Natural Resources for Human Health

visaga publishing house

Review

View Article Online

Check for updates

Received 28 November 2022
Revised 16 December 2022
Accepted 29 December 2022
Available online 07 February 2023

Edited by Barbara Sawicka

KEYWORDS:
Ethnomedicine
Fabaceae
Phytochemicals
Rajasthan
Tribes

Natr Resour Human Health 2023; 3 (2): 237-247
https://doi.org/10.53365/nrfhh/158809
eISSN: 2583-1194

Ethnomedicinal importance of Fabaceae family (Angiosperms) among the tribes of Rajasthan, India

Raj Shreya [1], Bhawana Sharma [1], Afroz Alam [1,*], Supriya Kumari Sharma [1]

[1]Department of Bioscience and Biotechnology, Banasthali Vidyapith, Tonk, Rajasthan, 304022, India

ABSTRACT: Among angiosperms, the Fabaceae (Leguminosae) family is well known for providing traditional or ethnic food and medicine. This family has three subfamilies with approximately 665 genera and 17500 species worldwide, with approximately 1100 species and 100 genera represented in India. *Astragalus* (>3000 species), *Acacia* (>1000 species), and *Indigofera* (>700 species) are the largest genera in this family. Many species in these genera have been identified as producing a variety of phytochemicals, including 3-nitropropanoic acid, a powerful mycotoxin. Almost every tribal community in India is aware of the medicinal uses of leguminous plants. In this regard, India's arid state can be regarded as an extremely rich territory; thus, a review of the scientific literature on their phytochemical characteristics and ethnomedicinal uses is expected to contribute to the further exploration and utilization of members of this large plant family.

1. INTRODUCTION

India is one of the world's 36 recognized biodiversity hotspots, and it is home to four of them: the Himalayas, the Western Ghats, the Indo-Burma region, and Sundaland. India is not only rich in floristic diversity, but also in traditional knowledge of drug plants, which are mentioned and frequently used in the traditional Indian medical systems, Ayurveda and Siddha. According to a World Health Organization (WHO) survey, approximately 80% of the global population relies on traditional medicinal herbs to meet their basic health care needs (Krishnaraju et al., 2005).

The discovery of therapeutic plants in folk and traditional herbal medicines has been greatly aided by information obtained from ethnic groups about traditional indigenous medicines. Plants have traditionally served mankind admirably as reservoirs of remedies in the prevention and treatment of many chronic ailments in humans and their livestock (Nonita & Mylene, 2010). Herbal medicines are becoming more popular because they have fewer side effects, which is why villagers continue to explore plants for ethnomedicinal purposes.

Ethnobotanical research is critical for understanding how traditional communities use plants for medicinal purposes and for preserving folk culture (Sebastian & Bhandari, 1984, 1988). Findings from ethnobotanical research help to reveal the relationship between modern and traditional knowledge, making it an important means for learning the biological properties of medicinal plants (Macêdo et al., 2020). S. Jain et al. (2009) made an important contribution when they described the Ethnobotanical Survey of the Sariska and Siliserh Regions of Rajasthan's Alwar District.

These indigenous tribes and ethnic races have their own traditions, customs, specters, religious events, medicines, agricultural practices, and so on. Because they have a tremendous opportunity to explore flora resources in the deepest points of rarely reached areas, these ethnic tribes use a wide range of cultivated and wild plants to cure a variety of illnesses. Their understanding of the flora in their surroundings supplements pharmaceutical or phytochemical knowledge (K.L. Meena & Yadav, 2010; Rana et al., 2014).

2. ARID STATES OF INDIA

Rajasthan is one of India's largest states, located in the country's north-western region. Rajasthan, popularly known as the "Land of Kings and Kingdoms," is a dome of cultural heritage located in the northwest of the country, sharing an international boundary with Pakistan in the west and north-west and domestic boundaries with Punjab, Haryana, and UP in the north and north-east, UP and MP in the east and south-east, and Gujarat in the south-west. Their architecture and way of life reflect the richness and enrichment of their culture.

* Corresponding author.
E-mail address: aafroj@banasthali.in (Afroz Alam)

Because of the state's varying climatic conditions and rainfall distribution, it is relatively dry and nearly infertile in nature. Throughout the year, the temperature ranges from 8 °C to 46 °C. Although the state's extreme environmental supremacy did not limit its versatility, it is estimated to have a population of 5, 64, 73,122 crore people. Approximately 80% of the population lives in villages where traditional medicine is practised. A large number of tribal people from various tribal gatherings live in Rajasthan's southern region. For treatment, these people rely heavily on their ancient healing methods, which are passed down through generations through oral communication with no historical evidence. They are well-versed in plant ethno-biological properties and rely heavily on the forest for their daily needs. Forest resources have historically been the sole source of revenue for meeting basic needs such as fodder, fuel, food, and medicine. They have amassed extensive knowledge in the care of their livestock using herbs, as well as the sustainable use of plant species native to their territories.

3. RAJASTHAN'S MAJOR TRIBAL GROUPS

Rajasthan is home to several tribal societies, including the Bhil, Bhil-Meena, Damors, Dhanakas, Garasias, Kathodias, Kolis, Meenas, Nayaks, and Sahariyas. All of the tribal regions mentioned above have one thing in common: they are all isolated, which has hampered the development and progress of the people. Aside from that, the state is home to a number of nomadic and semi-nomadic tribes, as well as unincorporated communities.

3.1. Flora of Rajasthan vs distribution of Fabaceae family

Even though Rajasthan is mostly desert, it has a diverse flora. The natural vegetation in this state is of the Northern Desert Thorn Forest type. This vegetation can be found in the form of small clumps scattered throughout the state. As you move from west to east, the size and density of these patches increase (Kotia et al., 2020; B.D. Sharma et al., 1993).

The eastern side of the Aravali range has sparse forest cover. It accounts for only 9% of the total state area. As a result, the desert has little vegetation. Stunted-growth trees, grass, and thorny shrubs are prevalent here. Aside from the natural vegetation of the Northern Desert Thorn Forest, there is also ephemeral vegetation to be found here. It can only be seen during the monsoon season (B.D. Sharma & Balakrishanan, 1996).

Kejri (*Prosopis cineraria* (L.) Druce; Fabaceae) is the most common plant in this state and is thus known as the "state tree." This is mostly found in arid areas. Sangria is a drink with a bean-like shape. It is used not only as fodder but also as a vegetable. It is considered a delicacy in Rajasthan. There are also many shrubs and akaro (*Calotropis procera* (Aiton) W.T. Aiton; Apocynaceae). The shrubs are thorny because they are desert vegetation (L. Sharma & Khandelwal, 2010).

Thor (*Euphorbia caducifolia* Haines; Euphorbiaceae), babul (*Vachellia nilotica* (L.) P.J.H.Hurter & Mabb.; Fabaceae), and bordi (*Ziziphus nummularia* (Burm.f.) Wight & Arn.; Rhamnaceae) are also found here. Dhaman (*Cenchrus ciliaris* L.), Bhrut (*Cenchrus catharticus* Delile), and Sewan (*Lasiurus hirsutus* (Forssk.) Boiss.) are some of the perennial grass species (Poaceae) that grow in the region. These plants not only help to keep the soil together, but they also serve as good fodder for cattle and are widely used by various tribes (S. Sharma & Tiagi, 1979; G.S. Singh, 1999; V. Singh & Panday, 1980).

