Journal of Plant Development Sciences
Meerut, India

RESEARCH ARTICLE

CASSIA AURICULATA (L.) BASED HIGH-DENSITY PLANTATION: AN IDEAL APPROACH FOR AUGMENTATION OF NATIVE MEDICINAL PLANT DIVERSITY IN CHAMBAL RAVINES OF RAJASTHAN

S. Kala*[1], H.R. Meena[1], I. Rashmi[1], Anita Kumawat[1], Ashok Kumar[1] and Shakir Ali

*[1]*ICAR-Indian Institute of Soil and Water Conservation, Research Centre, Kota-324 002, Rajasthan, India*
Email: kalaforestry@gmail.com

Received-18.08.2026, Revised-12.09.2026, Accepted-28.09.2026

Abstract: One of the key environmental benefits of sustainable resource management strategies in any type of ecosystem is the revival of biodiversity. Due to substantial biotic and abiotic interference from open grazing and falling, the natural vegetation of non-rehabilitated degraded ravine lands was extremely limited in distribution and diversity. Despite this, there is a dearth of information on the variety of medicinal plants found in rehabilitated ravine regions, both treated and untreated. The goal of the current study is to investigate the native flora under the Cassia auriculata-based land-use system in the Chambal ravines in the Kota district (Rajasthan) in terms of plant diversity, distribution, and ethnomedical applications. An account of 67 species observed denoting 38 families of plant kingdom in the rehabilitated study area. The documented indigenous plant species mostly belong to the plant families of Euphorbiaceae, Asteraceae, Apocynaceae, Solanaceae and Caesalpiniaceae, which have high drought tolerance capacity and the ability to grow under harsh environments. The maximum revival of native medicinal understory flora was observed in the *Cassia auriculata*-based rehabilitated lands. Rehabilitation/restoration/ woody shrubs may foster/facilitate revival/reappearance of valuable native medicinal flora through litter addition and residual moisture retention using soil moisture conservation measures in the study sites. Hence, crucial attention to proper woody plant species selection is essential for rehabilitation and enrichment of ravine biodiversity. Further, implementing appropriate conservation measures is highly needed to ensure the augmentation of indigenous medicinal flora under this resource poor region for sustainable ravine land utilization.

Keywords: Ravine, Rehabilitation, Diversity, Ethnomedicinal, Ethnovetetinary, Conservation

INTRODUCTION

Ravine ecosystems are extremely dynamic and drastically altered topography. Indigenous plant species play an important role in environmental rehabilitation in these locations due to their exceptional survival and high level of adaption to local conditions. Ravine lands are among the most degraded dry land ecosystems due to a harsh environment, low soil fertility, low soil moisture, severe temperature change, and high biotic pressure. Several natural and man-made factors have contributed to the creation of ravines. In a number of states, deep gullies have resulted from significant land degradation along some of the country's major river systems. The Chambal ravines form a 10-kilometer-wide band that runs south from the Yamuna confluence for 480 kilometers to the town of Kota in Rajasthan. *Cassia auriculata* (L.), commonly known as *Senna auriculata* (also known as Tanner's Cassia), is a multipurpose perennial legume shrub from the Caesalpinioideae family (Fig.1). It is also known locally as Indian Senna, Avartakgi, Avaram, Tangedu, Anwala, and Awalchawl. The two subfamilies of the family Leguminosae, Fabaceae, Mimoseae, and Papilionaceae, contain a small number of shrubs that grow as pioneer species. According to Banerjee *et al.* (1989), one of these is *Cassia auriculata*, which thrives under low elevated (even <200 msl) arid salt-tolerant plants. Therefore, it is appropriate to plant pioneer shrubs in degraded land afforestation to improve the site so that seral and climax stage species can sprout and flourish. These shrubs frequently act as nurse plants in afforestation. The remarkable concord with which they coexist is one of this shrub's most fascinating features. Native to India and Sri Lanka, *Cassia auriculata* is an Indo-Malaysian species that has been introduced to many regions of Southeast Asia. It can be found naturally from the northern regions of Rajasthan to the arid regions of peninsular India. In northern India, from West Bengal to Haryana, it is also grown for aesthetic purposes in gardens and hedges.

Many review papers indicated that *Cassia auriculata* has a range of phyto-constituents, indicating possible medical applications. Diabetes, liver toxicity, fungal infection, microbial infection, inflammation, pyrexia, and pain alleviation are some of the human illnesses that can be treated with the plant or its constituents.

*Corresponding Author

The relevance, conservation, and management of *Cassia auriculata* integrated landscapes for the sustainable management of shrub variety in the semi-arid chambal Ravine in Rajasthan, India, have all been attempted to be compiled in this work. However, much more effort remains to be done with *C. auriculata* in order to research and generate a superior genetic resource with a package of processes for production as a commercial plantation for potential use (Kala *et al.,* 2023). In many regions of India, this shrub grows wild and produces flowers and pods all year round. It grows well in wastelands, degraded forests, black soils beside roads, and dry stoney hills. Its blooms and seeds are used to make yellow dye (Chandramouli, 1995).

