

Saracaasoca (Roxb)Willd.: A Comprehensive Review of a Vulnerable Medicinal Tree of India

Ashwini¹, Pooja R², Y R Karthik³, Padmalatha S Rai^{4*}, and Y.L. Ramachandra¹

¹Department of Biotechnology and Bioinformatics, Kuvempu University, Jnanasahyadri, Shankaraghatta, Shivamogga -577 451, Karnataka, India

²Department of Biotechnology, Surana College Autonomous, Southend Road, Bangalore-560004, Karnataka, India

³Department of Paediatrics, Shridevi Institute of Medical Sciences and Research Centre, Sira Road, Tumakuru-572106, Karnataka, India

^{4*}Department of Biotechnology, Manipal School of Life Sciences, Manipal Academy of Higher Education, Manipal-576 104, Karnataka, India

Abstract

Ayurveda is a traditional System of medicine consisting of herbal therapies used systematically. *Saracaasoca* (Roxb.) Willd. Is an indigenous plant belonging to the Caesalpiniaceae Subfamily of the legume. *Saracaasoca* is an evergreen tree of medium size. The objective of this review is to provide the detailed features of Phytochemicals, Medicinal value, and Pharmacological Significance. It has been listed as a “Globally vulnerable” group of IUCN. All parts of this plant are pharmacologically important and are used to manage various gynaecological disorders like uterine bleeding, leucorrhoea, menorrhagia, and dysfunction. *S. asoca* contained phytoconstituents like steroids, glycosides, carbohydrates, tannins, flavonoids, and proteins and showed a lot of pharmacological activities like oxytocic, uterotonic, anti-menorrhagic, anticancer, anti-progestational, anti-mutagenic, genoprotective, antibacterial, spasmogic and dermatoprotective. *Asoca* herbs are reported in pharmacological actions, pharmacognostical information, and phytoconstituents. *S. asoca* plants are used for screening their endophytes for pharmaceutical-related compounds. This review paper will provide sufficient information for the researchers and pharmaceutical industry to manufacture the pharma worth of this natural product.

Keywords: Endophytes, Gynaecological disorder, Pharmacognosy, Pharmacology, Phytoconstituents, *asoca*

Introduction

Herbal medicine has an extraordinary property due to numerous alternative medicine therapies to treat patients with herbal remedies. India has been referred to as the best medicinal garden in the world. It contains an enormous wealth of medicinal plants. Plant materials have been used for many medicinal purposes. Plant material is a source of medicines for various human ailments. *Asoca* is one of the most ancient medicinal plants in India. It belongs to the Caesalpiniaceae family binomial nomenclature *S. asoca* (Roxb.) Willd. In the Sanskrit meaning of Ashoka is “without sorrow” [1]. Ashoka tree is especially sacred to the Hindu God of love Kamadeva worshipped on Dec 27. Gautama Siddhartha was said to have been born under the Ashoka tree. In the Ramayana Ashoka tree is mentioned as “Ashoka Vatika” where Hanuman first meets Sita. Its original distribution is in the central areas of the Deccan plateau and the middle section of the Western Ghats in the Western coastal zone of the Indian subcontinent [2]. Its flowering season is around Feb-April. The flower's color is bright orange-yellow color and turns red before it falls. Generally, the bark of Ashoka is used for the treatment of feminine disorders like anthelmintic, demulcent, enlargement of the abdomen colic, piles, ulcers, bloody discharges from the uterus, and menorrhagia. Bark is much used in uterine affections, especially menorrhagia. Seeds are useful for treating urinary discharges.

Abbreviations: International union for conservation of Nature (IUCN), High Performance of Liquid Chromatography (HPLC).



