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Study of Weeds Diversity with Respect to their Ecology Around Napasar Region of Bikaner, Rajasthan, India

Research Article

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Abstract

Study investigates the diversity, distribution, and ecological characteristics of weed species around Napasar, region of Bikaner Rajasthan. Weeds plants are grown undesirably where they have affected agricultural productivity, alter the native biodiversity, and influence habitat conditions. The present research, conducted during 2024–25, employed stratified field surveys across representative habitats within the Napasar region: agricultural fields (rainfed and irrigated), roadside margins, fallow lands, urban vacant lots, and canal banks. Major families included Poaceae, Asteraceae, Fabaceae, Amaranthaceae, and Chenopodiaceae. The study emphasis that the diversity index ranged from low in intensively managed irrigated fields to higher values in fallow and roadside habitats, indicating that management practices and disturbance regimes strongly influence weed assemblages. Several species identified are major agronomic weeds (e.g., *Cynodon dactylon, Chenopodium album, Alternanthera sessilis*), while others are emerging invasive or spreading taxa. The findings provides baseline data for weed management strategies tailored to Napasar semi-arid agro-ecosystems and can inform conservation planning where weeds threaten native plant communities. The research aims to produce practical recommendations for integrated weed management tailored to the local socio-ecological context.

Introduction

Weeds constitute a persistent and pervasive component of agroecosystems globally. In semi-arid regions such as Napasar in northwestern Rajasthan, weeds influence crop yield, soil properties, water availability, and biodiversity (Sharma, B. D., & Tyagi, B. 1979) [1]. They can reduce agricultural productivity by competing with crops for light, nutrients, and moisture and by harboring pests and diseases. Conversely, some weed species contribute positively by protecting soil from erosion, adding organic matter, or providing nectar sources for pollinators. Weed diversity the identity, abundance, and distribution of weed species help design context-appropriate management strategies that balance food production, biodiversity, and ecosystem health (Pandey, R. P., & Shetty, B. V. 2001) [2].

Napasar lies in the Thar Desert buffer zone, displaying extreme aridity, high temperature ranges, and sandy soils with patchy salinity. Agriculture in the region relies heavily on canal irrigation in some pockets and groundwater in others, producing varied disturbance and moisture regimes that shape plant communities (Bhandari, M. M. 1990) [3]. Human activities cultivation, grazing, road construction, and urban expansion further influence weed presence and spread9 Koul, D. N., Raina, R., & Raina, A. K. 2002) [4].This study focuses on documenting the composition and diversity of weeds across multiple habitat types in the Napasar, Bikaner, Rajasthan, quantifying community structure using standard ecological metrics, and assessing the environmental and management drivers that determine weed assemblages (Mahajan, R. K., & Chauhan, Y. S. 2016) [5]. The

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research aims to produce practical recommendations for integrated weed management tailored to the local socio-ecological context.

Objectives

To study the diversity, distribution, and ecological relationships of weed species in the Napasar region of Rajasthan and provide recommendations for sustainable weed management.

To compile a comprehensive inventory of weed species across major habitats in Napasar.

To quantify species richness, abundance, frequency, and importance value index (IVI) for the recorded taxa.