Eastern Rajasthan's shallow wetland landscape is dotted with creepers, shrubs, herbs, and bushes. Khejri and babul can be found in Keoladeo National Park. Over seventy tree species can be found in Ranthambore National Park. Some notable species include banyan (*Ficus benghalensis* L.; Moraceae), peepal (*Ficus religiosa* L.; Moraceae), dhak (*Butea monosperma* (Lam.) Taub.; Fabaceae), ber (*Ziziphus mauritiana* (Burm.f.) Wight & Arn.; Rhamnaceae), and khajur (*Phoenix dactylifera* L.; Arecaceae). The region contains 13 shrub varieties, 30 grass species, and over 100 medicinal species. Mount Abu, a hilly area, is home to bamboo (*Dendrocalamus strictus* (Roxb.) Nees; Poaceae), salai (*Boswellia serrata* Roxb.; Burseraceae), dhav (*Anogeissus pendula* Edgew; Combretaceae), and jamun (*Syzygium cumini* (L.) Skeels; Myrtaceae). There are also rare wild roses, ferns, and orchids to be found here (Solanki & Kotiya, 2021).

The herb dhava (*Anogeissus latifolia* (Roxb. ex DC.) Wall. ex Guill. & Perr.; Combretaceae) grows abundantly in Rajasthan's urban areas. Thor (*Euphorbia royleana* Boiss.; Euphorbiaceae), guggal (*Commiphora wightii* (Arn.) Bhandari; Burseraceae), gudhal (*Hibiscus* spp.; Malvaceae), shatawari (*Asparagus racemosus* Willd.; Asparaagaceae), brahmi (*Bacopa monnieri* (L.) Pennell; Scrophulariaceae), adusa (*Justicia adhatoda* L.; Acanthaceae). G.S. Singh (1999) described the biodiversity of the Indian National Park Rajasthan, situated in the Jaisalmer district of Rajasthan (Figure 1). A.K. Meena and Rao (2010) compiled new Flora of Rajasthan records. Recently, V. Singh and Pandey (2021) described the flora of Rajasthan to a great extent.

According to a floristic study conducted in Rajasthan, the most diverse plant families in terms of species diversity are the Euphorbiaceae, Asteraceae, and Fabaceae (Bhandari, 1990). The Fabaceae family is a rich source of medicinal and ornamental plants. Forest resources are the only source of revenue, fodder, fuel, food, and medicines in Rajasthan's southern region, which is home to a large number of tribal people. Local tribal people have extensive experience caring for their livestock by using plant species unique to their flora in a sustainable manner (K.L. Meena & Yadav, 2010). Medicinal plants abound in Rajasthan's dry state; in addition to the plants under Fabaceae family mentioned above (Table 1), medicinal plants from other families have been reported, viz., *Acalypha indica* L. *Emblica officinalis* L., *Euphorbia hirta* L., *Jatropha curcas* L. *Ricinus communis* L. (Euphorbiaceae); *Phyllanthus emblica* L. (Phyllanthaceae); *Achyranthes aspera* L., *Aerva javanica* (Burm. f.) Juss. ex Schult., *Amaranthus spinosus* L. (Amaranthaceae); *Aegle marmelos* L. Correa (Rutaceae); *Ageratum conyzoides* L., *Eclipta alba* (L.) Hassk, *Tridex procumbens* L. (Asteraceae); *Asparagus racemosus*

Figure 1. Map of Rajasthan showing prominent vegetation sites

Wild. (Liliaceae); *Azadirachta indica* A. Juss. (Meliaceae); *Boerrhavia diffusa* L. (Nyctaginaceae); *Calotropis procera* (Aiton) W.T. Aiton, *Tylophora indica* (Burm. F) Merill (Asclepiadaceae), *Cynodon dactylon* L. Pers. (Poaceae); *Datura stramonium* L., *Withania somnifera* (L.) Dunal (Solanaceae); *Evolvulus alsinoides* L. (Convolvulaceae); *Ficus benghalensis* L., *Ficus religiosa* L. (Moraceae); *Lawsonia inermis* L. (Lytheraceae); *Mangifera indica* L. (Anacardiaceae); *Momordica balsamina* L. (Cucurbitaceae); *Nerium indicum* Mill. (Apocynaceae), *Oxalis corniculata* L. (Oxalidaceae), etc. (Alam & Sharma, 2012; Rana et al., 2014; Trivedi, 2002).

4. ECONOMIC VALUE OF FABACEAE

Though the primary commercially valuable product in this family is fruit (legume/pod), various species are used as sources of dye, timber, fodder, and so on. Several species have been used as remedies and poisons, and their pharmaceutical properties have recently been studied (F. Ahmad et al., 2016; Alister et al., 2018). The Fabaceae family contains approximately 17000 legume species (Leguminosae). Some of these species, such as *Cicer arietinum* L., *Phaseolus vulgaris* L., and *Cajanus cajan* (L.) Millsp., are essential nutritional components that provide protein to over 300 million people worldwide. Legumes, particularly soybean [*Glycine max* (L.) Merr.] and peanut (*Arachis hypogaea* L.), account for more than 35% of the world's refined vegetable oil and are also good protein sources for the hog and poultry industries. The majority of pulses are considered nontoxic grains that can be used as food supplements as well as for a variety of medicinal purposes (Graham & Vance, 2003). Given the importance of the Fabaceae family, the current study aims to compile the scattered information on the rich ethnobotanical uses of Fabaceae family and its phytochemistry, with a focus on the Indian state of Rajasthan.

5. PHARMACOLOGICALLY IMPORTANT PHYTOCONSTITUENTS OF FAMILY FABACEAE

Leguminosae plants synthesize a diverse range of natural products, together with flavors, poisons, and dyes, and they are also vital for medicinal purposes (Chopra, 1982; Patel & Shah, 2014). Phytochemicals (Figure 2) such as 3-nitropropanoic acid, Gallic acid, Protocatechuic acid, Caffeic acid, Coumaric acid, Ferulic acid, Rutin, Rosmarinic acid, Resveratrol, Quercetin, Kaempferol, Epicatechin, and other polyphenols are mostly found in the plants of Fabaceae family (A. Jain et al., 2005; Obistioiu et al., 2021). In addition to flavonoids, legume leaves and seeds contain triterpenes, aldehydes, and lipids. These compounds are concentrated in vacuoles, cuticles, and resin ducts (in the case of hydrophilic substances) (Wink, 2013). The majority of these bioactive secondary metabolites are nitrogen-containing alkaloids and amines (Cyanogenic glucosides, Imidazole alkaloids, Tryptamine, and Phenylethylamine derivatives) (Wink, 2013).