The research on *Cassia auriculata* L. (Caesalpiniaceae, also known as Tanner's Cassia), a common Asian plant that has been used extensively in traditional medicine to treat diabetes, rheumatism, and conjunctivitis, is described in this work. Additionally, *Cassia auriculata*, the primary ingredient in Kalpa herbal tea and a common ingredient in Ayurvedic medicine as "Avarai Panchaga Choornam," has been the subject of much research because to its antidiabetic properties (Kala *et al.,* 2021). Researchers have been working to find and validate plant-derived compounds for the treatment of a range of illnesses in recent years. Similar to this, it has already been demonstrated that different plant parts-such as leaves, fruits, seeds, etc. Offer chemicals that improve human nutrition and health (Kala *et al.,* 2019). Another Indian plant, *Cassia auriculata* Linn., has several traditional uses against a variety of illnesses.

Therefore, *Cassia auriculata* is not only a culturally significant medicinal plant but also a scientifically proven herb with significant potential for creating new phytopharmaceuticals, especially for the treatment of oxidative stress-related illnesses and diabetes (Kala *et al.,* 2021). Gonorrhea, ulcers, and rheumatism are treated with bark. With demonstrated pharmacological effects and significant ethnopharmacological significance, *Cassia auriculata* is a versatile medicinal herb. In ravine land ecology, a thorough investigation of native plant diversity and their ethnobotanical applications remain unexplored. The study of the entire natural and customary interaction between humans and their domesticated animals and plants is known as ethnobotany. The general perception that "green medicines" or "herbal renaissance" are safer and healthier than synthetic ones has sparked a resurgence of interest in natural medications, particularly those made from plants, in recent decades (Meena, 2015). The market for herbal health goods, such as herbal tea, herbal cosmetics, essential oils, and flavors, is expanding, despite the fact that these items are more expensive than the comparable low-cost synthetic ones (Reddy *et al.*, 2011).

In addition to endangering biological resources, deforestation, urbanization, industrialization, transmigration, colonialism, and other developmental activities have also put traditional culture and ethnobotanical knowledge at risk. India is already well-known for being a treasure trove of valuable medicinal plants that are utilized in both Indian medical systems and regional folk health customs. Numerous high-value medicinal plant species from various parts of India have seen population declines over time due to the ongoing illegal exploitation of these species and the significant destruction of their habitats (Kala *et al.,* 2023). Several additional variables, such as habitat specificity, limited range of distribution, land use disturbances, introduction of non-native species, habitat alteration, climatic changes, heavy livestock grazing, population explosion, fragmentation and degradation, population bottleneck, and genetic drift, can all contribute to medicinal plant species' rarity. Natural enemies such as diseases, herbivores, and seed predators can also drastically diminish the number of unusual medicinal plant species in a given area (Bevill *et al.,* 1999). There are 4,000 to 10,000 medicinal plant species that could become extinct locally, nationally, regionally, or globally, wreaking havoc on livelihoods, economies, and health-care systems (Dhyani and Kala 2005).

An estimate states that throughout the past two fiscal years, the amount of Ayurvedic goods exported from India has tripled. Indian medicinal herbs are becoming more and more in demand on the global market. An important part of a country's natural resources are medicinal plants. They have a major role in providing the rural population with basic healthcare services (Gowda *et al.,* 2022). Several types of degraded lands in the nation could be used to meet the demand for indigenous medicinal plants on the international market. This practice will help prevent the overuse of cultivable crop land, and various studies explain that the cultivation of different medicinal plants helps to reclaim the degraded lands. Despite their significance, not much is known about the medicinal plants found in ravine flora in particular. There is a scarcity of information about the type and distribution of medicinal plants in the current study area, as well as publications on traditional knowledge of how residents use indigenous resources.



Fig. 1. *Cassia auriculata* – An indigenous multipurpose shrub species

The study's goals were to: 1. record the resurgence of native medicinal plants in Chambal ravines' untreated and treated ravine areas; and 2. compile possible ethnomedical knowledge and applications of medicinal plants through a phytosociological survey in Chambal ravines. These goals were chosen in order to inform future conservation and regeneration strategies for efficient use of ravines using potential medicinal plant species in India. In light of this, exploration research has been carried out in the restored Chambal Ravines in Kota district (Rajasthan) to record the richness, use, and management of indigenous medicinal plants.

MATERIALS AND METHODS

Due to overuse and inadequate management, this large area of existing ravine lands in northwest India may pose a threat to neighboring productive areas (Fig.2). With an average annual soil loss of around 17 tons per hectare, the ravines are growing at a rate of 8 to 9 meters per year. Both natural and man-made land degradation are prevalent in the ravine lands. This area's vegetation faces a number of unfavorable conditions, including biotic interference, moisture stress, and nutrient deficiencies. Below is a description of the study region and survey details.