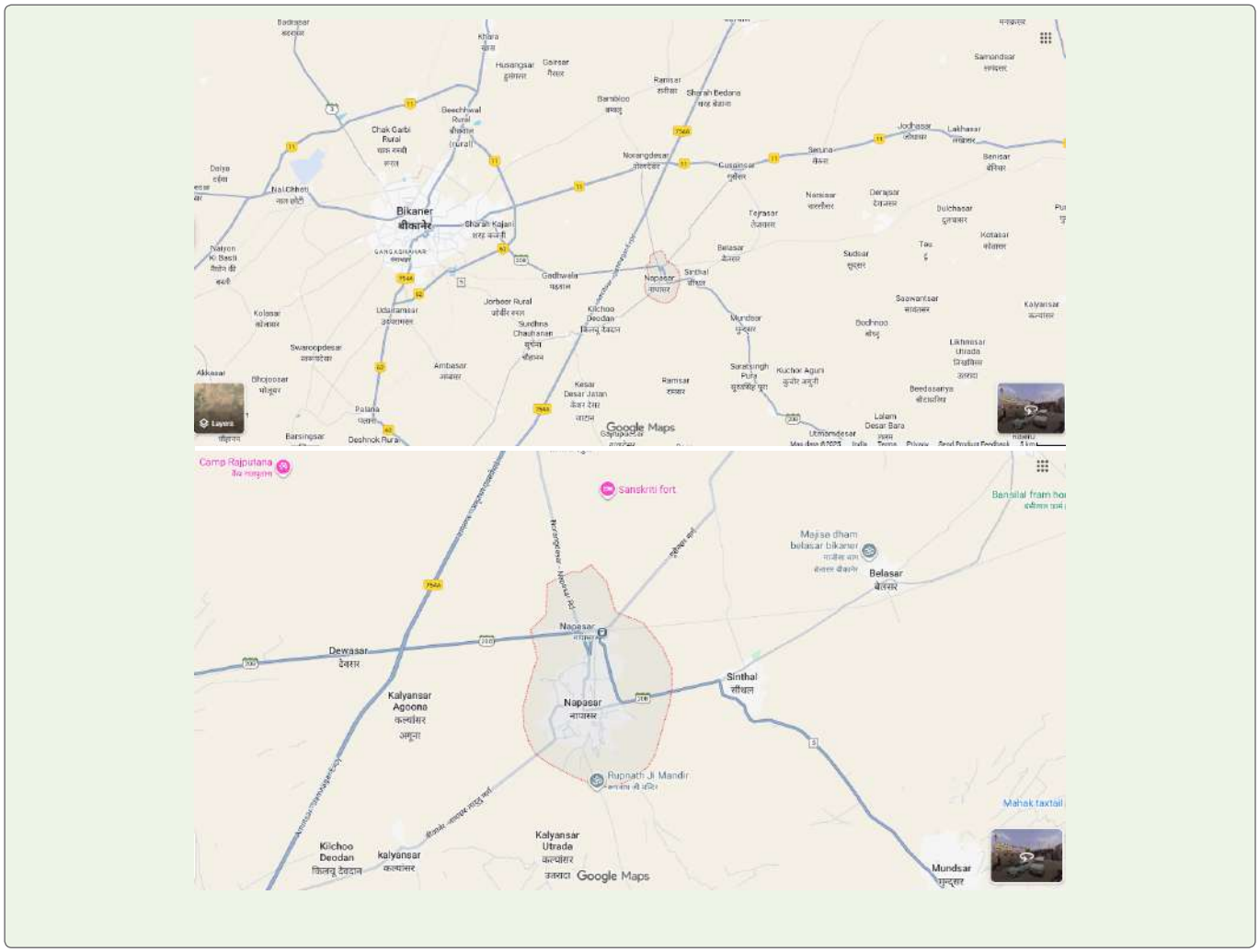
To compare diversity metrics (Shannon Wiener, Simpson's index, evenness) among cultivated, fallow, road margin, and urban habitats.

To analyze relationships between weed assemblages and environmental variables (soil texture, moisture, salinity, cropping practice).

To propose integrated weed management strategies grounded in ecological findings and local practices.

Materials and methods

Sampling used quadrat and transects methods to quantify species richness, relative abundance, frequency, density, and importance value index (IVI). Species were identified to the species level using available floras and herbarium comparisons. Diversity indices (Shannon Wiener, Simpson's) and evenness metrics were calculated. Results recorded X species across Y families (detailed species list in Appendix A).Sampling occurred during two main seasons to capture phenological variation: during monsoon (July–September, 2025). Random quadrat method was used to survey weed diversity. Quadrats of 1m × 1m were laid randomly in agricultural fields, wastelands, and roadside areas with minimum of 20 quadrats were studied from each habitat type. All the weed species within each quadrat were recorded. in context of individuals per species was counted to be determine frequency, density, and abundance of specimens were collected, pressed, and preserved for herbarium preparation. Collected specimens were identified using regional floras such as *Flora of Rajasthan* literature and the local herbarium of the varsity with other standard references which can cross-checked by the help of local dwellers and traditional peoples. The survey was conducted



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in and around Napasar, Bikaner district of Rajasthan, a semi-arid zone of the Thar Desert characterized by low and erratic rainfall, high summer temperatures, sandy soils, and frequent wind erosion. Such conditions create a mosaic of disturbed habitats including agricultural margins, wastelands, roadside verges, and irrigated plots—that provide ideal niches for the establishment and spread of a wide range of weed species.

Result

The results presented here summarize the diversity of weeds observed, their taxonomic affiliations, life forms, ecological preferences, and potential uses.

