Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 14 [6] May 2025: 04-11

Online ISSN 2277-1808
Journal's URL: http://www.bepls.com
CODEN: BEPLAD

ORIGINAL ARTICLE **OPEN ACCESS**

Floristic Study Survey of Some Important Medicinal Plants in Jeen Mata Village, Sikar, Rajasthan (India).

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ABSTRACT
This study aims to document the diversity, frequency, and density of plant species in the Jeenmata village and surrounding areas of Sikar district, Rajasthan, focusing on their medicinal and ethnobotanical significance. Ten plant species were observed across ten quadrats, with Euphorbia hirta showing the highest frequency of 100% and the highest density of 5.4 individuals per quadrat, indicating its widespread occurrence and significant role in traditional healthcare. Conversely, Sida cordifolia exhibited the lowest frequency of 29% and the lowest density of 2.9 individuals per quadrat, suggesting its limited distribution in the study area. Other species like Prosopis cineraria and Vachellia tortilis also showed high frequency and density, reinforcing their importance in the local medicinal practices. The study highlights the resilience of these plants to the semi-arid climate of Rajasthan, emphasizing their adaptability to harsh environmental conditions. This research, being the first of its kind in the study area, provides a valuable baseline for future ethnobotanical studies and contributes to the conservation and sustainable use of the region's plant resources. It underscores the importance of preserving the rich medicinal flora that supports the well-being of local populations while laying the groundwork for future investigations into the pharmacological potential of these species.
KEYWORDS: *Jeen Mata village, Floristic study ethnobotanical, Arid-zone, Rajasthan*

Received 25.03.2025 Revised 21.04.2025 Accepted 19.05.2025

INTRODUCTION

Vegetation plays a pivotal role in determining the status of an ecosystem, influencing various ecological parameters such as soil temperature, microclimate, water regimes, energy budget, surface runoff, photosynthesis, and biotic interactions within the ecosystem [1]. From a terrestrial ecology perspective, vegetation is a critical indicator that provides in-depth insights into the health and functioning of ecosystems. Consequently, vegetation patterns are considered essential for ecosystem assessment [2]. Different vegetation types within a particular area are interdependent, establishing a mutual relationship with the environment and collectively representing the plant community of the region [3]. The quantitative analysis of such communities, known as phytosociology, aims to describe, classify, and interpret vegetation in a systematic manner to determine its structural patterns [4]. Understanding plant communities is essential in terrestrial ecosystems to assess ecological sustainability, the functioning of communities, and the management of both flora and fauna within these ecosystems [2,5,6]. Sacred groves are forest fragments protected by indigenous communities based on religious beliefs. In Rajasthan, these groves are referred to as "Orans/Gochar." The local communities coexist with nature, conserving its flora and fauna through traditional knowledge [7,8]. The undisturbed nature of these groves enables them to maintain ecological balance over the years by accumulating organic matter, including fallen leaves, plant and animal remains, and other debris such as deadwood. This process contributes to the long-term preservation of biodiversity and ecosystem health within sacred groves. The district Sikar lies in the north eastern part of the Rajasthan between 27° 21' to 28° 12' N latitudes and 74° 44' to 75° 25' E longitudes. The area, which is approximately 432.31 meters above the mean sea level, is roughly crescent bowl or vessel shape. It is bound on the north by Jhunjhunu district and on the north-west by Churu district, on the south-west by Nagaur district and on the south-east by Jaipur district. In its north-east corner, it is bounded by Mahendargarh district of Haryana. The area of the district as reported by the Surveyor General of India is 3,027 Sq. miles and according to village papers it is 7,742.44 Sq. km. The district covers 2.27% of the total area of the state and stands 17th in rank in area amongst the other districts of the state. The district is composed of nine tehsils viz. Danta ramgarh, Dhod, Fathepur, Khandela, Lachhmangarh, Neem-Ka-Thana, Ramgarh