Fig.1. *S. asoca* tree Fig. 2. *S. asoca* Leaves Fig.3. *S. asoca* Flowers Fig.4. *S. asoca* Bark

Scientific Classification

Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Order : Fabales
Family: Caesalpiniaceae
Genus: *Saraca*
Species: *asoca*

A. Vernacular Names of *S. asoca* in India

Sanskrit- Kankeli, Asoka; Gandhpuspha;
English- Asoka tree;
Hindi- Ashoka, Anganpriya;
Marathi- Ashoka;
Bengali- Ashoka, Ashok;
Gujrati- Asupala, Ashopalav
Telugu- Asok;
Tamil Nadu- Asogam;
Punjabi- Ashok
Kannada - Ashokadamara

Significance Of Ashoka Tree In Hindu Mythology

In ancient times Ashoka tree is revered in Hindu mythology, Sculpture, art, and the Ramayana. SitaSat under the Ashoka tree in Lanka the tree is Significant in Buddhism because Shakyamuni/ Gautam Buddha is claimed to have been born under the Ashoka tree in Lumbini Garden. In Sanskrit Ashoka is a term that signifies the “free of grief”. Ashoka trees have been used as a regular ornamental motif. In the first month of the Hindu Calendar, Chaitra month Ravana led Sita Mata to Ashoka Vatika Lanka in the Ramayana. Ashoka flower buds are eaten by married women in India as a ritual to invoke deities for child protection as well as gynecological problems. Ashoka has been used to treat heart tonic tumors and abdominal pain. In the 15th century AD Ayurvedic book Kayadeva Nighantu describes the uses of Ashoka bark and flowers in menorrhagia, bleeding piles, dysentery and to prevent abortion. In the 19th century AD text, Saligram Nighantu cited the use of Ashoka to improve skin complexion treatment as well as abdominal pain, piles, abdominal complications, burning sensation, tumors, etc.

A. Morphological Characteristics of *S. asoca*

LEAVES: *S. asoca* leaves are alternate, paripinnate, 15-20cm long which have 4-6 pairs of leaflets and oblong-lanceolate, obtuse or acute, glabrous with a rounded base. Leaves are copper red when young and green on maturity [3].

FLOWERS: Flowers are fragrant, and borne in dense axillary dense corymbs. Flowers are yellow Bisexual aromatic, Staminate, and astringent in taste. It shows an orange color and white fragrance [4,5].

FRUITS: Fruits are pod, flat, oblong, and apiculate [4].

SEED: In pod contains 4-8 seeds which are ellipsoid, oblong, compacted, and covered with a seed coat. The Seeds turn black on maturity [5].

BARK: The bark is grey or dark down covered with a warty, surface. Bark is rough to touch, due to the presence of lenticels[4,5]. The *S. asoca* bark is the most important part of its medicinal value.

B. Phytoconstituents from Different Parts of *S.asoca*

Plant parts	Phytoconstituents
Flower	Oleic, linoleic, palmitic and stearic acids, sitosterol, quercetin kaempferol, quercetin, apigenin-7-O-P-D-glucoside pelargonidin-3,5-diglucoside, cyanidin-3,5-diglucoside, palmitic, stearic, linolenic, leucocyanidin and gallic acid.
Bark	Procyanidin, epicatechin, 11-deoxy procyanidin B, catechinleucopelargonidin and leucocyanidinxylopyranosyl, isolariciresinol, and schizandriside, and 3 flavonoids, epiafzelechin-(4 β →8)- epicatechin and procyanidin B2, epicatechin together with β - sitosterol glucoside
Seed and pod	Oleic, linoleic, palmitic, and stearic acids, Catechol, (-) epicatechol, and leucocyanidin.

Phytochemical and pharmacological study of *s. Asoca*

The *S. asoca* leaves are used to cure a wide range of various diseases. *S. asoca* flowers contain several chemical compounds that may be responsible for the various pharmacological actions. Methanolic extracts of flowers and leaves confirmed the presence of gallic acid using HPTLC, assay [6]. The extracts obtained were subjected to various phytochemical tests where ethyl acetate extract showed more active constituents compared to other extracts. In this study, the researchers have observed that the most active principles present in the flowers are flavonoids, steroids, tannins, and glycosides [7,8,9,10]. The leaves have shown the properties to purify the blood and drinking cumin seeds mixed with its juice is beneficial in stomach ache [11].