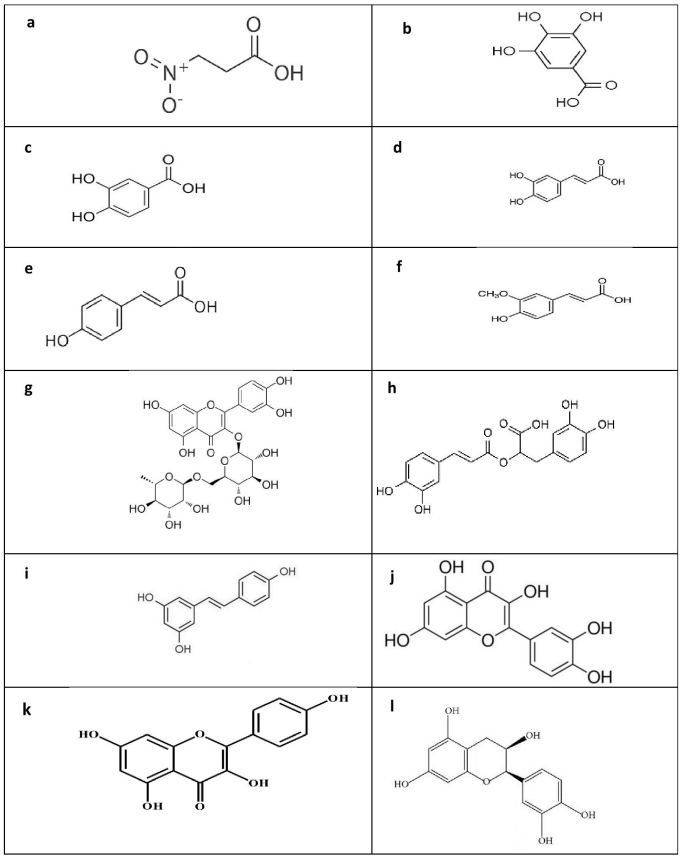

Figure 2. Few major phytochemicals extracted from the members of family Fabaceae

Polyphenols such as flavonoids and phenolic acids, carotenoids such as carotenes, and a few vitamins such as

Table 1
Ethnomedicinal plants of family Fabaceae and their medicinal uses among the tribes of Rajasthan

S. No	Botanical name and growth habit	Vernacular name	Tribes	Plant parts	Compounds isolated	Medicinal uses	References
1.	*Abrus precatorius* L. (Tree)	Chirmi, Ratti, Gunja, Chirmati	Bhil, Damor, Katho-dia, Garasia	Leaves, Seeds, root	Abrol, Alkaloids, Abrin, Abrine	Chewing the leaves for 2-3 days helps to cure white and red blisters in the mouth and both males and females consume seeds as an antifertility drug. The seeds are useful for boosting the nervous system and treating a variety of nervous disorders; a seed paste is also used to treat joint pain, and a root decoction is used to treat coughs, colds, and intestinal worms.	Katewa et al. (2003); G Garaniya and Bapodra (2014).
2.	*Acacia hockii* De Wild. (Tree)	Chekanti, Chakanti	Bhil, Damor	Leave, tender shoots, Bark	Flavonoids, Phenols, Terpenoids, Saponins	In the cure of stress related issues.	Guchu et al. (2020)
3.	*Acacia nilotica* (L.) Delile (Tree)	Kikar/ Babool	Bhils	Leaves, Bark	Polyphenolic compounds	The leaves of the plant are used to treat throat infections, and the crushed bark powder is used to treat skin issues, asthma, and bronchitis.	Godara et al. (2015); Auwal et al. (2014)
4.	*Albizia leebek* Benth. (Tree)	Siris	Damor	Leaf, Seed	Saponin, Tannin	Antidote, Saponin for snake position, Skin disease, Asthma, Piles, Diarrhea	Biswas et al. (2002)
5.	*Atylosia scarabaeoids* (Wight & Arn.) Druce (Shrub)	Gulsuni	Kathodia	Roots	Phenols, Tannins, Niacin Ascorbic acid	Paste obtained from roots used in rheumatism	Mehra and De (2017).
6.	*Bauhinia variegata* L. (Tree)	Kachnar	Meena	Leaf, Seed Pods, root, flower bud and bark	Sigmasterol, b – Sitosterol	The bark contains fibre and is used to treat diarrhoea; the roots are carminative; and the flower bud is laxative and antihelminthic.	N. Sharma et al. (2019)
7.	*Butea monosperma* (Lam.) Taub. (Tree)	Dhak, khakhra	Meena, Bhil, Damor	Whole plant	Butrin, Palssonin, Glycocides, b - Sitosterol,	It is used to treat excessive bleeding, sunburn, diarrhoea, labour pain, and leucorrhoea.	Tripathi et al. (1996); Patil et al. (2006)
8.	*Caesalpinia crista* L.	Fever nut	Bhil, Kalbelia	Leaf, Seed	d-Caesalpin	Burn, Inflammation, Digestive, Stomachic, Liver tonic, Skin disease,	Chethana et al. (2018)

Continued on next page

Table 1 continued

9.	*Cajanus cajan* (L.) Millsp. (Shrub)	Arhar, Tuvar	Meena	Leaves	Flavonoids, Tannin, Resins and Terpenoids	Oral ulcers and inflammation are treated with a leaf paste.	Upadhyay et al. (2010); Pal et al. (2011)
10.	*Cassia fistula* L. (Tree)	Amaltash	Meena	Roots, leaves	Anthraquinones, Flavonoids Flavanol	Roots of this plant are used to treat skin diseases and leprosy and leaves are used to treat rheumatism	Gautam and Batra (2014); Ali (2014)
11.	*Cassia alata* L. (Shrub/small tree)	Dadmari	Kalbelia, Damor	Leaves	Anthroquinone	Cut and sore treatment Asthma, piles, and wound healing	Rahman et al. (2008)
12.	*Cassia occidentalis* L. (Shrub)	Senna, Kasunda, Bari kasondi	Damor	Root, Seeds, Leaves, Fruit	Glycocides, Anthro-quinone, b-Sitosterol,	Leaf paste is used topically to treat scabies and heal bone fractures. Seeds have purgative and liver tonic properties.	M Manikan-daselvi et al. (2016)
13.	*Cassia tora* L.	Charota, Panwad	Meena	Leaf, Seed	d-manitol, Anthro-quinone, b-Sitosterol,	Leaf paste has a soothing effect when applied to the skin, and it also has a purgative effect. The seed is used to treat inflammation and fungal infections.	Roopashree et al. (2008)
14.	*Cicer arietinum* L. (Herb)	Chana	Minas	Seeds	Unsaturated fatty acids, Lipids, Sterols, Starch,	The seeds coats are used to cure sprains	Upadhyay et al. (2010); Jayaprakash and Das (2018).
15.	*Clitoria ternatea* L. (Tree)	Vardia	Meena, Bhil, Damor	Leaf, seed, roots	Anthocyanins, Steroids Triter-penoids, Glycosides	To treat syphilis- related edema in the eyes. Tonsillitis, Leukoderma, Cough	Tripathi et al. (1996); Desh-mukh and Jadhav (2014)
16.	*Dalbergia sissoo* DC. (Tree)	Talli, Shisham	Bhils, Meena, Damor, Gadolia luhar	Leave, bark		The leaves are used to treat gonorrhea, skin and leprosy diseases the bark powder is used to cure children suffering from pneumonia	Asif and Kumar (2011); Kumar et al. (2017)
17.	*Delonix regia* (Hook.) Raf. (Tree)	Gulmohar	Bhils, Garasia, Saharia	Leaves	Saponins, Alkaloids, Carotene, Hydrocar-bons, Flavonoids, Tannins, Steroids, Carotenoids, Terpenoids, Glycosides	Some disorders, such as inflammation and constipation, are treated with the leaves.	Srinivasan et al. (2001); Vyas et al. (2020)