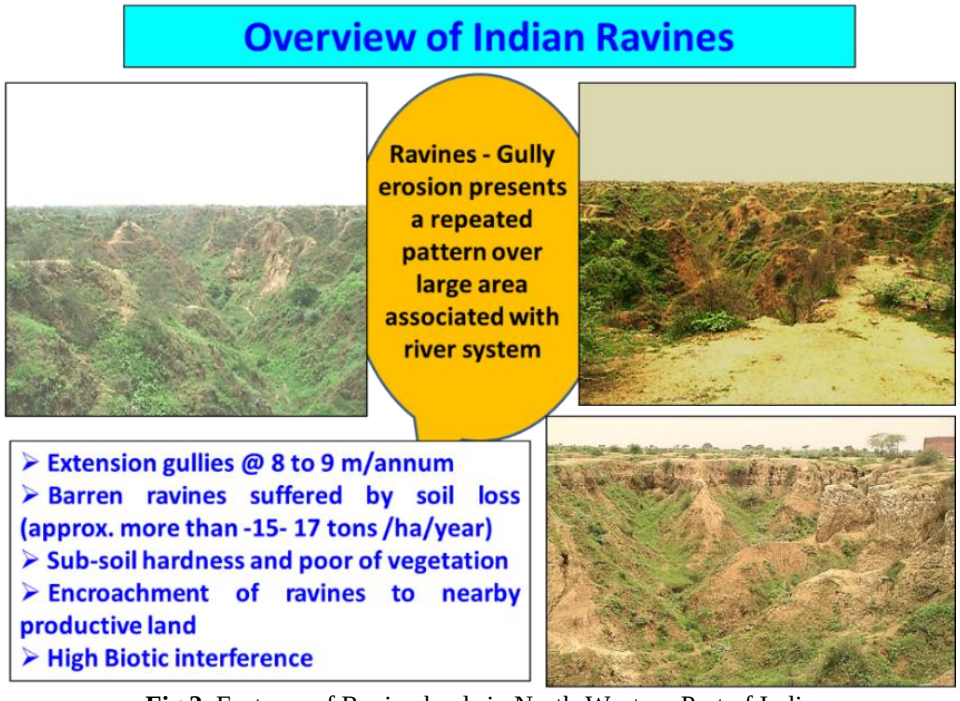


Fig.2. Features of Ravine lands in North-Western Part of India

Study Area:

The research region is located in the Kota district in southeast Rajasthan (longitude: 75°52′ to 75°52′ E; latitude: 25°13′to 25°14′N). The study farm consists of two distinct landscapes: agricultural tablelands (30 ha) and rehabilitated ravine lands (34 ha) along the Chambal River boundary (Fig.3). The soils at the research farm belong to the Kota series. These deep to exceptionally deep soils occur on flat, moderately sloping terrain with a slope of less than 2%. Typically, the $CaCO_3$ layer is found below 100 cm. The soils in the hyperthermic family of Typic Chromusterts are mostly fine-textured (>35% clay). Approximately 80% of the average annual rainfall (748 mm) falls between June and September, with the remaining 20% occurring in the winter. The temperature is normally moderate. In the winter, frost is common. In the assessment year 2024-2026, the average monthly temperature ranged from 4.7°C (lowest in January) to 43.10°C (highest in May). The rehabilitation of ravine lands and the enhancement of land productivity and biodiversity in wheezing regions were made possible by the implementation of situation-specific, economically viable technologies using agroforestry or other perennial plantation systems. In agreement with this, during the years 2023-2025, a phyto-sociological and ethnobotanical survey was conducted in the high-density plantation of *Cassia auriculata* raised with staggered contour trenches in the Chambal ravines through frequent field visits. In order to determine and comprehend the ecological indication and distribution of medicinal plant diversity in protected and rehabilitated regions of the Chambal ravines region, a transect study and in-person observations were implemented. Repeated field surveys were conducted in randomly selected sample plots (20 m x 20 m) to document the floral variety. The quadrats were physically demarcated using stakes and colored nylon ropes to ensure boundary clarity. All opposing species were photographed and identified in situ or in the field lab using standard floral keys. A field guide for recognizing native arborescent species found in Chambal ravines was one of the authoritative regional floras used to verify species identifications.

In the field notebooks, observations were recorded regarding the ecosystems and morphological characteristics of each species of medicinal plant. The plant species were gathered and identified down to the family or species level. The questionable species were verified by a botanist or online resources. Herbs, shrubs, and trees were the categories into which all the data pertaining to the sample plots recognized plant species were divided. Tables 1 and 2 list medicinal plants along with their uses in the following order: common name, botanical name, family, habit, economic aspect, and ethno-medical usage. Primary data were collected through field surveys in representative ravine villages nearby research site, targeting informants /healers verified with two age -groups viz., 41–60 years, and above 60 years. Structured questionnaires and oral interviews were employed to gather quantitative and qualitative data on knowledge of identity of medicinal plants, usage, mode application methods, interest in practicing own use/services and awareness of its cultural and environmental significance. The study was conducted with the consent of participants, with careful attention given to respecting cultural perspectives and authentically representing traditional knowledge. This knowledge was cross-checked using pertinent literature from the center's library and online sources.

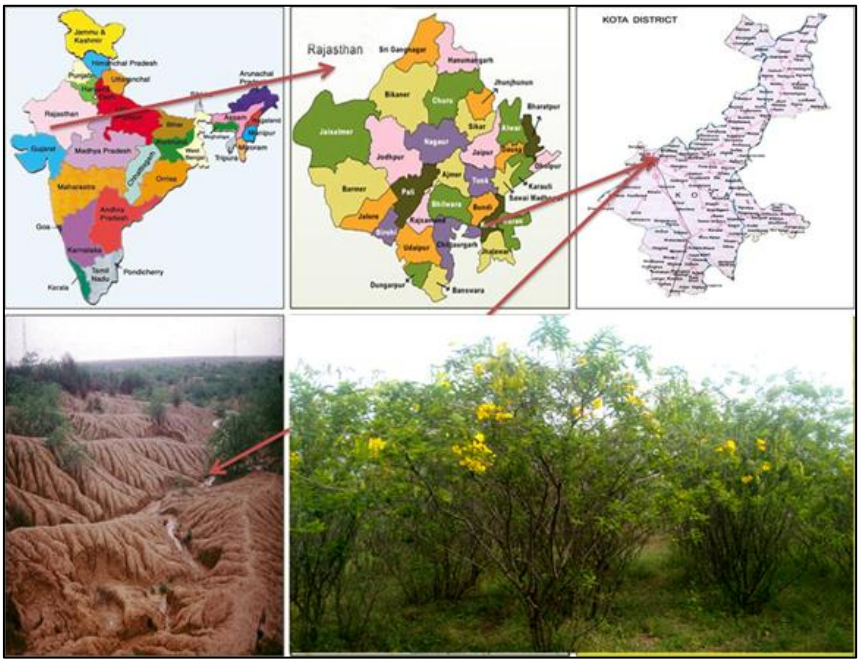


Fig.3. Survey areas of Chambal ravine in Rajasthan (India)