Table 1. Various Commercially sold Ashoka-based herbal drugs/formulations

Trade Name	From	Indications recommended for	Company
Evicare ^a	S	Menstrual disorders	Himalaya
Menosan ^a	T	Menopause-related indications	Himalaya
Ovoutoline ^a	S&T	Menorrhagia, dysmenorrhea, irregular menstruation, post-menopausal syndrome	Zandu
Restone ^a	T	Premenstrual tension, menopausal syndrome, genitourinary diseases	Maharishi Ayurveda
Menorex ^b	C	Menorrhagia, dysmenorrhea, irregular menstruation	Aryavaidya pharmacy
Femiplex ^a	C	Leucorrhoea	Charak
Ayapon ^a	T	Menorrhagia, metrorrhagia, Pubertal and menopausal bleeding	Alarsin
Shvet ^a	C	Leucorrhoea, menorrhagia, dysfunctional uterine bleeding	Shree dhanwantari Herbals
Pradarsudha ^a	S	Leucorrhoea, menorrhagia	Patanjali Ayurved
Femohills ^a	C	Leucorrhoea, menorrhagia, dysmenorrhea, lower back pain	Herbalhills
Menocramp ^a	T	Spasmodic and lower back pain, stress, and mood swings	Soulmiks
Ashotone ^a	T	Excessive bleeding, stress	Soulmiks

Asokchurna ^b	P	Leucorrhoea, dysmenorrhea, gynecological disorders	Hidco
Pradarantakchurn ^c	P	Leucorrhoea, irregular menses, premenstrual syndrome, ovarian cysts, uterine fibroids, dysfunctional uterine bleeding	Charak
M2-Tone Forte ^a	S	Excessive bleeding, menstrual flow issues	Charak
M2-Tone ^a	T	Irregular menses, gynecological disorders	Charak
Masturin ^a	S	Irregular menses, leucorrhoea, dysmenorrheal, uterine inflammation	Hamdard
Ashokrista ^a	S	Leucorrhea, dysmenorrhea, menorrhagia, dysfunctional uterine bleeding, gynecological disorders	Dabur

- **Source: Internet: This is not a comprehensive list.** ^aAshoka + other herbs, ^bAshokaonly, ^cAshoka+ayurvedic formulation; S, syrup; T, Tablets; C, capsules and P, powder.

Table 2. Classical uses of *S. asoca*

Plant parts	Treatment
Leaves	Uterine, genital, reproductive disorders in women, ailments of the urogenital tract, fever, pain
Stem	Anti-inflammatory, cardioprotective
Bark	Anti-oxidant
Flower	Anti-cancer, anti-oxidant, anti-diabetic
Pod	Anti-inflammatory, anti-oxidant, anti-microbial

Bioactive Compounds application from various *S.asoca* plant parts use various extracting Solvents.

The table below gives a brief detail about the parts of the plants, their extracts, and bioactive Compound applications of *S. asoca*. Studies have been done on different parts of plants like leaves, stems, flowers, and seeds. Phytochemicals are extracted using extracting solvents such as ethanol, methanol, ethyl acetate, chloroform, etc.

Class of compounds	Plant Organ	Extraction Solvent	Biological function
Phenolic acids	Bark, flowers, leaves	Ethyl acetate	Hypolipidemic, anti-cancer, anti-oxidant, anti-diabetic
Flavonols	Seed, Pod, Bark, leaves	Hexane, benzene, chloroform, methanol, water, hot water	Anti-inflammatory, anti-oxidant, anti-microbial
Flavonol glycosides	Bark, flowers	Ethanol, methanol, water	Anti-inflammatory, anti-oxidant, anti-diabetic
Lignan glycosides	Bark, leaves, flowers	Methanol	Anti-oxidant
Steroidal glycosides	Bark	Methanol	Anti-oxidant
Steroids	Leaves, stem	Hexane, Chloroform, methanol, water, hot water	Hypolipidemic, anti-oxidant, anti-diabetic
Alkaloids	Leaves	Chloroform, ethanol, methanol, water	Anti-oxidant
Terpenoids	Leaves	Methanol	Anti-oxidant
Fattyacids	Leaves, stem	Hexane, Chloroform	Anti-inflammatory, Cardioprotective
Tannins	Bark	Acetone	Anti-oxidant

Biological and Pharmacological properties of *S. asoca*

I. Anti-bacterial activity: Antibacterial properties reported by methanolic, ethanolic, acetone, and aqueous extracts of bark, dried flower buds, and leaves of *S. asoca* have been against many pathogenic bacteria such as *B.subtilis*, *E.coli*, *S. aureus*, *K. pneumonia*, *P. aeruginosa*, *Proteus vulgaris*. To find single molecular antibiotics in the future against the rising resistance of several human pathogenic bacteria to the known major antibiotics [12].