Continued on next page

Table 1 continued

18.	*Derris indica* (Lam.) Benn. (Small tree)	Karanj	Gadolia luhar	Whole plant	Flavonoids,	Beri, Bleeding piles, Bronchitis, Leucoderma, Ulcers	Khan et al. (2006)
19.	*Desmodium trifolium* L. (Herb)	Nilamparanda	Garasia, Saharia	Leaves	b-Phenylamine, Trigonelline, Alkaloids	Antidote, diuretic, carminative, tonic, diarrhea, skin disease, wound healing	Pathak et al. (2021)
20.	*Entada abyssinica* A.Rich (Small tree)		Bhil, Garasia	Leaves, Bark	Flavonoids, Terpenoids, monoglyc-eride, phenols	Cold, bronchial pains, stomachache, ulcers	Sobeh et al. (2020)
21.	*Erythrina abyssinica* Lam. ex DC. (Tree)		Gadolia, Garasia	Bark, Leaf, Root	Alkaloids, Flavonoids, Triter-penoids, Lectin	Toothache, Fever, Menstrual disease	Bunalema et al. (2011)
22.	*Indigofera tinctoria* L. (Tree)	Nai	Bhil, Katho-dia, Meena	Roots	Flavonoids, Alkaloids, Glycosides, Terpenoids.	The tribal people consume root powder orally.	Verma and Suresh (2002); Arora and Meena (2014)
23.	*Melilotus indica* (L.) All. (Herb)	Ban methi, Senji, metha	Kathodia	Leaves and seeds	Seleno-amino acids	Seeds used in bowel complaints and infantile diarrhea. Used as discutient and emollient.	Ahmed and Al-Refai (2014)
24.	*Millettia pinnata* (L.) Panigrahi (Tree)	Karanj	Bhil, Gurjar		Bitter fatty oil, Karanjin, Pongam oil,	Skin disease, Leukoderma, Carminative, Parasiticide, Bleeding	Jena et al. (2020)
25.	*Mimosa pudica* L. (Herb)	Chuimui	Bhil, Meena	Whole plant	b-Amyrin, b-Sitosterol	Allergy, Asthma, Ulcer, Bleeding	H. Ahmad et al. (2012)
26.	*Mucuna pruriens* (L.) DC. (Tree)	Kirmich	Minas	Seed, Root	Alkaloids, Amino acids, Tetrahy-droisoquino-line	Mixture of seed powder is mixed with honey to treat asthma disease while the roots are taken orally to cure diseases of nervous system such as facial paralysis	Katewa and Galav (2005); Patha-nia et al. (2020)
27.	*Prosopis cineraria* (L.) Druce (Tree)	Khejri, Khejra, Janti	Bhil	Bark, Flower, Inflores-cence, Fruit	Alkaloids, Saponins, Tannins, Flavanoids, Flavanols, Phenolics	The dried powder and its paste can be used to cure rheumatic disorders and pregnant women eat the flowers of this plant to protect against abortion Piles, Increase memory power	Soni et al. (2017); Vyas et al. (2020)

Continued on next page

Table 1 continued

28.	*Prosopis juliflora* (Sw.) DC. (Tree)	Shammi	Meena, Bhil	Leaves and pods	Alkaloids, Flavonoids, Terpenoids, Steroids	Children with motor development delays are given syrup made from ground pods; for oral infections, powdered leaves are brewed in water and the liquid is applied to treat irritation.	Malik et al., 2013; Patnaik et al. (2017)
29.	*Pterolobium stellatum* (Forssk.) Brenan (Small tree)	Beneka, Gorsa	Kalbelia, Shariya	Roots, Leaves	tannins	Pneumonia, Treatment for infertility and snake bites.	Meenakumari et al. (2011)
30.	*Senegalia catechu* (L.f.) P.J.H.Hurter & Mabb. (Tree); (Syn. Acacia catechu (L.F.) Willd	Khair	Damor, Garasia		Catechin, Catechutanic Acid, Tannin,	Toothache, Headache, Diarrhea, Cough, Digestive, Skin disease	Negi and Dave (2010)
31.	*Senegalia senegal* (L.) Britton	Kumbat	Kathodia, Garasia	Bark, Flower, Gum	Phenols, Flavonoids, Tannins	This plant is also used to treat diabetes, hemorrhage, inflammation, and as a demulcent and emollient. This plant can also be used to treat the condition known as Intestinal Mucous.	Satish and Asna (2018)
32.	*Tamarindus indica* L. (Tree)	Imli	Bhil, Meena, Garasia, Kathodi, Damor, Saharia	Fruit, seed	Triterpenes, Lupeol, Fatty acids	Fever, laxative , skin rashes	Bhadoriya et al. (2011); H. Sharma and Kumar (2011).
33.	*Tephrosia purpurea* (L.) Pers. (Herb)	Dhamosa, Sarphonka	Bhils, Garasia, Saharia, Gadolia-Lohar	Root	β-sitosterol, Lupeol, Purpurin, Purpurenone	The powder of root along with black pepper is given orally to treat snake venom, enlarged liver and used as anthelmintic for children as blood purifier. Leaf paste is applied locally in piles and leprosy.	Saxena and Choubey (1997); Khalafalah et al. (2010); Charan and Sharma (2016).
34.	*Trigonella foenum-graecum* L. (Herb)	Methi	Kathodi, Lohar	Leaves and seeds	Phenols	Seeds as food lower blood sugar levels; powdered seeds reduce menstrual pain in females.	Hwa et al. (2019)

vitamin C and vitamin E are the most common natural antioxidants. These antioxidants are of particular interest because they have potential therapeutic applications for major diseases such as cardiovascular diseases and cancer. These phenolic compounds have hydroxyl groups in their aromatic rings. Tannins, like phenolic acids, are high-molecular-weight compounds with phenolic groups. Glycosides and aglycones, in addition to flavonoids, are chemically glycosides and aglycones (Kapoor, 2015). Antioxidants are essential in the prevention of human diseases. Antioxidant compounds include the formation of singlet oxygen quenchers, reducing agents, pro-oxidant metals, more complex antioxidant compounds, and free radical scavengers (Rajeshwar et al., 2005). Antioxidants are commonly used in oils and fatty diets to prevent oxidation. Artificial antioxidants, such as Butylated hydroxytoluene (BHT) and Butylated hydroxyanisole (BHA), are suspected of causing cancer; their use in food is restricted. As a result, numerous investigators have focused on natural antioxidants and crude extracts, and unadulterated natural substances from the plant kingdom have already been discovered to have antioxidant properties (Ho et al., 2012).