RESULTS AND DISCUSSION

Multipurpose medicinal plants are a significant component of the understory flora and are crucial to the revitalization of the ravine from an ecological and socioeconomic standpoint. This study found 67 medicinal plants from 38 families that local and common people in this area utilize as folk medicine to cure a variety of illnesses or diseases in humans and domestic animals. Trees, shrubs, climbers, and herbs made up the majority of the recognized therapeutic plants. The table .1 & Fig .3. indicate that habit wise distribution of medicinal plants under Cassia rehabilitated Chambal Ravines. In the study site, herbs make up the majority (42), followed by shrubs (15), climbers (9), and grass (1). According to the current study, the groups Euphorbiaceae, Asteraceae, Apocynaceae, Solanaceae, and Caesalpiniaceae comprised the bulk of the species. The identified and recorded native plant species are very drought-tolerant and may thrive in challenging conditions. Through forest cover-induced climatic adjustment, sustainable management of restored Chambal ravines with adequate protection undoubtedly improves species richness and conserving biodiversity. However, compared to unprotected open ravine lands, Cassia-based rehabilitated ravine lands have a significantly greater variety of medicinal plants (Kala *et al.*, 2023). These results are consistent with research by a number of authors showing that understory plant species are more diverse and abundant in rehabilitated or protected or undisturbed ravine than in degraded ravine open forest areas (Uthappa *et al.*, 2018).

Table 1. Listed of Medicinal Plants list in the Cassia based rehabilitated Chambal Ravine in Kota -Rajasthan

Sl. No	Common Name	Scientific Name	Plant Family	Habit Type
1.	Choti-ber	*Ziziphus jujuba*	Rhamnaceae	Shrub
2.	Bichhu-butti	*Xanthium indicum*	Asteraceae	Shrub
3.	Nahtoota	*Tridax procumbens*	Asteraceae	Herb
4.	Lutanki	*Trianthema triquetra*	Aizoaceae	Herb
5.	Mundi	*Sphaeranthus indicus*	Asteraceae	Herb
6.	Kalijibi	*Sonchus asper*	Asteraceae	Herb
7.	Ankhali	*Sonchus ankhali*	Asteraceae	Herb
8.	Pasarghatali	*Solnaum suranttense*	Solanaceae	Herb
9.	Makoy	*Solanum nigrum*	Solanaceae	Herb
10.	Desikharenti	*Sida ovata*	Malvaceae	Herb
11.	Kharenti	*Sida cordifolia*	Malvaceae	Shrub
12.	Lunkia	*Portulaca oleracea*	Portulacaceae	Herb
13.	Lalbuti	*Polygonum plebeium*	Polygonaceae	Herb
14.	Chirpotan	*Physalis minima*	Solanaceae	Herb
15.	Cap berry	*Physalis angulata*	Solanaceae	Herb
16.	Bhui anola	*Phyllanthus niruri*	Euphorbiaceae	Shrub
17.	Milk weed	*Pergularia daemia*	Apocynaceae	Climber
18.	Dakhni	*Pedalium murex*	Pedaliaceae	Herb
19.	Aaera	*Oxalis corniculata*	Oxalidaceae	Herb
20.	Tulsi	*Ocimum sanctum*	Lamiaceae	Herb
21.	Van tulsi	*Ocimum gratissium*	Lamiaceae	Herb
22.	Bapchi	*Ocimum americanum*	Laminaceae	Herb
23.	Kaner	*Nerium oleander*	Apocynaceae	Shrub
24.	Kirmich	*Mucuna pruriens*	Fabaceae	Climber
25.	Khakoda	*Momordia foetida*	Cucurbitaceae	Climber
26.	Chirio ghas	*Mollugo cerviana*	Molluginaceae	Herb
27.	Laajivanthi	*Mimosa pudica*	Mimosaceae	Herb
28.	Alai	*Mimosa hamata*	Mimosaceae	Shrub
29.	Alfa-alfa	*Medicago sativa*	Fabaceae	Herb
30.	Bichtukando	*Martynia annua*	Martyniaceae	Shurb
31.	Darkan	*Leucas urticaefolia*	Lamiaceae	Herb
32.	Timadia	*Impatiens balasamina*	Balsaminaceae	Herb
33.	Gurmar	*Hemidesmus indicus*	Asclepediaceae	Climber
34.	Gangeran Phalsa	*Grewia tenax*	Tiliaceae	Shrub