II. Anti-fungal activity: Antifungal activity of methanolic and hot water extracts of *S. asoca* leaves and bark against *Alternariaalternata*, *Collectotrichumgloeosporioides*, *Drechleraspecifera*, *Alternariacajani*, *Fusariumsp*,

A. fumigatus, *A. flavus*, *Curvularialunata*, *Bipolaris* sp, and *Helminthosporium* these have been reported by various groups [13,14]. The findings were visualized in terms of the zone of inhibition after a 24-hour incubation period, the zones diameter was measured by using millimeters.

III. Anti-Cancer activity: *S. asoca* flowers showed the presence of 50% Cytotoxicity (*invitro*) in Dalton's lymphoma ascites and sarcoma 180 tumor cells at a concentration of 38µg and 54µg [15,16].

IV. Antioxytotic activity: The plant was seen in oxytotic activity in rat and human-isolated uterine preparations. The alcoholic extract was shown moresensitive to estrogen primed were pentolinumbitartrate completely blocked the oxytotic action [17].

V. Antiulcer activity: *S. asoca* flowers are shown against gastric ulcers in albino rats. *S. asoca* exhibits an antiulcer activity showing the possible mechanism including inhibition of basal gastric secretion, stimulation of mucus secretion, and endogenous gastric mucosal prostaglandin synthesis [18,19].

VI. Larvicidal activity: The petroleum ether and Chloroform extracts of the bark, leaves, and flowers of *S. indica* have been shown to Significantly reduce the population of the mosquito *Culexquinquefasciatus* [20,21] they control the breeding of insect vectors.

VII. Anti-diabetic activity: *S. asoca* dried bark powder consumed with milk or as a decoction is taken twice per day to cure diabetes [22].

VIII. Anti-helminthic activity: In the human body presence of parasitic worms to leads malnutrition, weakness, and Susceptibility to bacterial and viral infection. *S. asoca* leaves have methanolic extracts that paralyze and kill the adult Indian earthworm, *Pheritimaposthumaw* which resembles a human round-worm parasite [23,24].

IX. Anti-inflammatory activity: *S. asoca* leaves are used to determine the anti-inflammatory activity against Carrageenan paw edema in animals is the most suitable test procedure to screen for anti-inflammatory activity. Anti-inflammatory activity is shown at the dose of 200mg/kg [25,26].

X. Analgesic activity: The analgesic activity above extract was evaluated by using the tail immersion method and formalin-induced pain method in albino mice.

XI. Uterine tonic activity: The herbal preparation of U-3107 is formulated with different plant extracts which are useful in a variety of menstrual disorders. Such as puberty, menorrhagia, Dysmenorrhagia, Premenstrual Syndrome, abnormal bleeding, and threatened abortion [27].

XII. Antimenorrhagic activity: In India, *S. asoca* flower and dried bark are given as a tonic to women in case of uterine disorders. *S. asoca* stem, bark is also used to treat disorders, like the menstrual cycle [28,29,30,31].

XIII. CNS depressant activity: *S. asoca* leaves show CNS depressant activity. The activity was evaluated using Phenobarbitone-induced sleeping time by using an actophotometer [32].

XIV. Anti-nephrolithiatic activity: *S. asoca* root has been used in conditions of urinary passage obstruction due to kidney stones and dissolved oxalic acid stones present in the kidney [33,34,35].

XV. Antimutagenic and genoprotective effect: *S. asoca* is also known as a good source of antioxidants which may reduce mutagenesis. Mutagenesis can cause cancer and other debilitating diseases. *S. asoca* bark extract has been shown to prevent mutagenesis in *Salmonellastrains* [36].

XVI. Dermatoprotective: Several reports have described the presence of flavonoids in *S. asoca* flower extracts which have been shown to reduce skin tumors induced by 7,12-dimethyl benzanthracene [37].

XVII. Antiarthritic activity: *S. asoca* using the model system of carrageenan-induced paw edema and also brine shrimp assay [38,39,40,41,42].

XVIII. Cardioprotective activity: Cardiovascular diseases are generally attributed to the inflammatory response mediated by proinflammatory cytokines.

