acutangula (L.) Roxb.</i>	Cucurbitaceae	Jangli Dodka; Jungli Turai;	Climbers	In Dhargad, Kelpani and Jarida	Gonorrhea Leucorrhoea	Fruits, Seeds; Fruits;	[3, 89] [49]
103.	<i>Macrotyloma uniflorum (Lam.)</i>	Lythraceae	Kurti Kalai;	Climbers	Gullarghat	Leucorrhoea	Roots;	[4, 44]
104.	<i>Magnolia champaca (L.) Baill.</i>	Magnoliaceae	Champa	Tree	-	Gonorrhea	Flowers;	[21, 35]

Sr. No.	Botanical names	Families	LN	Ha	FA (in Melghat)	Ailments	PU	References
105.	<i>Mallotus philippensis (Lam.)</i>	Euphorbiaceae	Sendri;	Tree	Higher elevations	HIV / AIDS	Fruits;	[3, 90]
106.	<i>Mangifera indica L.</i>	Anacardiaceae	Amba; Am;	Tree	Grows as wild in some deep ravines on hill slopes	Gonorrhea Syphilis HIV / AIDS Leucorrhoea	Leaves; Leaves; Stem bark; Stem bark, Leaves, Flowers; Seed;	[3, 28, 51] [28, 51] [91] [32,33,48,57,91]
107.	<i>Mimusops elengi L.</i>	Sapotaceae	Bakul	Tree	Planted	Gonorrhea Leucorrhoea	Roots; Flower;	[21, 92] [45]
108.	<i>Momordica balsamina sensu</i>	Cucurbitaceae	bara-karela; barh karelo;	Climbers	Rare; along road from Chikhaldara to Kolkhas	Syphilis Gonorrhea HIV / AIDS	Roots; Leaves; Whole plant; Fruit;	[4, 30] [30] [30]
109.	<i>Moringa oleifera Lam</i>	Moringaceae	Senja; Shevga;	Tree	Planted	STDs	Roots;	[21, 40]
110.	<i>Mucuna pruriens (L.) DC.</i>	Lythraceae	Khajkuyari;	Shrubs	Frequent;	Gonorrhea Leucorrhoea Syphilis	Seeds; Seeds; Leaves;	[3, 93] [32, 48] [93]
111.	<i>Nepeta hindostana (Roth) Haines</i>	Lamiaceae	Badranj boya;	Herbs	Chikhaldara	Gonorrhea	Whole plant;	[3, 44]
112.	<i>Ocimum canum Sims.</i>	Lamiaceae	Ran – Tulas	Herbs	-	Gonorrhea	Leaves;	[3, 57]
113.	<i>Ocimum gratissimum L.</i>	Lamiaceae	Ajavala;	Shrubs	Behali area	Gonorrhea	Whole plant; Leaves;	[21, 28, 41]
114.	<i>Oxystelma esculentum (L.)</i>	Asclepiadaceae	Dudhani	Shrubs	Rare; Dharni	Gonorrhea	Fruits;	[7, 94]
115.	<i>Paracalyx scariosus (Roxb.)</i>	Lythraceae	Ranghevada;	Climbers	Dharni tahsil	Leucorrhoea	Roots;	[4, 95]
116.	<i>Phoenix sylvestris (L.) Roxb.</i>	Arecaceae	Tadi; Shinda	Tree	Only on foot hills	Gonorrhea	Central tender part;	[3, 96]
117.	<i>Phyla nodiflora (L.) Greene</i>	Verbenaceae	Jal buti;	Herbs	Frequent	Leucorrhoea	Whole plant;	[3, 32]
118.	<i>Phyllanthus amarus</i>	Euphorbiaceae	Bhuiavali;	Herbs	Chandore	Gonorrhea	Whole plant; Whole plant;	[7, 49]
119.	<i>Phyllanthus urinaria L.</i>	Euphorbiaceae	Hajarmani	Herbs	-	Gonorrhea	Whole plant;	[21,44, 48]
120.	<i>Phyllanthus virgatus G.Forst.</i>	Euphorbiaceae	Bhui Aola;	Herbs	Occasional	Gonorrhea	Leaves, Flowers, Fruits;	[3, 44]
121.	<i>Plumbago zeylanica L.</i>	Plumbaginaceae	Chitrak	Shrubs	Frequent	Gonorrhea	Leaves, Roots;	[21, 39, 41]
122.	<i>Pongamia pinnata (L.)Pierre</i>	Lythraceae	Gangagi;	Tree	Occasional	Leucorrhoea	Stem bark;	[3, 38]
123.	<i>Portulaca oleracea L.</i>	Portulacaceae	Ghol;	Herbs	Very common	Gonorrhea Syphilis	Whole plant; Whole plant; Whole plant; Whole plant;	[3, 28, 35, 51] [28, 51]
124.	<i>Pterocarpus marsupium Roxb.</i>	Lythraceae	Bija;	Tree	Frequent	Leucorrhoea	Bark;	[3, 32]
125.	<i>Pterospermum acerifolium (L.)</i>	Malvaceae	Muchkund;	Tree	Planted	Leucorrhoea	Flower;	[21, 32]
126.	<i>Putranjiva roxburghii Wall.</i>	Putranjivaceae	Patravanti	Tree	Planted	Leucorrhoea	Seeds;	[21, 32]
127.	<i>Rubia cordifolia</i>	Rubiaceae	Manjishtha	Herbs	Chikhaldara	Gonorrhea	Roots;	[21, 39, 97]