Gnanaraja et al. (2014) investigated the anticancer, antidiuretic, anti-diabetic, and anti-inflammation activities of secondary metabolites from this important family. Secondary metabolites, such as pyrrolizidine alkaloids, are commonly found in plant extracts of several members of Fabaceae family and have a variety of biological activities, including antiviral, hepatotoxic, and neuroactive properties. Plant species in the Fabaceae family have antioxidant and antimicrobial properties that can be used in industry (Omondi & Omondi, 2015). Later, Mehra and De (2017) discovered that plants in the Fabaceae family contain high levels of alkaloids, tannins, steroids, terpenoids, and carbohydrates, all of which have been linked to the prevention of degenerative diseases like neurological illness, cancer, and cardiovascular disease. It has been claimed that several plants of Fabaceae family constrain natural antioxidant amalgams, which are bioactive and can be used in the food industry as nutritional additives.

5.1. Treatment Forms

Several species of Fabaceae family have been reported to cure diseases such as anaemia, cancer (Bhushan & Kumar, 2013), diarrhoea, diabetes, and dysentery. Bioactive components, which include alkaloids, flavonoids, saponins, sitosterol, tannins, polyphenolic compounds, and various other compounds, aid in the treatment of toothache, headache, leukoderma, piles, asthma, bronchitis, dermatitis, and other conditions. It treats fever, allergies, skin diseases, urinary disorders, inflammation, worms, premenstrual syndrome, and other conditions.

They frequently have antidotal, purgative, tonic, antiseptic, curative, and laxative properties. Because these bioactive components contain "additives" that act as synergists on pathogens, various studies on plant mixture use and its preparative home remedies have been reported (Jeph & Khan, 2020).

As a result, the presence of antioxidant properties ultimately justifies the presence of antibacterial and antiviral properties. And, as the practise of harvesting in the direction of the wild becomes more common, the need to preserve the plant and its properties for wholesome use will grow in the future. Tannins, flavonoids, and alkaloids are major chemical constituents in species such as *Mimosa tenuiflora* (Willd.) Poir. Terpenes and saponins have also been found in the plant. It has been observed to exhibit halogenation properties (Schultes, 1994). *Mimosa pudica* derived tannins, flavonoids, and terpenes contribute to its anti-inflammatory, antimicrobial, antifungal, and anti-plasmolytic properties (Muhammad et al., 2016). Anti-mutagen properties are also discussed. Although they have a low pharmacological value, they can be very useful in the treatment of inflammation and skin disease, as well as a good effect on fever and rheumatism.

Bauhinia cleilantha (Bong.) Steud. is widely used to treat weakness and dizziness. Its mechanism of action in hypoglycemia validates its utility in diabetes (Almeida et al., 2006). *Cajanus*, due to its toxicity, exhibits similar properties in addition to teratogenic and abortive effects (Lemonica & Alvarenga, 1994).

5.2. Other uses

Aside from their potential medical applications, they have been widely used in food, food additives, animal food, poison, material, social use, and, most notably, fuel. Because of the presence of tannins, the leaves of *Petrolobium* sp. are a source of dye (Sathyanarayanan et al., 2017).

5.3. Cosmetical uses

The compounds extracted from this family, which is widely popular in India and abroad, have an impact on a variety of beauty products. *Cajanus cajan*, also known as pigeon pea, is prized in the cosmetic industry for its potent antioxidant properties (Tungmunnithum & Hano, 2020).

6. CULTURAL IMPORTANCE INDEX OF MEDICINAL PLANTS

The cultural importance index (CI) was calculated as the sum of the use reports (UR) in each use category mentioned for a species in the locality, divided by the number of participants (N) in that locality, to determine the cultural significance of each species in each locality (Pardo-De-Santayana et al., 2007). Similarly, each species' mean cultural importance index (mCI) was carefully chosen. The cultural significance index (CI) of each family (CIf) was calculated by adding the CI of each family's species according to following formula:

Being a culturally important plant/species within a community is simply defined by the CI. As a result, they provide a list of important plants within the community in a defined stratum or rank. In a study on medicinal plants of Rajasthan, Tripathi et al. (1996) used this approach.

7. CONCLUSIONS

Rajasthan has a sizable tribal population, accounting for 9% of India's total tribal population. The tribal peoples' extensive knowledge of the ethnobotanical uses of various Fabaceae family species has paved the way for long-term natural source treatment of several diseases. Members of the Fabaceae family thus serve as a repository for important phytochemicals and antioxidants with medicinal and industrial applications. Traditional wisdom is under threat of extinction as a result of increasing urbanization, and a reconsideration of conservational paths is required to restore this exceptionally valuable knowledge. Because wild harvesting is becoming more common, it is critical to preserve the plants and their valuable properties for future wholesome use. There is also a need to conduct additional research on the Fabaceae family for various compound studies and to validate the recorded ethnobotanical uses.

CONFLICTS OF INTEREST

There are no conflicts of interest relevant to this article, according to the authors.

ACKNOWLEDGMENTS

The authors would like to thank Prof. Ina Aditya Shastri, Vice-Chancellor of Banasthali Vidyapith in Rajasthan, for her encouragement and support. We also thank DST for funding the FIST programme at the Department of Bioscience and Biotechnology in Banasthali, as well as the Bioinformatics Center at Banasthali Vidyapith.

ORCID

Raj Shreya	0000-0001-5420-1957
Bhawana Sharma	0000-0003-3167-0915
Afroz Alam	0000-0001-8575-4677
Supriya Kumari Sharma	0000-0003-1488-1729

AUTHOR CONTRIBUTIONS

All authors worked together to complete this project. The subject was created by AA. The article was written by BS, SKS, and RS after conducting a literature search. All authors reviewed and approved the final manuscript.

REFERENCES

Ahmad, F., Anwar, F., Hira, S., 2016. Review on medicinal importance of Fabaceae Family. Pharmacology online. 3, 151–156.

Ahmad, H., Sehgal, S., Mishra, A., Gupta, R., 2012. *Mimosa pudica* L. (Laajvanti): An overview. Pharmacognosy Reviews. 6(12), 115–124. https://doi.org/10.4103/0973-7847.99945

Ahmed, S., Al-Refai, M., 2014. Chemical constituents and cytotoxic activities of the extracts of *Melilotus indicus*. European Journal of Chemistry. 5(3), 503–506. https://doi.org/10.5155/eurjchem.5.3.503-506.1070

Alam, A., Sharma, V., 2012. Textbook of Economic Botany,. Pointer Publishers, India, pp. 317–317.

Ali, M.A., 2014. *Cassia fistula* Linn: A review of phytochemical and pharmacological studies. International Journal of Pharmaceutical Sciences and Research. 5(6), 2125–2155.