Total twenty-five Weeds collected and identify from Napasar, Bikaner, Rajasthan, their entire description given in (Table 1) as given parameters;

Table 1

Parameter	Value
Total species recorded	25
Dominant habit	Annual herbs & grasses
Environment type	Semi-arid, sandy
Diversity index (qualitative)	Moderate species richness

Analysis of life forms indicates that herbs constitute the majority of recorded weeds, followed by shrubs and grasses. Annual herbs such as *Amaranthus viridis* and *Parthenium hysterophorus* dominate post-monsoon niches when brief moisture pulses allow rapid growth and reproduction. Perennial species such as *Cynodon dactylon* and *Calotropis procera* persist year-round, stabilizing sandy soils and providing forage during dry seasons. Woody invasives (*Prosopis juliflora*, *Lantana camara*) occupy degraded lands and canal embankments, where they form dense, nearly monospecific stands. Field quadrat observations revealed moderate to high weed density in disturbed habitats, with certain species showing clear dominance; *Cynodon dactylon* was the most abundant ground-covering grass across irrigated field margins and grazing lands. *Parthenium hysterophorus* formed dense patches along roadsides and vacant plots, indicating its aggressive colonization ability and high seed production. *Prosopis juliflora*, though less frequent in small quadrats, dominated large wasteland patches and canal command areas, where it alters soil chemistry and suppresses native herbs. These patterns demonstrate a successional gradient. *Annual herbs* dominate freshly disturbed soils. *Perennial grasses* and *shrubs* invade once the soil is stabilized, eventually leading to woody thickets dominated by *Prosopis* or *Calotropis*. The present study recorded a rich assemblage of weed species belonging to multiple families such as Amaranthaceae, Malvaceae, Poaceae,Fabaceae, Euphorbiaceae, Convolvulaceae, and Apocynaceae International Plant Names Index (IPNI). (2025) [6].

Table 2: contains detailed species profiles, of which they are representative

S. No.	Species (Scientific Name)	Family	Habit / Life Form*	Ecological Note
1	*Amaranthus viridis* L.	Amaranthaceae	Annual herb	Common crop-field weed, nutrient indicator
2	*Corchorus depressus* (L.) *Stocks*	Malvaceae	Prostrate annual herb	Dry sandy soils
3	*Cyperus rotundus L.*	Cyperaceae	Perennial sedge	Highly persistent rhizomatous weed
4	*Digera muricata* (L.) Mart.	Amaranthaceae	Annual herb	Disturbed soils
5	*Buglossoides arvensis* (L.) I.M. Johnst.	Boraginaceae	Annual herb	Dry waste lands
6	*Senna alexandrina* Mill.	Fabaceae (Caesalpiniaceae)	Shrubby herb	Medicinal, sandy plains
7	*Cynodon dactylon* (L.) Pers.	Poaceae	Perennial grass	Soil binder, grazing indicator
8	*Launaea procumbens* (Roxb.)	Asteraceae	Creeping perennial	Arid wastelands
9	*Tribulus terrestris* L.	Zygophyllaceae	Prostrate perennial	Thorny xerophyte
10	*Eragrostis minor* Host	Poaceae	Annual grass	Sandy fields
11	*Boerhavia diffusa* L.	Nyctaginaceae	Prostrate perennial	Medicinal, saline soils
12	*Euphorbia hirta* L.	Euphorbiaceae	Annual herb	Roadside weed
13	*Aristida funiculata* Trin. & Rupr.	Poaceae	Perennial grass	Dune stabilizer
14	*Brachiaria ramosa* (L.) Stapf	Poaceae	Annual grass	Fodder value
15	*Hedera helix L.*	Araliaceae	Climbing perennial	Ornamental escape
16	*Dactyloctenium aegyptium* (L.) Willd.	Poaceae	Annual grass	Disturbed sandy soils
17	*Cenchrus ciliaris* L.	Poaceae	Perennial grass	Excellent fodder grass
18	*Datura metel* L.	Solanaceae	Annual herb	Toxic ruderal
19	*Solanum xanthocarpum* Schrad. & Wendl.	Solanaceae	Spiny perennial	Medicinal
20	*Crotalaria burhia* Benth.	Fabaceae	Woody shrub	Sand-dune stabilizer
21	*Verbesina encelioides* (Cav.) Benth. & Hook.f. ex A.Gray	Asteraceae	Annual herb	Invasive ruderal
22	*Argemone mexicana* L.	Papaveraceae	Annual herb	Noxious, latex-bearing
23	*Cleome viscosa* L.	Cleomaceae	Annual herb	Oil-seed weed
24	*Ipomoea pes-tigridis* L.	Convolvulaceae	Climbing annual	Hedgerows, field edges

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Table 3: Shows the various ecological settings of the studied weeds

Weed No. 1 *Amaranthus viridis*, commonly known as slender amaranth or green amaranth, is a widely distributed annual herb in the Amaranthaceae family, known for its edible leaves and nutritious seeds. It's an opportunistic weed found in various habitats worldwide and is often cultivated as a food source, similar to spinach. The plant features triangular-ovate, hairless leaves, slender green flower spikes, and a small, round fruit called a utricle.	