shekhawati, Sikar and Sri Madhopur. The district is divided into two topographic regions. The western part is characterized by sand dunes and the eastern by the hill ranges. There are no perennial rivers in the district. There are also five streams namely Doha, Kantli, Krishnawati, Mendha, Sabi. The soil of the region varies from sandy to loam. The main range of Aravalli hills runs through the district in the north-east and southwest direction cutting it almost into two parts. The sandy tract among the study area are composed of Danta ramgarh, Dhod, Fatehpur, Lachhmangarh, Ramgarh-shekhawati and Sikar tehsils and the comparatively fertile part consisting of Khandela, Neem-KaThana and Sri Madhopur tehsil having sandy loam soil. The vegetation in the Sikar district is sparse, consisting mainly of stunted, thorny or prickly shrubs and few scattered trees. Perennial herbaceous flora is very limited, capable of drought resistance. It is studied that the Shekhawati area of Rajasthan especially the hilly tracts of areas and reported that these hills are endowed with wealthy flowers and the local community well learnt to use the area's flowers resources which consist of fitness care. These human beings effectively cope with many hard diseases using plant-based totally tablets [9]. A survey is also carried out in Sikar and Jhunjhunu for ethno medicinal plant life among the people of those localities recorded the use of 48 species of dicotyledonous and multiple species of monocotyledonous plants and enlisted distinctive varieties of plants used for various traditional purposes [10]. Some important plants which were found in this region are *Abutilon indicum, Ageratum conyzoides, Ailanthus excelsa, Argemone mexicana, Balanites aegyptiaca, Barleria cuspidata, Calligonum polygonoides, Citrullus colcynthus, Euphorbia hirta, Ficus benghalensis, Helicteres isora, Lawsonia inermis, Ocimum sanctum, Pedalium murex, Ricinus communis, Solanum indicum* and *Tephrosia appotinea*. The local and tribal people of the region uses all these plant species for curing diseases such as respiratory ailments, blood and liver disorders, urinary disorder, sexual problems, diabetes, animal and parasitic bites, rheumatism, eye, ear, teeth, hair, skin diseases, digestive system related ailments and common fever. As it is evident from the above review that there is very scarce work has been done on floristic studies of sacred groves of Sikar and no study has mentioned flora from Jeen mata temple sacred grove, therefore present study has been proposed.

MATERIAL AND METHODS

The primary pressures on the area's biodiversity are grazing and firewood collecting, therefore quadrat method will be used to measure a variety of ecological parameters in the Sikar district. To know the dominance, certain analytical character such as frequency, densities, abundance of species in a community are expressed in quantity. Different methods like quadrat method, line transect method, point frame method are mean to serve the purpose of analytical characters **[11].** Random sampling technique was used to study and analyse the vegetation cover of the study area with the help of Quadrat Method. Sampling unit of area was taken in the area of definite size of at least 500m with trail transect. All the species occurring in each quadrat were noted and their numerical count was carried out. Names of species and number of individual species in each unit were recorded.

Frequency- It is the number of sampling units or quadrats in which a given species occurs.
Density- It is the number of individuals per sampling unit.
Abundance- It is described as no. of individuals per quadrat of occurrence.

Percentage frequency (% F), density and abundance can be estimated by following formulae:

$$\textbf{\% Frequency} = \frac{\text{No. of quadrats in which the species occurred}}{\text{Total no. of quadrats studied}} \times 100$$

$$\textbf{Density D} = \frac{\text{Total number of individuals}}{\text{Total no. of quadrats studied}}$$

$$\textbf{Abundance A} = \frac{\text{Total number of individuals}}{\text{Number of quadrats of occurrence}}$$

Each specimen was identified by help of available literature and Herbarium of Department of Botany, University of Rajasthan, Jaipur.

Study area- Jeenmata is a village with religious importance in Dantaramgarh tehsil of Sikar district. It distance 29km from Sikar town in south. An ancient temple dedicated to Jeen Mata (Goddess of Power) is situated there. According to the beliefs, the sacred shrine of Jeenmata is thousand years old. In a colorful festival, devotees in millions assemble here which held twice in a year during the Navratri in the Hindu months of Chaitra and Ashvin. Harsh Bhairav nath who is believed to be her brother is situated close to this temple on the top of the hill.

RESULTS

TABLE 1: Details of plants found in floristic survey of Jeen mata village.