Alister, D.M., Muasya, A.M., Chimphango, S.B.M., 2018. Linking root traits to superior phosphorus uptake and utilization efficiency in three Fabales in the Core Cape Subregion, South Africa. Functional Plant Biology. 45(7), 760–770. https://doi.org/10.1071/fp17209

Almeida, E.R., Guedes, M.C., Albuquerque, J.F., Xavier, H., 2006. Hypoglycemic effect of *Bauhinia cheilandra* in rats. Fitoterapia. 77, 276–278. https://doi.org/10.1016/j.fitote.2006.03.001

Arora, A., Meena, J., 2014. Ethnobotanical study of hepato-protective/hepato- curative plants used by ethnic communities of South-East Rajasthan, India. Indian Journal of Applied Research. 4(6), 26–29.

Asif, M., Kumar, A., 2011. Phytochemical investigation and evaluation of antinociceptive activity of ethanolic extract of *Dalbergia sissoo* (Roxb.) bark. Journal of Natural Science. 2(1), 76–79. https://doi.org/10.4103/0976-9668.82315

Auwal, M.S., Saka, S., Mairiga, I.A., Sanda, K.A., Shuaibu, A., Ibrahim, A., 2014. Preliminary phytochemical and elemental analysis of aqueous and fractionated pod extracts of *Acacia nilotica* (Thorn mimosa). Veterinary Research Forum. 5(2), 95–100.

Bhadoriya, S.S., Ganeshpurkar, A., Narwaria, J., Rai, G., Jain, A.P., 2011. Tamarindus indica: Extent of explored potential. Pharmacognosy Reviews. 5(9), 73–81. https://doi.org/10.4103/0973-7847.79102

Bhandari, M.M., 1990. Flora of Indian Desert. MPS Repros, 435–435.

Bhushan, B., Kumar, M., 2013. Ethnobotanically Important Medicinal Plants of Tehsil Billawar. Journal of Pharmacognosy and Phytochemistry. 2(4), 14–21.

Biswas, S.C., Saxena, N., Bisen, S.S., 2002. Studies on chemical composition and amino acids profile of seeds of *Albizia lebbeck* L. Indian Journal of Tropical Biodiversity. 10, 33–38.

Bunalema, L., Kirimuhuzya, C., Tabuti, J.R., Waako, P., Magadula, J.J., Otieno, N., Orodho, J.A., Okemo, P., 2011. The efficacy of the crude root bark extracts of *Erythrina abyssinica* on rifampicin resistant *Mycobacterium tuberculosis*. African Health Sciences. 11(4), 587–593.

Charan, P.D., Sharma, K.C., 2016. Floral diversity of Thar desert of Western Rajasthan, India. Journal of Phytological Research. 29(1-2), 55–71.

Chethana, K.R., Sasidhar, B.S., Naika, M., Keri, R.S., 2018. Phytochemical composition of *Caesalpinia crista* extract as potential source for inhibiting cholinesterase and β-amyloid aggregation: Significance to Alzheimer's disease. Asian Pacific Journal of Tropical Biomedicine. 8, 500–512. 10.4103/2221-1691.244159

Chopra, R.N., 1982. Indigenous Drugs of India,. Academic Publication, Calcutta, New Delhi, India, pp. 582–582.

Deshmukh, S., Jadhav, V., 2014. Bromatological and mineral assessment of *Clitoria ternatea* Linn. leaves. International Journal of Pharmacy and Pharmaceutical Sciences. 6, 244–246.

Garaniya, N., Bapodra, A., 2014. Ethno botanical and Phytophrmacological potential of *Abrus precatorius*- L.: A review. Asian Pacific Journal of Tropical Biomedicine. 4(1), 27–34. https://doi.org/10.12980/APJTB.4.2014C1069

Gautam, A., Batra, A., 2014. Ethnomedicinal plants of Mount Abu region in Rajasthan. Research Journal of Pharmacognosy and Phytochemistry. 6(1), 33–36.

Gnanaraja, R., Prakash, V., Shanta, P., Mahendraverman, M., 2014. Qualitative and quantitative phytochemicals analysis of selected Fabaceae medicinal plants from Allahabad region. Pharma Innovation. 3(7), 53–56.

Godara, S.K., Kumar, N., Parihar, R., 2015. Study of the ethnomedicinal importance of some plant species among flora of North-West Rajasthan. International Journal of Advanced Research. 3, 723–