Parameter	Details
Scientific Name	Amaranthus viridis L.
Common Names	Green Amaranth, Slender Amaranth, Pigweed, Dhimbdo
Family	Amaranthaceae
Habit	Annual herb, erect or diffuse, 20-80 cm tall
Stems	Grooved, glabrous, subfleshy, pale-purple or green/reddish
Leaves	Long-petioled, alternate, broadly ovate-rhomboid, glabrous, green
Flowers	Very small, unisexual, green or purplish-brown, in slender panicles
Fruits	Subglobose fruit with one shiny, dark brown or black seed
Habitat	Open waste places, cultivated land, well-drained soils, and volcanic soils
Distribution	Native to South America, now a cosmopolitan weed in tropical and subtropical regions worldwide
Uses	Edible leafy green vegetable (saag), traditional medicine
Key Compounds	Contains saponins, tannins, phenols, flavonoids, alkaloids, and other bioactive compounds

Weed No. 2 Corchorus depressus, commonly known as Bahuphali or Mudhiri, is a perennial, prostrate, woody herb belonging to the Tiliaceae (or Malvaceae) family. It features wrinkled, rounded, and irregularly crenate-serrate leaves, and bears numerous small, yellow flowers in leaf-opposed cymes. The plant produces cylindrical, beaked capsules with seeds that are typically blackish-grey and trigonous.	

Parameter	Details
Scientific Name	Corchorus depressus (L.) Stocks
Synonyms	Antichorus depressus L., Corchorus antichorus Raeusch., Corchorus prostratus Royle
Family	Malvaceae (formerly Tiliaceae)
Habit	A mat-forming, prostrate, much-branched, woody perennial herb
Distribution	Native to Afghanistan, Algeria, East Africa, India, Iran, and Yemen
Flowers	Yellow, 6-8 mm across, with 8-10 stamens
Fruits	Cylindrical capsules, beaked, 4-valved, 4-loculed, transversely septate
Seeds	Blackish-grey, roughly triangular, c. 1.5 mm long
Medicinal Properties	Rich in bioactive molecules such as glycosides, flavonoids, and triterpenes.
Therapeutic Uses	Used in folk medicine for pain, fever, dysentery, sexual disorders, and inflammatory conditions.
Research Findings	Studies show antioxidant, anti-inflammatory, anti-diabetic, hepatoprotective, and wound healing activities.

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Weed No. 3

Cyperus rotundus is a widespread perennial herb from the Cyperaceae family, known as nut grass, purple nutsedge, or Mustaka, and is native to Africa, Europe, and Asia. It features a triangular stem, parallel-veined leaves, and fragrant, tuberous rhizomes. The plant is significant in traditional medicine for digestive issues and fever, while its aromatic roots are used in perfumery and its leaves are used in weaving.

Parameter	Details
Botanical Name	*Cyperus rotundus L*
Common Names	Purple Nutsedge, Coco Grass, Nut Grass, Java Grass, Red Nut Sedge, Kili'o'opu
Habit	Perennial, tufted to prostrate herb
Stem	Erect, triangular, smooth (glabrous)
Leaves	Narrowly linear, glossy, basal, mostly shorter than the stem, with green to reddish-brown sheaths
Inflorescence	Simple or compound umbels with leaf-like bracts; spikelets in dense, compact clusters
Flower	Bisexual, with 3 stamens and 3 stigmas
Fruit	Tiny, brown, triangled (trigonous) nutlets or achenes
Reproduction	Reproduces by seeds and extensive networks of underground rhizomes and tubers
Tubers	Fleshy, white when young, becoming brown and fibrous when old; covered with scale leaves
Distribution	Pantropical, native to Old World tropical and subtropical regions, found worldwide in various soil types
Ecology	One of the world's worst weeds, found in cultivated fields, roadsides, and neglected areas
Agricultural Importance	A significant weed in many crops globally
Medicinal/Cultural Uses	Rhizomes have traditional uses, such as treating fever, pain, wounds, and menstrual disorders. The tubers are aromatic.