S No	Name of the plant species with RUBL (accession no.)	Number of individuals in each quadrat										(N)	(Y)	(Z)	% F =(Y/Z x100)	A=(N/Z)	D=(N/Y)
		1	2	3	4	5	6	7	8	9	10						
1.	*Tephrosia purpurea*	5	3	0	6	2	0	7	5	3	4	35	8	10	80	3.5	4.38
2.	*Euphorbia hirta* RUBL 21711	7	7	9	6	5	7	8	3	0	2	54	10	10	100	5.4	5.40
3.	*Ziziphus nummularia*RUBL 21721	6	9	5	0	6	6	8	9	5	6	60	9	10	90	6	6.67
4.	*Xanthium strumarium* RUBL 21720	7	6	8	7	8	5	7	0	6	5	59	9	10	90	5.9	6.56
5.	*Ficus religiosa* RUBL 21710	5	6	5	4	0	3	5	0	5	3	36	8	10	80	3.6	4.50
6.	*Prosopis cineraria* RUBL 21726	5	5	5	4	6	4	6	6	8	6	55	10	10	100	5.5	5.50
7.	*Sida cordifolia* RUBL 21716	3	5	3	3	0	4	0	4	2	5	29	9	10	90	2.9	3.22
8.	*Vachellia tortilis* RUBL 21712	5	6	6	5	7	7	6	8	6	7	63	10	10	100	6.3	6.30
9.	*Ailanthus excelsa* RUBL 21713	6	8	5	4	0	0	5	6	7	4	45	8	10	80	4.5	5.63
10.	*Datura stramonium* RUBL 21727	5	8	6	5	6	7	3	6	4	3	53	10	10	100	5.3	5.30

Where Y= No. of quadrats in which species occurred; Z= Total quadrats studied; N= Total no of individuals; RUBL= Rajasthan University Botany Lab

Table 1 represents data for frequency and distribution of different plant species studied. *Tephrosia purpurea* appeared in 8 quadrats (80% frequency) out of 10 studied quadrats. It had a total of 35 individuals, resulting in a density of 3.5 individuals per quadrat and an abundance of 4.38 indicating that its distribution is fairly widespread with moderate density. With the highest frequency of 100% (present in all 10 quadrats), *Euphorbia hirta* had a total of 54 individuals. Its density was calculated as 5.4 individuals per quadrat, and its abundance was 5.40. This species is the most frequent and widely distributed, showing a relatively high density across all quadrats. *Ziziphus nummularia* was found in 9 quadrats (90% frequency) with a total of 60 individuals. Its density is 6 individuals per quadrat, and its abundance is 6.67, indicating that it has a strong presence and moderately high density. *Xanthium strumarium* had a frequency of 90% (9 quadrats) with a total of 59 individuals. The density is 5.9 individuals per quadrat, and its abundance is 6.56. It is relatively well-distributed with a slightly higher density compared to *Z. nummularia*. *Ficus religiosa* appeared in 8 quadrats (80% frequency) with 36 individuals. Its density is 3.6 per quadrat, and its abundance is 4.50. This species had moderate frequency and density, though it was slightly less common than others in the study. *Prosopis cineraria* was found in all 10 quadrats (100% frequency), it had a total of 55 individuals, with a density of 5.5 per quadrat and an abundance of 5.50. This species, like *E. hirta*, was extremely common and well-distributed across all quadrats. *Sida cordifolia* appeared in 9 quadrats (90% frequency), but with a lower total of 29 individuals. The density of this species was 2.9 individuals per quadrat, with an abundance of 3.22. While it had a high frequency, its density was lower compared to others. *Vachellia tortilis* had a frequency of 100% (present in all 10 quadrats) and a total of 63 individuals, giving it a density of 6.3 individuals per quadrat and an abundance of 6.30. It shared the highest frequency with *E. hirta* and *P. cineraria,* and its high density suggests it was one of the most abundant species. Ailanthus excelsa appeared in 8 quadrats (80% frequency) with a total of 45 individuals, giving it a density of 4.5 individuals per quadrat and an abundance of 5.63. It had moderate frequency and density, suggesting it was present but not as common or dense as some other species. *Datura stramonium* was present in all 10 quadrats (100% frequency), with a total of 53 individuals, resulting in a density of 5.3 individuals per quadrat and an abundance of 5.30. Like several other species, it was widely distributed and had moderate

density.

Details of plants-

1. ***Tephrosia purpurea* L. Pers.:** It is also known as ***Sarphuka*** and is scientifically recognized for its extensive medicinal properties, is one of the most significant plants that have been thoroughly investigated through modern scientific methodologies.