726.
Graham, P.H., Vance, C.P., 2003. Legumes: Importance and Constraints to greater use. Plant Physiology. 131(3), 872–877. https://doi.org/10.1104/pp.017004
Guchu, B.M., Machocho, A.K., Mwihia, S.K., 2020. In Vitro Antioxidant Activities of Methanolic extracts of *Caesalpinia volkensii* Harms., *Vernonia lasiopus* O. Hoffm., and *Acacia hockii* De Wild. . Evidence Based Complementary and Alternative Medicines. 2020, 3586268. https://doi.org/10.1155/2020/3586268
Ho, Y.L., Haung, S.S., Deng, J.S., Lin, Y.H.Y.-H., Chang, Y.S., Huang, G.J., 2012. In-vitro antioxidant properties and total phenolic contents of wetland medicinal plants in Taiwan. Botanical Studies. 53(1), 55–66.
Hwa, C.Y., Perveen, N., Paliwal, N., Khan, N.H., 2019. Phytochemical screening, antimicrobial and antioxidant activity determination of *Trigonella foenum*-graecum seeds. Pharmacy & Pharmacology International Journal. 7(4), 175–186.
Jain, A., Katewa, S.S., Galav, P.K., 2005. Some phytotherapeutic claims by tribals of southern Rajasthan. Indian Journal of Traditional Knowledge. 4, 291–297.
Jain, S., Jain, R., Singh, R., 2009. Ethnobotanical survey of Sariska and Siliserh regions from Alwar district of Rajasthan India. . Ethnobotanical Leaflets. 13, 171–88.
Jayaprakash, B., Das, A., 2018. Extraction and Characterization of Chickpea (*Cicer arietinum*) extract with Immunostimulant Activity in BALB/C mice. Asian Pacific Journal of Cancer Prevention. 19(3), 803–810. https://doi.org/10.22034/apjcp.2018.19.3.803
Jena, R., Rath, D., Rout, S.S., Kar, D.M., 2020. A review on genus *Millettia*: Traditional uses, phytochemicals and pharmacological activities. Saudi Pharmaceutical Journal. 28(12), 1686–1703. https://doi.org/10.1016/j.jsps.2020.10.015
Jeph, A., Khan, J.B., 2020. Ethnomedicinal study in reserve forest area of Jhunjhunu District,. , pp. 379–387. https://doi.org/10.22271/tpr.2020.v7.i2.044
Kapoor, S., 2015. Bioactive and therapeutic potential of legumes: A review. International Journal of Pharmacy and Biological Sciences. 5, 65–74.
Katewa, S.S., Chaudhary, B.L., Jain, A., Galav, P., 2003. Traditional uses of plant biodiversity from Aravalli hills of Rajasthan. Indian Journal of Traditional Knowledge. 2(1), 27–39.
Katewa, S.S., Galav, P.K., 2005. Traditional herbal medicines from Shekhawati region of Rajasthan. Indian Journal of Traditional Knowledge. 4(3), 237–245.
Khalafalah, A.K., Yousef, A.H., Esmail, A.M., Abdelrazik, M.H., Hegazy, M.E., Mohamed, A.E., 2010. Chemical constituents of *Tephrosia purpurea*. Pharmacognosy Research. 2(2), 72–75. https://doi.org/10.4103/0974-8490.62951
Khan, M.R., Omoloso, A.D., Barewai, Y., 2006. Antimicrobial activity of the *Derris elliptica*, *Derris indica* and *Derris trifoliata* extractives. Fitoterapia. 77, 327–357. https://doi.org/10.1016/j.fitote.2006.03.007
Kotia, A., Solanki, Y., Reddy, G., 2020. .
Krishnaraju, A.V., Rao, T.V.N., Sundararaju, D., Vanisreeb, M., Tsayb, H.S., Subbaraju, G.V., 2005. Assessment of bioactivity of Indian medicinal plants using brine shrimp (*Artemia salina*) lethality assay. International Journal of Applied Science and Engineering. 3(2), 125–134.
Kumar, D., Singh, B., Sharma, R.A., 2017. Ethnomedicinal plant species at District Nagaur in Rajasthan, India used in folk and herbal medicines. Imperial Journal of Interdisciplinary Research. 3(1), 1783–1786. http://dx.doi.org/10.21474/IJAR01/1488
Lemonica, I.P., Alvarenga, C.M., 1994. Efeitoabortivo e teratogênico do *A. hispidum* DC. *Cajanus cajan* (L.) Millps. emratasgrávidas. Journal of Ethnopharmacology. 43, 39–44. https://doi.org/10.1016/0378-8741(94)90114-7
Macêdo, N.S., Silveira, Z.D.S., Bezerra, A.H., Costa, J.G.M.D., Coutinho, H.D.M., Romano, B., Capasso, R., Cunha, F.A.B.D., Da, S., 2020. *Caesalpinia ferrea* C. Mart. (Fabaceae) phytochemistry, ethnobotany and bioactivities: A review. Molecules. 25, 3831. https://doi.org/10.3390/molecules25173831
Manikandaselvi, S., Vadivel, V., Brindha, P., 2016. Studies on physicochemical and nutritional properties of aerial parts of *Cassia occidentalis* L. Journal of Food and Drug Analysis. 24(3), 508–515. https://doi.org/10.1016/j.jfda.2016.02.003
Meena, A.K., Rao, M.M., 2010. Folk herbal medicines used by the Meena community in Rajasthan. Asian Journal of Traditional Medicines. 5(1), 19–31.
Meena, K.L., Yadav, B.L., 2010. Some traditional ethnomedicinal plants of southern Rajasthan. Indian Journal of Traditional Knowledge. 9(3), 471–474.
Meenakumari, S., Verma, S., Absar, A., Chaudhary, A., 2011. Antimicrobial susceptibility pattern of clinical isolates of *Pseudomonas aeruginosa* in an Indian cardiac hospital. International Journal of Engineering Science and Technology. 3(9), 7117–7124.
Mehra, Y.K., De, K., 2017. Determination of Phytochemical, Total flavonoids and antioxidant activity of methanolic extract of *Pisum Sativum*. International Journal of Innovative Pharmaceutical Sciences and Research. 5(8), 1–12.
Muhammad, G., Hussain, M.A., Jantan, I., Bukhari, S.N.A., 2016. *Mimosa pudica* L., a High-Value Medicinal Plant as a Source of Bioactives for Pharmaceuticals. Comprehensive Reviews in Food Science and Food Safety. 15(2), 303–315. https://doi.org/10.1111/1541-4337.12184
Negi, B.S., Dave, B.P., 2010. In Vitro Antimicrobial Activity of *Acacia catechu* and Its Phytochemical Analysis. Indian Journal of Microbiology. 50(4), 369–374. https://doi.org/10.1007/s12088-011-0061-1
Nonita, P.P., Mylene, M.U., 2010. Antioxidant and cytotoxic activities and phytochemical screening of four Phillipine medicinal plants. Journal of. Medicinal Plants Research. 4, 407–414. https://doi.org/10.5897/JMPR.9000213
Obistioiu, D., Cocan, I., Tîrziu, E., Herman, V., Negrea, M., Cucerzan, A., Neacsu, A.G., Cozma, A.L., Nichita, I., Hulea, A., Radulov, I., Alexa, E., 2021. Phytochemical Profile and Microbiological Activity of Some Plants Belonging to the Fabaceae Family. Antibiotics (Basel). 10(6), 662. https://doi.org/10.3390/antibiotics10060662
Omondi, S., Omondi, J.C., 2015. Phytochemical analysis of fifty selected plants found in the University Botanic Garden, Maseno, Kenya for their chemotaxonomic values. Journal of Medicinal Herbs and Ethnomedicine. 1, 130–135.
Pal, D., Mishra, P., Sachan, N., Ghosh, A.K., 2011. Biological activities and medicinal properties of *Cajanus cajan* (L) Millsp. Journal of Advanced Pharmaceutical Technology & Research. 2(4), 207–214. https://doi.org/10.4103/2231-4040.90874
Pardo-De-Santayana, M., Tardo, J., Blanco, E., Carvalho, A.M., Lastra, J.J., San, E., Morales, R., 2007. Traditional knowledge of wild edible plants used in the northwest of the Iberian Peninsula (Spain and Portugal): a comparative study. Journal of Ethnobiology and Ethnomedicine. 3, 27. https://doi.org/10.1186/1746-4269-3-27
Patel, S., Shah, D.B., 2014. Phylogeny in few species of Leguminosae family based on matK sequence. Computational Molecular Biology. 4, 245797332.
Pathak, J., Aswathi, M.P., Patel, B.R., Harisha, C.R., Shukla, V.J., 2021. Microscopic and Phytochemical analysis of *Desmodium velutinum*

(Willd) DC and *Desmodium gangeticum* (L.) DC. Panchanga powder. Research Journal of Pharmacy and Technology. 14(6), 2950–2956. https://doi.org/10.52711/0974-360X.2021.00517

Pathania, R., Chawla, P., Khan, H., Kaushik, R., Khan, M.A., 2020. An assessment of potential nutritive and medicinal properties of *Mucuna pruriens*: a natural food legume. 3 Biotech. 10(3), 261–261. https://doi.org/10.1007/s13205-020-02253-x

Patil, D.A., Pawar, S., Patil, M.V., 2006. Ethnobotany of *Butea monosperma* (Lam.) Kuntze in North Maharashtra, India. Natural Product Radiance. 5(4), 323–325.

Patnaik, P., Abbasi, T., Abbasi, S.A., 2017. Prosopis (*Prosopis juliflora*): blessing and bane. Journal of Tropical Ecology. 58, 455–483.