35.	Gandhi-buti	*Glinus lotoides*	Molluginaceae	Herb
36.	Dudhi	*Euphorbia prostrata*	Euphorbiaceae	Herb
37.	Danda -thor	*Euphorbia nerifolia*	Euphorbiaceae	Shrub
38.	Choloharnach	*Dicoma tomentosa*	Asteraceae	Herb
39.	Dhatura	*Datura metal*	Solanaceae	Herb
40.	Doob grass	*Cynodan dactylon*	Poaceae	Grass
41.	Patharchatti	*Corbichonia decumbens*	Molluginaceae	Herb
42.	Bajar - bel	*Cocculus hirsutus*	Menispermaceae	Climber
43.	Aparajita	*Clitoria ternatea*	Papilionaceae	Climber
44.	Singali	*Cleome viscosa*	Cleomaceae	Herb
45.	Karalia	*Cleome gynandra*	Cleomaceae	Herb
46.	Gar-tumba	*Citrullus colocynthis*	Cucurbitaceae	Climber
47.	Chilva	*Chenopodium album*	Chenopodiaceae	Herb
48.	Karonda	*Carrisa carandas*	Apocynaceae	Shrub
49.	Karil	*Capparis decidua*	Capparaceae	Shrub
50.	Aakda	*Calotropis procera*	Asclepediaceae	Shrub
51.	Santhi	*Boerhavia procumbens*	Nyctaginaceae	Herb
52.	Ankh-Phorniki	*Bergia suffruticosa*	Elatinaceae	Herb
53.	Bajrandanti	*Bareria prionitis*	Acanthaceae	Shrub
54.	Wild onion	*Asphodelus tenuifolius*	Xanthorrhoeaceae	Herb
55.	Satawari	*Asparangus racemosus*	Asparagaceae	Climber
56.	Prickly poppy	*Argemone mexicana*	Papaveraceae	Herb
57.	Kalmegh	*Andrograpis paniculata*	Acanthaceae	Herb
58.	Jal bhangro	*Ammannia baccifera*	Lythraceae	Herb
59.	Chauli	*Amaranthus caudatus*	Amaranthaceae	Herb
60.	Pigweed	*Amaranthus blitoides*	Amaranthaceae	Herb
61.	Gwar Patha	*Aloe vera*	Liliaceae	Herb
62.	Kali-Bui	*Aerva lanata*	Amaranthaceae	Herb
63.	Ardusa	*Adhatoda vasica*	Acanthaceae	Shrub
64.	Senna	*Cassia auriculata*	Caesalpiniaceae	Shrub
65.	Chauriya	*Acalypa indica*	Euphorbiaceae	Herb
66.	Kanghil	*Abutilon indicum*	Malvaceae	Herb
67.	Chirmi	*Abrus precatorius*	Fabaceae	Climber

The study result indicated that grasses (2.70%), herbs (56.76%), climbers (18.91%), and shrubs (21.62%) were discovered in the study areas. The reported medicinal plants were classified based on habit and distribution (Fig. 4). In contrast to the slope and upper portion of the ravine lands, the valley beds of the ravines are covered in lush vegetation. This could be because during the monsoon and post-monsoon seasons, there is more soil moisture available in the valley beds. Herbaceous families like Asteraceae, Apocynaceae, Amaranthaceae, and Acanthaceae make up the majority of the herbaceous stratum of the rehabilitated cassia-based landuse system. Beyond nutrient acquisition, arbuscular mycorrhizal fungi (AMF) promote soil aggregation through the production of glomalin-related soil proteins, which improve aggregate stability and contribute to greater nutrient and water retention and enhanced soil fertility indicates that plant–microbe interactions likely play an important role in sustaining nutrient cycling in these nutrient-deficient sandy soils (Zaman *et al.,* 2025).These families play crucial ecological roles in soil stabilization, moisture retention, and pollinator support networks (Swarupanandan *et al.,* 2001). Legume plant species in the Caesalpiniaceae family, which are frequently or highly occupy in open or disturbed areas, are especially good ground cover forming vegetation at reducing erosion and encouraging the return of vegetation after disturbance events. Alsaveri *et al* (2026) findings suggested that *S. italica* enhances soil fertility through integrated plant–soil–microbe interactions involving biological nitrogen fixation, rhizosphere-mediated nutrient mobilisation, and mycorrhizal associations in arid soils of Jeddah - Saudi Arabia. *Senna italica* as a potential ecosystem engineer with promising applications in ecological restoration, soil rehabilitation, and sustainable management of degraded sandy soils in arid and semi-arid regions.

According to Archana *et al.* (2007), Banaras Hindu University in Varanasi, Uttar Pradesh, has a wide diversity of medicinal plant resources and their traditional usage. Similar trends of highlighting medicinal diversity and ethnomedical usage were found in another research carried out in Uttar Pradesh's Chandauli district (Singh and Singh, 2009). A properly restored ravine forest area has a much greater variety of medicinal plants as understory vegetation due to microclimate modification. This is

also consistent with a few other authors' findings that the regrowth of forest vegetation modifies soil fertility, light, temperature, and moisture, all of which have an impact on ground-level competition dynamics (Barbier *et al.* 2008; Carnevale and Montagnini 2002; Shankar *et al.* 1998, Kala *et al.*, 2023). In our study, greater tree diversity under forest regrowth was correlated with higher densities and diversities of medicinal plants.