XIX. Hypolipidemic activity: *S. asoca* extracts were reported to have lower lipid and cholesterol content and reduce elevated glucose levels in a dose-dependent manner[43,44].

Commercial applications: *S.asoca*, commonly known as the Ashoka tree, is a plant with noteworthy medicinal properties deeply rooted in traditional Indian medicine. *S. asoca* has a rich historical background of utilization in the management of gynecological disorders and various other ailments, earning immense respect within the community.

Conclusion:

S. asoca is a universal remedy in the classical Indian text and is used to treat many disorders such as hemorrhoids, uterine bleeding, dysfunction, leucorrhoea, and menorrhagia. Ashoka drug of choice in females endowed with large-scale pharmacological activities such as, anti-cancer, anti-microbial, anti-menorrhagic, larvicidal, anti-tumor, anti-oxidant, CNS depressant, anti-diabetic, anti-estrogenic, anti-progestational, anti-mutagenic, dermatoprotective, genoprotective. These are used extensively in Ayurveda, Unani, and Homeopathic science of medicine. It has been listed as a Globally vulnerable category of IUCN. *S. asoca* plant contains many phytochemical compounds such as flavonoids, glycosides, proteins, tannins, saponins, steroids, etc. *S. asoca* plant lacks comprehensive modern scientific investigations like Spectroscopy, Metabolomics, Spectrometry, Molecular and Physicochemical-based research studies for its pharmacological value and also purpose oriented rapid, scientific standardization *asoca* cell culture technique are also essential to study different aspects of its metabolite production. Ashoka-associated bioactive secondary metabolites pharmaceutical bioprospecting of *S. asoca*-associated endophytes provide a new dimension to expand the pharma worth of this plant. *S. asoca* are medicinal plant that shows significant anti-cancer activity due to the presence of some natural compounds like anti-oxidants, Flavonoids, and Phenolics compounds these are characteristically against different types of Cancer. It has many medicinal uses and is also a non-toxic traditional medicinal plant. In *S. asoca* Plant microorganisms were present within the limits of the Ayurvedic Pharmacopoeia of India. *S.asoca* shows antibacterial activity against various microorganisms.

Declaration statement:

Funding	No, I didn't receive
Conflict of Interest	No potential conflict of Interest relevant to this article was reported.
Ethical Approval and Consent to Participant	No, the article does not require ethical approval and consent to participate with evidence

References:

- Borokar A., Pansare T.A., Plant profile, Phytochemistry and Pharmacology of Ashoka (*Saraca Asoca* (Roxb), De.Wilde-A Comprehensive Review. *International Journal of Ayurvedic and Herbal Medicine*.2017;2524-2541.
- Pradhan P., Joseph L., Gupta V., Chulet R., Arya H., Verma R., Bajpai A., *Saraca asoca* (Ashoka): A Review. *Journal of Chemical and Pharmaceutical Research* .2009;1(1):62-71.
- Shukla Saluja, Yogendra K., Gautam. Plant Profile, Phytochemistry, Pharmacology and Genetic Diversity of *Saraca asoca*: a vulnerable medicinal tree of India. *J. Indian bot. soc.*2023;vol.103(2):109-108. <https://doi.org/10.5958/2455-7218.2023.00018.9>.
- Satish A Bhalerao, Deepa R Verma et.al. *Saraca asoca* (Roxb), De.Wild: An overview. *Annals of Plant Sciences*.ISSN:2287-688X.2014.
- Smitha G.R., Thondaiman V., Reproductive biology and breeding system of *Saraca asoca* (Roxb.) De Wilde: a vulnerable medicinal plant. *Springer Plus*.2016;vol.5 2025.
- Jayita Saha et.al. Phytoconstituents and HPLC Analysis in *Saraca asoca* (Roxb.) Wilde. *International Journal of Pharmacy and Pharmaceutical Sciences*.2012;ISSN.0975-1491.
- Maruthappan V., Shree K.S., Antiulcer activity of aqueous suspension of *Saraca indica* flower against a gastric ulcer in albino rats. *Journal of Pharmacy Research*.2010;3(1):P.17-20.
- Gosh S., Majumder M., et.al. Saracin: A Lactin from *S. indica* Seed Integument Induces apoptosis in Human T- Lymphocytes. *Archives of Biochemistry and Biophysics*, 1999;371:P.163-68.