***Tephrosia purpurea* L. Pers.**

Numerous bioactive compounds have been isolated and characterized from various parts of the plant. The plant as a whole has demonstrated efficacy in treating a wide range of conditions, including liver cirrhosis, splenomegaly, inflammation, skin diseases, cellulitis, gonorrhea, and leprosy. Furthermore, ***Sarphuka*** exhibits notable pharmacological activities, such as blood purification, diuresis, antibacterial, antidiabetic, and hepatoprotective effects **[12].**

2. ***Euphorbia hirta L.*: *Asthma plant***, an annual medicinal weed, is widely recognized not only for its status as a weed but also for its significant medicinal properties. This herb is commonly found in tropical and temperate regions across the world, including India, Bangladesh, Africa, and Australia.

Euphorbia hirta L.

Comprehensive literature reviews indicate that various parts of the plant exhibit a broad spectrum of pharmacological activities, including antimicrobial, antidiabetic, anticancer, antitumor, antiplasmodial, antifertility, wound healing, anti-inflammatory, sedative, and diuretic effects **[13].**

3. ***Ziziphus nummularia (Burm.f.) Wight & Arn***: ***Ziziphus nummularia***, a small bush belonging to the Rhamnaceae family, has been extensively utilized in traditional folk medicine and is known for its richness in bioactive molecules.

Ziziphus nummularia (Burm.f.) Wight & Arn

Numerous studies on its phytochemical and pharmacological properties have confirmed that this plant serves as a valuable source of novel bioactive compounds. Research to date has highlighted a diverse pharmacological profile for ***Z. nummularia***, demonstrating significant antioxidant, anticancer, anti-inflammatory, and cardioprotective activities **[14].**

4. ***Xanthium strumarium L.*:** The fruits of ***Xanthium strumarium*** L. have gained significant importance in traditional Chinese medicine and are commonly employed in clinical practice for the treatment of various nasal diseases, including acute and chronic rhinitis, allergic rhinitis (AR), nasosinusitis, and nasal obstruction, as well as for itching and painful conditions **[15].**

Xanthium strumarium L.

Over 170 chemical compounds have been isolated and identified from this plant, encompassing a diverse range of constituents, such as sesquiterpenes, lactones, phenols, glycosides, alkaloids, fatty acids, and others **[16].**

5. ***Ficus religiosa L.*:** Phytochemical studies on *Ficus religiosa* L. have led to the isolation of various secondary metabolites, including phenolic components, hydrocarbons, aliphatic alcohols, volatile compounds, phytosterols, amino acids, and furanocoumarins, among others.

Ficus religiosa L.

Both in vitro and in vivo pharmacological evaluations of crude extracts and isolated compounds from *Ficus religiosa* have revealed a broad spectrum of bioactivities. These include anti-inflammatory, analgesic, antimicrobial, antiviral, hypolipidemic, antioxidant, immunomodulatory, antiasthmatic, parasympathetic modulation, estrogenic, anticancer, antiulcer, antianxiety, anthelmintic, endothelial receptor antagonistic, apoptosis-inducing, and hypotensive effects **[17].**

6. ***Prosopis cineraria (L.) Druce*:** In traditional Indian medicine, the rind of ***Prosopis*** is employed in the treatment of various ailments, including leprosy, dysentery, and asthma, among others **[18,19].** The rind of ***Prosopis africana*** has demonstrated notable anti-inflammatory and antibacterial activities, particularly against ***Mycobacterium arum*** and ***Staphylococcus aureus***. Additionally, the leaves of ***Prosopis*** are rich in sterols, including campesterol, stigmasterol, and actacosanol **[18],** which exhibit antioxidant and hypoglycemic properties. Methanol extracts of ***P. juliflora*** leaves have also shown anti-cancer activity in cell culture **[19].**

Prosopis cineraria (L.) Druce

Furthermore, ***Prosopis*** flowers are utilized in traditional medicine, often pounded and mixed with sugar, to prevent miscarriage in women and for their diuretic effects **[18].**

7. ***Sida cordifolia L.*: *Sida cordifolia*** L. has been reported to exhibit analgesic, anti-inflammatory, hypoglycemic, and hepatoprotective activities. Traditionally, ***Sida cordifolia*** (Linn.) has been used as a central nervous system depressant, for weight loss, as an analgesic, anti-inflammatory agent, hypotensive, and hepatoprotective. The presence of ephedrine in the plant has further emphasized its therapeutic potential.