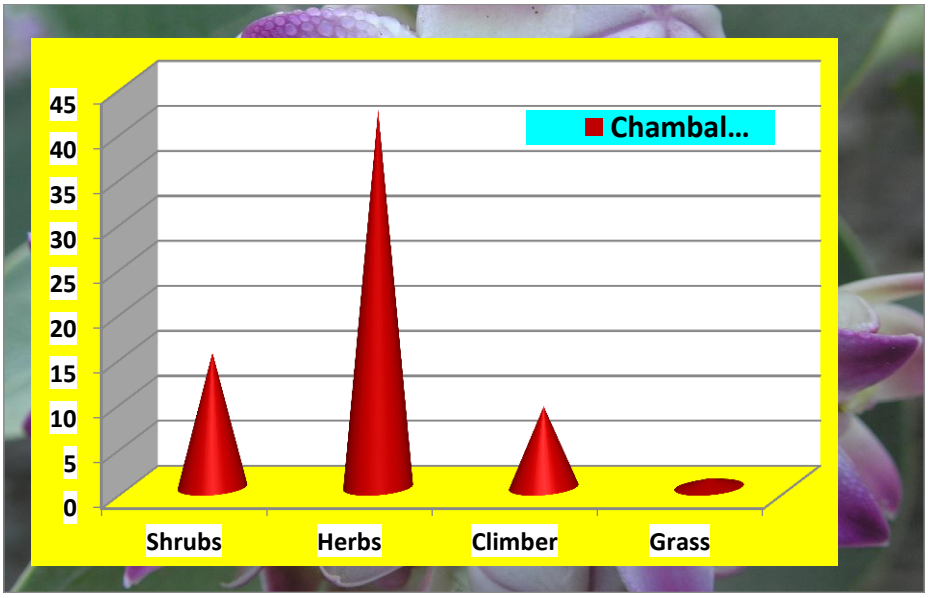


Fig.4. Habit wise distribution of medicinal plants under Cassia based rehabilitated Chambal Ravines

This demonstrates the variety and distribution pattern of medicinal plants in places that have been restored via successful conservation initiatives. The majority of the recognized medicinal plants have ecological responsibilities by preventing soil erosion by lowering runoff water velocity and the erosive effects of raindrops. Traditional healers and local residents (elderly people) in the sample region were also consulted for ethno-medical uses and knowledge. Each plant has a different component that is utilized to make medications. The most popular methods for preparing herbs were crushing, homogenizing with additives, and chewing. The most common application methods were drinking, inhaling smoke, and using a strap and hold-on.

A few therapeutic plants, including Keir, Ber, and Aloe vera, were found to be valuable in local marketplaces. Their market price was still unappealing, though. Although they were offered to the market in many forms, leaves, roots, seeds, and fruits were the most often marketed portions. Leaves, roots, bark, fruit, flowers, and seeds are used to make medicinal remedies. Plants applied as a paste, powder, decoction, extracts, and juices, as well as others applied as oil, smoke, and chew, are examples of the mode or formulation of intake. According to this survey, the most commonly used plant part was the leaf (28%), followed by the root (20%), fruit (14%), seed (11%), entire plant (9%), flower (6%), bark (8%), and gum (4%) (Fig. 5) in Chambal ravine region people. To create effective management strategies, indigenous knowledge and its applications must be examined. To guarantee equitable benefit sharing and greater involvement in conservation, the indigenous botanical knowledge of the local/traditional herbal healers must be respected.

Ethnoveterinary medicine deals with traditional animal health care, which includes methods, practices, beliefs, knowledge, and abilities. Therefore, it would be extremely important to describe ethnoveterinary medicine from areas with a rich cultural and biological environment. There is virtually little information known about ethnoveterinary medicinal plants in the ravine region. Compared to allelopathic medications, locally accessible and readily available medicinal plants offer a less expensive option for treating a variety of illnesses and diseases in livestock. With the goal to acquire data concerning the use of ethnoveterinary medicinal plants available in the area for treating various ailments and diseases of livestock, old, educated farmers and seasoned traditional healers who have traditional knowledge of these ethnoveterinary medicinal plants in the villages of the surveyed district were directly interviewed. Authours received consent of traditional healers and farmers were interviewed and acknowledge properly. The most significant native ravine ethnoveterinary medicinal plants may be crucial to the administration of animal health care, according to Table 2 and Fig.6. To record, preserve, and assess the effectiveness of these priceless medications, botanists, ethnobotanists, and ethnopharmacologists must work together urgently.

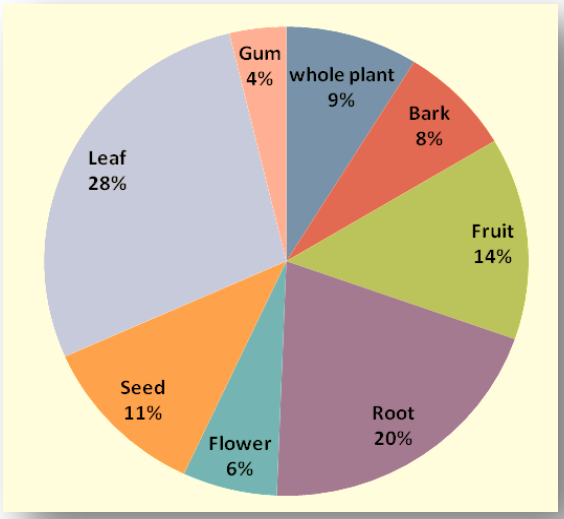


Fig 5. Plant parts wise number of medicinal plants used as a medicine.