9. Mathew N., Anitha M.G.,*et.al.* Larvicidal activity of *Saracaindica*, *Nyctanthesarbor-tristis*, and *Clitoriaternatea* extracts against three mosquito vector species. *Parasitology Research*. 2008;104:P.1017-25.
10. Cibin TR., Gayathri DD., Abraham A., Chemoprevention of skin cancer by the flavonoid fraction of *Saracaasoca*. *Phytotherapy Research*. 2010; 24:P.666-72.
11. Rasekar V., Shahi S., Medical application of Ashok tree (*Saracaasoca*): A review. *International Journal of Health Sciences*. 2022;6(52),8752-8759.
12. Shirolkar, A.,Gahlaut,A.,Chillar, A.K. and Dabur, R., Quantitative analysis of catechins in *S. asoca* and correlation with antimicrobial activity. *J. Pharm,Anal.*,2013;3,421-428.
13. Seetharam, N., Sujeeth, H., Jyothishwaran, G., Barad, A., Sharanabasappa, G. Shabana,P., Antibacterial activity of *Saracaasoca* bark. *Indian J. Plant Sci.*,2003;65,658-659.
14. Dabur, R., Gupta, A., Mandal, T.K., Singh, D.D., Bajapai,V.,Gurav, A.M. and Lavekar, G.S., Antimicrobial activity of some Indian Medicinal Plants. *Afr.J.Trad.CAM*;2007; 4,313-318.
15. Cibin,T.R., Devi, D.G.and Abraham, A., Chemoprevention of two-stage skin cancer *in vivo* by *Saracaasoca*. *Integr. Cancer.ther.*,2012;11,279-286.
16. Kaur,J.D. and Misra, K., Biological and Pharmacological activity of *Saracaasoca*: anticancer activity. *J.Indian Chem.Soc.*,1980;57(12),1243.
17. ManjunathKP,Shivakumar H, Prakash T, PatilKS,VeeranagoudaA,Jayakumarswamy BHM, Venkatesh,NagendraRao R, Anthelmintic activity of roots of Swertiachirata, Ind.*J.Nat.Prod*,2006;(1),8-10.
18. Maruthappan V,Sakthisk, Antiulcer activity of aqueous Suspension of *Saracaindica* flower against gastric ulcers in albino rats.*ResearchGate*. 2010.
19. Njar VCO, Adesanwo JK, Raji Y, Methyl A, The antiulcer agent of the stem bark of *Entandropharmaangolense*, *planta Med*, 1995;61,91-92.
20. Mishra, A., Kumar, A., Rajbhar, N. and Kumar, A., Phytochemical and Pharmacological importance of *Saracaindica*. *Int. J. Pharm. Chem. Sci.*,2013;2,1009-1013.
21. Mathew, N.,Anitha, M.G.,Bala, T.S.L.,Sivakumar, S.M.,Narmadha, R. and Kalyanasundram, M., Larvicidal activity of *Saracaindica*, *Nyctanthesarbor-tristis*, and *Clitoriaternatea* extracts against three mosquito vector species. *Parasitol. Res.*,2009;104.1017-1025.
22. Dhawan BN, Patnaik GK, Rastogi RP, Singh KK, Tandon JS, Screening of Indian plants for biological activity part VI, *Indian J. Exp. Biol*,1977,15,208-219.
23. Preeti, B., Bharti, A., Sharma, A. and Vishwabhan, S., A review on *Saracaindica* Plant. *Int.Res.J.Pharm.*,2012;3,80-84.
24. Sarojini, N.,Manjari, S.A. and Kanti, C.C., Phytochemical Screening and anti-helminthic activity study of *Saracaindica* leaves extract. *Int. Res.J.Pharm.*,2011;2,194-197.
25. Nayak S, Sahoo AM, Chakrabarti CK, Haque MI, Antibacterial Study of *Saracaindica* leaves extract, *IJPRD*,2011;3(3),160-163.
26. Acharyya S, Patra A, Prasanta KB, Evaluation of the antimicrobial activity of some medicinal plants against enteric bacteria, *Tropical Journal of Pharmaceutical Research*, 2009;8(3),231-237.
27. Mitra SK, Gopumadhavan S, Venkatarangana MV, Sharma DNK and Anturlikar SD. Uterine tonic activity of U-3107(even care),aherbal preparation in rats, *Indian Journal ofPharmacology*, 1999;31, 200-203.
28. Middelkoop TB, Labadie RP,Pharmacognostical and Phytochemical Studies of AnAyurvedic drug *Saracaasoca* stem bark.*Int. J. crude Drug Rec.*,1986;24(1),41-44.
29. Bhandary MJ, Chandrasekhar KR, Averiappa KMK, *J.EthnoPharmacol*,1995;47(3),149-158.
30. Kumar Y, Haridasan K, Rao RR, Ashoka (*Saracaindica*) as a women-friendly plant: A review. *ResearchGate*. 2017.
31. Middelkoop TB, Labadie RP, The Action of *Saracaasoca*Roxb. De Wilde bark on the PGH2 synthetase enzyme complex of the sheep vesicular gland. *Section C, Journal ofBiosciences*. 1985;40(7-8):523-526. <https://doi.org/10.1515/znc-1985-7-812>.
32. Verma A, Houtem KRJ, Raja, Sens, Sachans, Mishra A, Pharmacological evaluation of *Saracaindica*leaves for CNS depressant activity in mice.*J.Pharm Sci, Res*. Vol.2010;2(6),338-343.
33. Pradhan, P., Joseph, L., Gupta, V., Chulet, R., Arya, H., Verma, R. and Bajpai, A., *Saracaasoca* (Ashoka): a review. *J.Chem.Pharm. Res.*,2009;1,62-71.
34. Begum, S.N., Ravikumar, K. and Ved, D.K., 'Asoka'- an important medicinal plant, its market Scenario and Conservation measures in India *Curr.Sci.*, 2014;107,26-28.
35. Godara, D., Kaushik, V., Sharma, G. and Saini, V., A method of isolation ofCapparisterol from *Capparis decidua* and antinephrolithiasis activity. *Ann. J. Adv. Drug. Del.*,2015;3,86-94.