Sr. No.	Botanical names	Families	LN	Ha	FA (in Melghat)	Ailments	PU	References
						Syphilis	Roots;	[97]
128.	<i>Salvia plebeia</i> R.Br.	Lamiaceae	Kamrkash	Herbs	Drying ponds	Gonorrhea	Seeds;	[21, 44]
129.	<i>Santalum album</i> L.	Santalaceae	Chandan;	Tree	On bordering hills	Gonorrhea	Leaves; Wood;	[21, 35, 82]
						Leucorrhoea	Roots;	[98]
130.	<i>Scoparia dulcis</i> L.	Plantaginaceae	Madhukam	Herbs	Rare, in river beds	Gonorrhea	Whole plant; Leaves, Roots;	[3, 28, 35, 40, 44]
131.	<i>Semecarpus anacardium</i> L.	Anacardiaceae	Bhilawa	Tree	Dhargad, Bori	Syphilis	Seeds;	[3, 48]
132.	<i>Shorea robusta</i> Gaertn.	Dipterocarpaceae	Guggilu; Rala;	Tree	Planted	Gonorrhea	Leaves; Bark; Seed;	[21, 31, 44]
133.	<i>Sida acuta</i> Burm. F.	Malvaceae	Chikna; Kharanti;	Shrubs	Very common	Gonorrhea	Leaves; Roots; Seeds;	[3, 31, 44, 48, 82]
						Leucorrhoea	Roots; Seeds;	[32, 48, 57]
134.	<i>Sida cordata</i> (Burm.f.) Borss.	Malvaceae	Kharenti	Herbs	Very common	Gonorrhea	Leaves, Roots, Whole plant;	[3, 44]
135.	<i>Sida cordifolia</i> L.	Malvaceae	Kharenti; Bala;	Shrubs	Common, weed in waste lands	Gonorrhea	Leaves, Roots; Seed; Whole plant;	[21,31,33, 40, 44, 48]
						Leucorrhoea	Root bark; Root;	[32, 44, 48]
136.	<i>Sida rhombifolia</i> Linn	Malvaceae	Bariara; Kharenti;	Herbs	Makhala	Gonorrhea	Whole plant;	[4, 28]
						Leucorrhoea	Roots; Whole plant;	[32, 48]
137.	<i>Smilax zeylanica</i> L.	Smilacaceae	Ram-datvan,	Climbers	Damp valleys	Leucorrhoea	Whole plant; Roots; Leaves;	[21, 32, 38, 57]
						Gonorrhea	Leaves;	[57]
138.	<i>Solanum americanum</i> Mill.	Solanaceae	Kamuni	Herbs	Common	Gonorrhea	Leaves, Roots;	[21, 39]
139.	<i>Solanum incanum</i> L.	Solanaceae	Dorli	Shrubs	Occasional	Gonorrhea	Roots, Flowers;	[3, 39]
140.	<i>Solanum surattense</i> Burm. F.	Solanaceae	Sundaka	Herbs	-	Gonorrhea	Whole plant;	[3, 48]
141.	<i>Soyimida febrifuga</i> (Roxb.) Juss.	Meliaceae	Soimi,	Tree	Common	Leucorrhoea	Bark;	[3, 99]
142.	<i>Spondias pinnata</i> (L. f.) Kurz	Anacardiaceae	Amra, Ktamba	Tree	Koktu	Leucorrhoea	Wood;	[3, 32, 48]
						Gonorrhea	Wood;	[48]
143.	<i>Streblus asper</i> Lour.	Moraceae	Karsani, Dahia	Tree	Khatkali side	Syphilis	Leaves, Stem;	[21, 28]
						Leucorrhoea	Stem bark;	[38]
144.	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Jambhul	Tree	Common	Leucorrhoea	Roots; Stem bark;	[3, 32, 38]
145.	<i>Tamarindus indica</i> L.	Lythraceae	Chinch, Imli	Tree	Occasional	Syphilis	Leaves;	[3, 28]
						Gonorrhea	Bark; Root;	[35]
146.	<i>Tectona grandis</i> L. f.	Verbenaceae	Sagwan	Tree	Very common	Gonorrhea	Bark, Wood, Fruit;	[3, 35]
147.	<i>Tephrosia purpurea</i> (L.) Pers.	Leguminosae	Avasa	Shrubs	Around villages	Gonorrhea	Whole plant; Leaves;	[3, 31, 35]
148.	<i>Terminalia arjuna</i> (Roxb.)	Combretaceae	Koha, Kahu	Tree	Common	Leucorrhoea	Bark; Stem bark; Stem bark;	[32,33,38,45,48, 57]
149.	<i>Terminalia chebula</i> Retz.	Combretaceae	Karka, Harro	Tree	Semadoh and Chaurakund areas	Leucorrhoea	Fruits;	[3, 32, 100]
						HIV / AIDS	Fruits;	[100]