Sida cordifolia L.

Various Ayurvedic preparations of ***Sida cordifolia*** are utilized in the treatment of asthma, weight loss, and energy enhancement. Additionally, oil preparations of this plant are used to alleviate pain and swelling, while ***Gritha*** (clarified butter) prepared from the plant is traditionally used to treat heart diseases **[20].**

8. ***Vachellia tortilis (Forssk.) Galasso & Banfi*****:** It is a a medicinal plant from the *Fabaceae* family, is widely distributed in the arid and semi-arid regions of North and East Africa, Southern Africa, the Middle East, and the Arabian Peninsula. In traditional medicine, it is commonly utilized to treat various ailments, including diabetes, asthma, hepatitis, and burns.

Vachellia tortilis (Forssk.) Galasso & Banfi

Essential oils and organic extracts derived from *V. tortilis* have demonstrated a range of biological activities, including antibacterial, antifungal, antiparasitic, antioxidant, antiproliferative, antidiabetic, and anti-inflammatory effects **[21].**

9. *Ailanthus excelsa Roxb***: *Ailanthus*** *excelsa Roxb.*, belonging to the ***Simaroubaceae*** family, is a deciduous, perennial, and fast-growing multipurpose tree commonly referred to as the Tree of Heaven. It is widely distributed across the semi-arid to temperate regions of central and southern India and Sri Lanka.

Ailanthus excelsa Roxb

This plant exhibits a variety of pharmacological properties, including antihelminthic, antiamoebic, antiplasmodial, anti-inflammatory, antidiarrheal, antifertility, antioxidant, and antimicrobial effects. Additionally, **it** contains several phytochemicals, such as alkaloids and flavonoids, as well as proteins, fatty acids, and carbohydrates **[22].**

10. *Datura stramonium L.***: *Datura stramonium*** L., commonly known as "Devil's Trumpet," "Thorn Apple," "Locoweed," or "Jimson weed," is a wild-growing plant belonging to the ***Solanaceae*** family. It is known for both its poisonous and medicinal properties. The neurotoxicity of the plant is primarily attributed to the presence of tropane alkaloids, which contain a methylated nitrogen atom ($N\text{-}CH_3$) and include anticholinergic compounds such as atropine, scopolamine, and the narcotic cocaine.

Datura stramonium L.

The wide range of medicinal applications of *Datura stramonium* has been extensively recognized in both scientific research and ethnomedicine**.**

It can be concluded that among the species observed, *Euphorbia hirta, Prosopis cineraria, Vachellia tortilis,* and *Datura stramonium* exhibited the highest distribution, being found in all 10 quadrats (100% frequency). These species had the most extensive spread across the study area. On the other hand, *Tephrosia purpurea* had the lowest distribution, appearing in only 8 quadrats (80% frequency), which is still relatively high, but slightly less than the aforementioned species.

DISCUSSION

The studies conducted over the years in the Shekhawati region of Rajasthan and specifically in Sikar district offer valuable insights into the rich ethnobotanical heritage of the area. It is examined the forest areas of Shekhawati, identifying 56 plant species used by local communities for various ailments, with sacred groves in Sikar district being particularly important. Their findings reflect a long tradition of using both whole plants and their parts such as leaves, stems, roots for medicinal purposes [23]. This is in line with the results of our study, where species like *Euphorbia hirta* and *Prosopis cineraria*, which have high frequencies and densities, are frequently used in traditional remedies. Similarly, plants such *as Xanthium strumarium* and *Withania somnifera*, which were noted by Kumar and Khan in 2023, are part of the plant list from our study, showing strong parallels in the use of species with high medicinal value.

The great medicinal potential of the flora in Rajasthan, particularly its application in the pharmaceutical industry also noted [24,25]. This resonates with our findings, where species like *D. stramonium* and *V. tortilis* were identified as abundant and relevant for local medicinal practices. Furthermore, research on the Shakambhari sacred grove, which included species like *Z. nummularia*, aligns with our study's identification of this species as part of the region's medicinal flora [26]. This reflects the strong presence of important plant species in sacred groves, which are known to harbor diverse and useful species in the area. Identification of 18 ethnobotanically significant species, further confirming the prevalence of plants used for traditional medicinal purposes in the Shekhawati region [10], some of which overlap with our findings. Their focus on the use of plants for timber and musical instruments adds another layer to the region's complex relationship with its flora, underscoring the multifunctional role of these species in local livelihoods.