These woody and herbaceous understory communities are particularly vulnerable to anthropogenic stressors and climate variability due to their ecological, functional, and economic significance. The resilience of the Chambal ravine forests and the stability of the ecosystem depend on their conservation. By enhancing canopy development, continuous litterfall, nutrient cycling, improving soil properties, and improving moisture regime, *Senna italica* may facilitate the revival of ground cover/ vegetation and contribute to long-term ecosystem resilience. Therefore, this native woody legume shows significant potential as a keystone plant species for degraded land mitigation, ecological restoration, soil rehabilitation, and sustainable land productivity in degraded arid landscapes (Alsaveri *et al.*,2026). Therefore, in order to maintain the biological integrity of these frequently disregarded but crucial understory components of ravine land for improved resource conservation, targeted management tactics with native shrubs and habitat-specific soil-moisture conservation interventions are necessary. Campaigns to raise awareness are therefore urgently needed to increase the local community's understanding of the significance and proper use of medicinal plants. Many people now believe that in situ conservation is the only practical and economical way to let a species continue on its natural evolutionary path while interacting with its environment and with itself. Even though the present data on the nation's medicinal plant variety is unclear and scattered among multiple research institutes, a thorough program to document the diversity and current state of medicinal plants in the country has to be started.

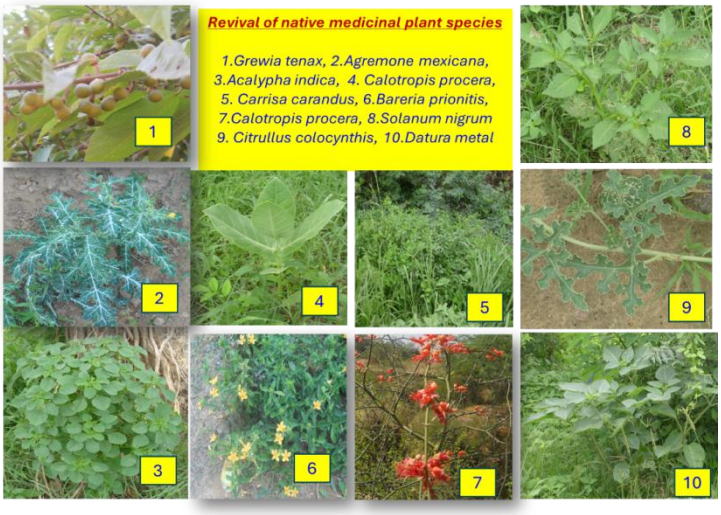


Fig.6. Revival of medicinal plants under *Cassia auriculata* based rehabilitated land use in Chambal ravine of Rajasthan

Table 2: Key plant species used as an ethno-veterinary medicine in Chambal ravines

Sl.No	Common Name	Plant Species	Ethno-veterinary medicinal uses	Part and Utility form
1.	Ardusa	*Adhatoda vasica*	Cure diarrhea	Leaf and bark
2.	Gwar Patha	*Aloe vera*	Ecto parasites	Leaf pulp
3.	Prickly poppy	*Argemone mexicana*	rheumatism	Leaf juice decoction
4.	Satawari	*Asparagus racemosus*	Cure arthritis and foot infection	Root powder and leaf juice
5.	Aakda	*Calotropis procera*	Snake bite	Latex
6.	Doob grass	*Cynodan dactylon*	Increasing lactation	Whole plant
7.	Datura	*Datura metal*	Wound healing	seed paste
8.	Bajrandanti	*Bareria prionitis*	Cure Fever and redness in body	Leaf juice and flower paste
9.	Kainth	*Grewia tenax*	Cure ulcers	Leaf +Flower paste
10.	Van Tulsi	*Ocimum grantissimum*	Cure cold and cough	Leaf decoction
11.	Tulsi	*Ocimum sanctum*	Removal stomach parasites	Leaf decoction
12.	Gokshura	*Tribulus terrestris*	Cure colic cough	Leaf juice
13.	Keir	*Capparis decidua*	Diarrhea	Leaf fodder
14.	Ber	*Ziziphus jujuba*	Skin burn	Leaf paste + Neem oil

CONCLUSION

According to the study, the groups Euphorbiaceae, Asteraceae, Apocynaceae, Solanaceae, and Caesalpiniaceae comprised the bulk of the species. Because they can withstand drought and thrive in challenging conditions, the identified and recorded indigenous plant species exhibit high intensity natural regeneration in ravine environments. In spite of its unpalatable nature, it can also be used as a hedge plant. It is used as a shelter and windbreak shrub in Rajasthan's desert to control wind erosion and enhance the productivity of degraded soils. Through cassia green cover-induced microclimatic conditions, enhance revival native plant species diversity in restored Chambal ravines, which undoubtedly facilitates / improves species richness and conserving biodiversity. Compared to other tree-based land-use systems, Tanner's Cassia-based rehabilitated ravine lands have rich biodiversity support future than according to the current study. Hence, crucial attention with proper species selection is essential towards enrichment of ravine biodiversity. Therefore, it is immediately required to preserve these significant plant species for long-term, sustainable uses. In the ravine areas, initiatives for sustainable farming and harvesting should be started. Furthermore, effective conservation measures, followed by appropriate documentation, conservation, sustainable utilization, and awareness building, are critical to ensuring the future expansion of indigenous medicinal flora in this resource-poor region for sustainable ravine land use.

ACKNOWLEDGEMENT

The authors acknowledge the support of the Director, Indian Council of Agricultural Research, and technical staff for assistance during field experimentation.

REFERENCES

Alsayeri, N, Alharthi, S., Aldomaigi, J. and Almuziny, M. (2026). *Senna italica* as an Ecosystem Engineer: Enhancing Soil Fertility and Function in Nutrient-Poor Sandy Soils. *International Journal of Plant & Soil Science*, **38** (8), 110–118. https://doi.org/10.9734/ijpss/2026/v38i86202

Google Scholar

Archana, K.V., Munesh Kumar and Rainer, W.B. (2007). Medicinal plants in an urban environment: the medicinal flora of Banaras Hindu University, Varanashi, Uttar Pradesh. *Journal of Ethnobilogy and Ethnomedicine,* **3** (8): 35 pp.