Sr. No.	Botanical names	Families	LN	Ha	FA (in Melghat)	Ailments	PU	References
150.	<i>Tinospora cordifolia</i>	Menispermaceae	Guduchi, Giloy	Herbs	Occasional	Leucorrhoea Gonorrhea	Stems; Whole plant;	[3, 32] [49]
151.	<i>Trema orientalis (L.) Blume</i>	Ulmaceae	Ghatari,	Tree	Belkund, Dhakna,	Gonorrhea	Leaves; Bark;	[3, 45]
152.	<i>Trianthema portulacastrum L.</i>	Zygophyllaceae	Khaparkhuti	Herbs	In river beds	Gonorrhea	Leaves;	[3, 101]
153.	<i>Tribulus terrestris L.</i>	Zygophyllaceae	Gokharu	Herbs	Dry lands	Gonorrhea	Fruits;	[3, 31]
154.	<i>Trichosanthes cucumerina L.</i>	Cucurbitaceae	-	Climbers	Chaurakund	HIV / AIDS	Aerial part;	[7, 40]
155.	<i>Triumfetta rhomboidea Jacq.</i>	Tiliaceae	Anduli	Shrubs	Common	Gonorrhea Leucorrhoea	Leaves, Flower, Fruit; Leaves, Roots;	[3, 49] [32, 33, 35]
156.	<i>Uraria picta (Jacq.)DC.</i>	Lythraceae	Bishnaparni,	Shrubs	Occasional	Gonorrhea	Leaves;	[3, 102]
157.	<i>Urena lobata L.</i>	Malvaceae	Unga	Shrubs	Frequent	Gonorrhea	Leaves; Roots;	[3, 35]
158.	<i>Vallisneria spiralis (L.) Kuntze</i>	Apocynaceae	Ramsur	Climbers	-	Syphilis	Latex, Stem;	[21, 44]
159.	<i>Vanda tessellata (Roxb.)</i>	Orchidaceae	Banda, Aitkel	Orchid	Fairly common	Syphilis	Roots; Leaves;	[3, 103]
160.	<i>Ventilago denticulata Willd.</i>	Rahamnaceae	Kharbel	Climbers	Stream and River	Syphilis	Root, Flowers, Bark; Whole plant;	[3, 44]
161.	<i>Vernonia cinerea (L.) Less</i>	Asteraceae	Sahdevi	Herbs	Very common	Leucorrhoea	Whole plant;	[3, 32, 44, 48, 59]
162.	<i>Viscum articulatum Burm. f.</i>	Santalaceae	Banda, Budu	Shrubs	Bori and Koktu	HIV / AIDS	Whole plant;	[3, 104]
163.	<i>Vitex negundo L.</i>	Verbenaceae	Nirgudi;	Shrubs	Abundent	Gonorrhea Leucorrhoea Syphilis	Roots; Fruits; Fruits; Leaves, Roots, Flower;	[3, 35] [35] [44]
164.	<i>Withania somnifera (L.) Dunal</i>	Solanaceae	Ashwagandha	Shrubs	Semadoh	Leucorrhoea	Roots;	[21, 48]
165.	<i>Woodfordia fruticosa (L.) Kurz</i>	Lythraceae	Dhi, Khinni	Shrubs	Frequent	Leucorrhoea Syphilis	Flowers; Leaves, Bark, Flowers;	[3, 32, 48] [44]
166.	<i>Xanthium strumarium L.</i>	Asteraceae	Gokharu	Herbs	Very common	Leucorrhoea	Flowers, Fruits; Whole plant;	[3, 38]
167.	<i>Ziziphus mauritiana Lam.</i>	Rahamnaceae	Bor, Ber	Tree	Village sites	Leucorrhoea	Seeds;	[3, 32]

LN – Local Name, Ha - Habit, FA - Floristic Allocation & PU – Part Used.



Graph 1. A) Plant categories Vs Number of Plants B) Disease Vs Number of Plants

4. CONCLUSION

This literature review reveals that herbal remedies used for STI from the Melghat region of Maharashtra, India has intended to document the folk, indigenous practices and serve as scientific baseline information for researchers engaged in herbal drug discovery and development. All the plants reviewed exhibited potent activity confirming their various traditional uses and their ability to treat prevalent diseases. Therefore, it is the need of the subject to study these plants for further details, by isolating active compounds which can be processed into new and potent medicines and the need to study their mechanisms of action.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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