Additionally studied sacred groves in Sikar and documented similar species to those found in your study, reinforcing the idea that sacred groves are key biodiversity hotspots with valuable medicinal plants [27]. It is also documented that 17 Angiospermic species used for healthcare preparations [28], further support

the notion that the local people rely heavily on a small, yet diverse, set of plant species for medicinal purposes.

It can be said that the results from your study closely align with the findings from these previous studies, demonstrating that Sikar and the broader Shekhawati region have a rich array of medicinal plants. The consistency in the types of species identified across these studies highlights the resilience and utility of these plants in the face of the region's challenging climate, making them integral to the local people's health and well-being. The common thread running through these studies is the recognition of the local flora's multifaceted value, from medicinal uses to cultural and ecological significance. Jeenmata village in Sikar district, Rajasthan, experiences a hot semi-arid climate characterized by high temperatures and low annual rainfall [29]. The average annual temperature is approximately 35°C, with summer temperatures reaching up to 50°C, and the monsoon season bringing about 469.8 mm of rainfall. In our study, we observed ten plant species across various quadrats, noting their frequency and density distributions. Species such as *Euphorbia hirta L., Prosopis cineraria, Vachellia tortilis*, and *Datura stramonium* exhibited the highest frequency, being present in all 10 quadrats (100% frequency). These species are known for their adaptability to arid conditions,which aligns with the hot semi-arid climate of Jeenmata village. Comparatively, a study conducted in the Fatehpur Beed area of Sikar district reported a rich diversity of tree species with balanced distribution and moderate evenness [30]. This suggests that, despite the arid climate, the region supports a variety of plant species, possibly due to microhabitats and varying soil conditions. Additionally, research on the medicinal plants of the Shekhawati region, which includes Sikar district, indicates that 70% of plant species are common across different habitats, such as sand dunes and sandy plains. This adaptability to diverse habitats further supports the notion that the region's flora is resilient and capable of thriving in various microenvironments.

In conclusion, the plant species observed in our study exhibit distributions those are consistent with the climatic conditions of Jeenmata village. The prevalence of drought-tolerant species and the region's rich plant diversity underscore the resilience of the local flora in adapting to the hot semi-arid climate of Sikar district.

The significance of this study lies in its pioneering exploration of plant species in the Jeenmata village and broader areas of Sikar district, which, to the best of our knowledge, has not been extensively studied in this context before. This research provides valuable insights into the diversity, frequency, and density of plant species in an under-researched region, specifically focusing on their medicinal and ethnobotanical importance. By documenting the occurrence and distribution of species such as *Euphorbia hirta*, *Prosopis cineraria*, and *Vachellia tortilis*, this study not only fills a gap in the local botanical knowledge but also lays the foundation for future investigations into the region's natural resources. Additionally, our study contributes to the broader understanding of plant diversity in the semi-arid climate of Rajasthan, an area known for its harsh environmental conditions. By focusing on species that thrive in this climate, it highlights the resilience and adaptability of local plants, which could have potential applications in both traditional medicine and modern pharmaceutical research.

CONCLUSION

Present research is significant in terms of its potential contribution to the conservation of medicinal plants in the region. As the local population relies on these plants for healthcare, understanding their distribution and medicinal value becomes crucial for promoting sustainable use and conservation efforts. This study sets a precedent for future ethnobotanical and floristic surveys in the region, providing a comprehensive baseline for further research into plant species' medicinal properties, ecological roles, and cultural significance.

Overall, this study is a significant step towards preserving the plants of ethnobotanical importance of the Jeenmata village and surrounding areas, while also emphasizing the importance of safeguarding the rich biodiversity that sustains local communities.

ACKNOWLEDGEMENT

Authors extend their sincere thanks to HOD, Dept of Botany, University of Rajasthan for his valuable support in conducting the present research.

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CITATION OF THIS ARTICLE

Suman K, Vinay K and Bindu S. Floristic Study Survey of Some Important Medicinal Plants in Jeen Mata Village, Sikar, Rajasthan (India). Bull. Env. Pharmacol. Life Sci., Vol 14 [6] May 2025: 04-11