36. Nag, D., Ghosh, M. and Mukherjee, A., Antimutagenic and genoprotective effects of *Saracaasoca* bark extract. *Toxicol. Indian Health*, 2013; 8,696-703.
37. Cibin, T.R.,Devi, D.G. and Abraham, A.,Chemoprevention of two-stage skin cancer *invivoby Saracaasoca*. *Integr. Cancer. Ther.*, 2012;11,279-286.
38. Pradhan, P., Joseph, L., Gupta, V., Chulet, R., Arya, H., Verma, R. and Bajpai, A., *Saracaasoca* (Ashoka): a review. *J. Chem. Pharm. Res.*, 2009;1,62-71.
39. Mishra, A., Kumar, A., Rajbhar, N. and Kumar, A., Phytochemical and Pharmacological importance of *Saracaindica*. *Int. J. Pharm.Chem.Sci.*,2013;2,1009-1013.
40. Preeti, B., Bharti, A., Sharma, A. and Vishwabhan, S., A review on *Saracaindica*Plant. *Int. Res.J.Pharm.*,2012;3,80-84.
41. Preeti, F. and Krishnakumar, K., Anti-inflammatory activity of thebarks of *Saracaindica* Linn. *Pharmacology Online*,2011;657-662.
42. Shelar, D.B., Shirote, P. J. and Naikwade, N.S.,Anti-inflammatory activity and brine Shrimps lethality test of *Saracaindica* (Linn.) leaves extract. *J.Pharm.Res.*,2010;3,2004-2006.
43. Jain, A., Jasmine, Sharma, S. and Saini, V., Hypolipidemic, the hypoglycemic and antioxidant potential of *Saracaasoca*ethanolic leaves extract in Streptozotocin induced-experimental diabetes. *Int.J.Pharm.Sci*,2013; 5, 302-305.
44. Kumar, S.,Narwal, S.,Kumar, D., Singh, G., Narwal, S. and Arya, R., Evaluation of antihyperglycemic and antioxidant activities of *Saracaasoca* (Roxb.)De Wild leaves in Streptozotocin-induced diabetic mice. *Asian Pac. J.Trop.Med.*,2012;1,170-176.