Google Scholar

Banerjee, A.K. (1989). Shrubs in tropical ecosystems- examples from India. World bank technical paper. WTP No.**103**. Washington, D.C. USA.

Google Scholar

Barbier, S., Gosselin F. and Balandier, P. (2008). Influence of tree species on understory vegetation diversity and mechanisms involved-A critical review for temperate and boreal forests. *Forest Ecology and Management*.; **254**:1–15.

Google Scholar

Bevill, R.L., S.M. Louda and Stanforth, L.M. (1999). Protection from natural enemies in managing rare plant species**.** *Conservation Biology***, 13:**1323-1331.

Google Scholar

Carnevale N.J. and Montagnini F. (2002). Facilitating regeneration of secondary forests with the use of mixed and pure plantations of indigenous tree species. *Forest Ecology and Management*, **163**:217–227.

Google Scholar

Chandramouli, K.V. (1995). Sources of Natural Dyes in India. A compendium with regional names, PPST Foundation, Adayar, Madras Tamil Nadu, India.

Google Scholar

Dhyani, P.P. and Kala, C.P. (2005). Current research on medicinal plants: Five lesser known but valuable aspects. *Current Science*, **88:** pp335-34.

Google Scholar

Gowda, S.H., Karthik S., Shankar Jai., Umakanth, B.S. Syed, S.A, and Rupesh Kumar, M. (2022). "A Pharmacological Review on *Cassia auriculata*", *Journal of Innovations in Applied Pharmaceutical Science*, **7** (3), 113-17. https://doi.org/10.37022/jiaps.v7i3.363.

Google Scholar

Hall, P. and Bawa. K. (1993). Methods to assess the Impact of Extraction of Non-Timber Tropical Forest Products on Plant Populations. *Economic Botany*, **47**: 234-247.

Google Scholar

Jain, S.K. (1991). Contribution to Indian Ethnobotany. Scientific publishers, Jodhpur,1-160.

Google Scholar

Joshi, K. P., Chavan, D. Warude and Patwardhan (2004). Molecular markers in herbal drug technology. *Current Science*, **87**: pp159-165.

Google Scholar

Kala, S., Rashmi, I., Meena, H.R., Ali Shakir., Reeja S., Vennila, S. and Rejendran, Ambika (2023). Genetic Divergence Studies among Indigenous Accessions of *Cassia auriculata* (L.) Roxb., through Screening and Utilization for Chambal Ravine Rehabilitation, *Legume Research*, **46** (10): 1302-1307. doi: 10.18805/LR-5170.

Google Scholar

Kala, S., Meena, H.R. Singh, A.K. Rashmi,I., Anita Kumawat, Reeja, S., Subbulakshmi, V. and Singh, R.K. (2021). A First Report of Albinism in Legume Medicinal Shrub of *Cassia auriculata*, L. *The Indian Forester*, **141** (1); 91-92.

Google Scholar

Meena, V.K. (2015). Ethnobotany of the Pratapgarh Tehsil of Rajasthan, (Ph.D., Thesis Submitted to Department of Botany, University of Kota, Rajasthan); Pp:1-181.

Google Scholar

Reddy, S.R., Reddy, A.M., Philomina, N.S. and Yasodama, N. (2011). Ethnobotanical survey of Sheshachala hill range of Kadapa district, Andhra Pradesh, India. *Ind. J. of Funda and App. Life Sciences*, **1**(4): 324-329.

Google Scholar

Shankar, U., Lama, S.D. and Bawa, K.S. (1998). Ecosystem reconstruction through "taungya" plantations following commercial logging of a dry, mixed deciduous forest in Darjeeling Himalaya. *Forest Ecology and Management*, **102**:131-142.

Google Scholar

Sharma, A.B. (2004). Global Medicinal Plants Demand May Touch $5 Trillion By 2050.*Indian Express*. **29**, 2004.

Google Scholar

Singh, A. and Singh, P.K. (2009). An ethnobotanical study of medcinal plants in chanduali district of Uttar Pradesh in India. *Journal of ethnopharmocology*. **121**(2): 324-329.

Google Scholar

Swarupanandan, K., Sasidharan, N., Chacko, K. C. and Basha, S. C. (2001). Floristic and ecological studies on the sholas of Idukki District. In Shola Forests of Kerala: Environment and Biodiversity, Kerala Forest Department and Kerala Forest Research Institute, Peechi, India, pp. 259–286.

Google Scholar

Uthappa, A.R., Chavan, S.B., Ramesha, M.N., Kala, S., Kumar, Veeresh, Handa, A.K. and Chaturvedi, O.P. (2018). Plant Biodiversity of ravine ecosystem: May open new vistas for enhancing productivity. Chapter: 4, *In* JC Dagar et al.(eds*) Ravine Lands: Greening for Livelihood and Environmental Security*. ISBN 978-981-10-8043-2 (Springer International Publishing), Pp: 119-141.

Google Scholar

Zaman, F., Ali, A., Khattak, W. A., Khan, H., Anwar, Z., Rahimi, M. and Chen, F.S. (2025). Diversity of arbuscular mycorrhizal fungi (AMF) and its and role in nutrient recycling and availability in subtropical forest ecosystem of China: A review. *Eurasian Soil Science*, **58**, Article 145. https://doi.org/10.1134/S1064229325601489.

Google Scholar