Rahman, M.S., Ali, M.Y., Ali, M.U., 2008. In vitro screening of two flavonoid compounds isolated from *Cassia alata* L. leaves for fungicidal activities. Journal of Biological Sciences. 16, 142–193. https://doi.org/10.3329/jbs.v16i0.3759

Rajeshwar, Y., Kumar, G.P.S., Gupta, M., Mazumder, U.K., 2005. Studies on in vitro antioxidant activities of methanol extract of *Mucuna pruriens* (Fabaceae) seeds. European Bulletin of Drug Research. 13(1), 31–39.

Rana, S., Sharma, D.K., Paliwal, P.P., 2014. A Note on the Ethno-Medicinal Properties of Some Plants Used by the Tribal and Rural Community in Ghatol Area of District Banswara of South Rajasthan, India. Research Journal of Medicinal Plant. 8, 246–257.

Roopashree, T., Dang, R., Rani, R.S., Chaudhary, N., 2008. Antibacterial activity of antipsoriatic herbs: *Cassia tora*, *Momordica charantia* and *Calendula officinalis*. International Journal of Applied Research in Natural Products. 1, 20–28.

Sathyanarayanan, S., Muniyandi, K., George, E., Sivaraj, D., Sasidharan, S.P., Thangaraj, P., 2017. Chemical profiling of *Pterolobium hexapetalum* leaves by HPLC analysis and its productive wound healing activities in rats. Biomedicine & Pharmacotherapy. 95, 287–297. https://doi.org/10.1016/j.biopha.2017.08.062

Satish, A., Asna, U., 2018. Quantification of flavonoids by UPLC-MS and its antibacterial activity from *Brassica oleracea* var. capitata L. . GSC Biological and Pharmaceutical Sciences. 5, 109–114. https://doi.org/10.30574/gscbps.2018.5.1.0105

Saxena, V.K., Choubey, A., 1997. A neoflavonoid glycoside from *Tephrosia purpurea* stem. Fitoterapia. 68, 359–60.

Schultes, R.E., 1994. El campo virgenen la investigación de las plantaspsicoativas, Plantas, C. y Estados de Consciencia. Fericgla JM, ed., Barcelona, L.L. de Marzo S.L., (Eds.). , pp. 25–116.

Sebastian, M.K., Bhandari, M.M., 1984. Medico-ethno botany of Mount Abu, Rajasthan, India. Journal of Ethnopharmacology. 12, 223–230. https://doi.org/10.1016/0378-8741(84)90050-3

Sebastian, M.K., Bhandari, M.M., 1988. Medicinal plant lore of Udaipur District Rajasthan.

Sharma, B.D., Balakrishanan, N.P., 1996. Botanical Survey of India. 1(4).

Sharma, B.D., Balakrishna, N.P., Rao, R.R., Hajra, P.K., 1993. Flora of India. https://bsi.gov.in/page/en/flora-of-india

Sharma, H., Kumar, A., 2011. Ethnobotanical studies on medicinal plants of Rajasthan (India): A review. Journal of Medicinal Plants Research. 5(7), 1107–1112.

Sharma, L., Khandelwal, S., 2010. Traditional uses of plants as cooling agents by the tribal and traditional communities of dang region in Rajasthan, India . Ethnobotanical Leaflets. 14, 218–224.

Sharma, N., Sharma, A., Bhatia, G., Landi, M., Brestic, M., Singh, B., Singh, J., Kaur, S., Bhardwaj, R., 2019. Isolation of Phytochemicals from *Bauhinia variegata* L. Bark and their in vitro Antioxidant and Cytotoxic Potential. Antioxidants (Basel). 8(10), 492. https://doi.org/10.3390/antiox8100492

Sharma, S., Tiagi, B., 1979. Kalyani Publication, New Delhi, India, pp. 540–540.

Singh, G.S., 1999. A contribution to ethnomedicine of Alwar district of Rajasthan. Ethnobotany. 11, 97–99.

Singh, V., Panday, R.P., 1980. Medicinal plant lore of the tribals of Eastern Rajasthan. Journal of Economic and Taxonomic Botany. 1, 137–147.

Singh, V., Pandey, R.P., 2021. Ethnobotany of Rajasthan (India),. Scientific Publishers, Jodhpur), Rajasthan, India, pp. 367–367.

Sobeh, M., Hassan, S.A., Hassan, M.A.E., Khalil, W.A., Abdelfattah, M.A.O., Wink, M., Yasri, A., 2020. A Polyphenol-rich extract from *Entada abyssinica* reduces oxidative damage in cryopreserved Ram Semen. Frontiers in Veterinary Science. 7. https://doi.org/10.3389/fvets.2020.604477

Solanki, Y., Kotiya, A., 2021. Floristic diversity of Umari Dham sacred grove in Jaipur, Rajasthan, India. Holistic Approach to Environment. 11(4), 109–121. https://doi.org/10.33765/thate.11.4.2

Soni, L.K., Parasher, P., Dobhal, M.P., 2017. Phytochemical evaluation of *Prosopis cineraria*, *Curcuma amada* and *Citrullus colocynthis*. Journal of Environment Science and Technology. 3(2), 17–20.

Srinivasan, K., Muruganandan, K.N., Chandra, S., 2001. Anti-inflammatory and analgesic activity of some medicinal plants. Journal of Medicinal and Aromatic Plants. 6, 56–58. https://doi.org/10.1016/j.jep.2006.03.015

Tripathi, Y.C., Prabhu, V.V., Pal, R.S., Mishra, R.N., 1996. Medicinal plants of Rajasthan in Indian system of medicine. Ancient Science of Life. 3, 190–212.

Trivedi, P.C., 2002. Ethno-medicinal Plants of Rajasthan State India, Ethnobotany, Trivedi, P. C., (Eds.). Aavishkar Publishers and Distributors, Jaipur.

Tungmunnithum, D., Hano, C., 2020. Cosmetic Potential of *Cajanus cajan* (L.) Millsp: Botanical Data, Traditional Uses, Phytochemistry and Biological Activities. Cosmetics. 7(4), 84. https://doi.org/10.3390/cosmetics7040084

Upadhyay, B., Parveen, Dhaker, A.K., Kumar, A., 2010. Ethnomedicinal and ethnopharmaco-statistical studies of Eastern Rajasthan, India. Journal of Ethnopharmacology. 129, 64–86. https://doi.org/10.1016/j.jep.2010.02.026

Verma, S.M., Suresh, K.B., 2002. Phytochemical investigations of *Indigofera tinctoria* Linn. leaves. Ancient Science of Life. 21, 235–239.

Vyas, S., Pandya, D., Mankad, A., 2020. A review on *Prosopis cineraria* as an important plant of arid regions of India. International Journal of Multidisciplinary Research. 6(3), 1–6.

Wink, M., 2013. Evolution of Secondary Metabolites in Legumes (Fabaceae). South African Journal of Botany. 89, 164–175. https://doi.org/10.1016/j.sajb.2013.06.006