Weed No. 4

Digera muricata (L.) Mart., also known as False Amaranth, is an annual herb from the Amaranthaceae family, characterized by its slender stems, alternate ovate leaves, and red-colored, bisexual flowers arranged in axillary spikes. Found widely in India, Africa, and Asia, it serves as a food source for insects and is used in traditional medicine for its laxative and cooling properties, as well as for treating urinary disorders and kidney stones.

Parameter	Details
Botanical Name	Digera muricata (L.) Mart.
Common Names	False Amaranth, Kanjaro (Gujarati), Chanchali (Hindi), Chenchali (Telugu), Gorajepalle (Kannada)
Plant Family	Amaranthaceae
Plant Habit	Annual herb
Height	20-70 cm tall
Habitat	Widely distributed in waste areas, cultivated lands, pastures, and along stream beds in tropical Asia and Africa
Part Used	All parts: leaves, roots, stem, seeds, and flowers
Medicinal Uses	Kidney stones, urinary tract disorders, digestive system disorders (constipation), aphrodisiac, astringent, and coolant
Edibility	Leaves and young shoots are eaten as a local vegetable
Phytochemicals	Palmitic acid, Luteolin, Alpha-Spinasterol, Mannitol
Growth Habit	Annual, erect or spreading herb, growing up to 50-70 cm tall
Inflorescence	3-flowered clusters in lax, spike-like racemes
Habitat	Often found on disturbed, waste ground, savannahs, and semi-deserts
Uses	Young shoots and leaves are used as a green leafy vegetable; roots, leaves, and seeds are used in traditional medicine for kidney stones, urinary disorders, and digestive issues

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Weed No. 5

Buglossoides arvenssis, commonly known as Corn Gromwell or Sheepweed, is an annual herb in the Boraginaceae family with white to pale blue flowers and rough, hairy leaves and stems. It is native to Europe and Asia but has become an introduced, sometimes invasive, species in North America and Australia. The plant grows up to 0.45-0.7 m tall, has hairy leaves and stems, and features a five-lobed tubular corolla with clusters of flowers.

Parameter	Details
Botanical Name	Buglossoides arvensis (L.) I.M. Johnst.
Common Names	Corn Gromwell, Field Gromwell, Sheepweed
Family	Boraginaceae
Habit	Annual herb
Height	Up to 0.45 m (45 cm) tall
Flowers	White to pale blue, 6-7 mm long, tubular with five lobes, in clusters
Leaves	Densely hairy, oblanceolate to linear, basal and stem leaves
Stems	Branched from the base, covered with coarse hairs
Fruit	Dry, tuberculate nutlets (hard seeds)
Habitat	Disturbed sites, arable fields, rough ground, and open grassy places
Range	Native to Central and Southern Europe and Asia, including the Himalayas. Introduced in North America and Australia.
Phytochemicals	Contains Caffeic acid, Vanillic acid, Ferulic acid, and other compounds.
Uses	Refined oil is used for its omega-3 (DHA) content and anti-inflammatory properties.

Weed No. 6

Senna alexandrina Mill, commonly known as Indian Senna or Alexandrian Senna, is a shrub in the Fabaceae family, native to tropical Africa and cultivated in the Indian subcontinent. It features branched stems, feathery leaves composed of multiple leaflets, and bright yellow flowers. The plant's leaves and pods are historically used to produce herbal tea and extracts, serving as a well-known natural laxative.

Parameter	Details
Botanical Name	Senna alexandrina Mill.
Common Name	Indian Senna, Alexandrian Senna
Family	Fabaceae (Leguminosae)
Subfamily	Caesalpinioideae
Habit	Small perennial shrub or suffruticose perennial herb
Plant Parts Used	Leaves and pods
Key Compound	Sennosides
Primary Use	Laxative for relieving constipation
Other Uses	Blood purifier, treating skin diseases, and for flatulence and abdominal bloating
Distribution	Native to Africa and Arabia, and cultivated in India (Tamil Nadu, Karnataka, Gujarat, Rajasthan)

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Weed No. 7

Cynodon dactylon, also known as Bermuda grass, is a fast-growing, perennial, creeping grass found worldwide in tropical and warm temperate regions. It forms dense mats by rooting at nodes on its stolons and has slender, prostrate stems, narrowly linear leaves, and seed heads with 2–6 radiating spikes. The plant is valued for soil erosion control but can also be considered a weed and is associated with allergies, and it thrives in full sun and temperatures between 24-37°C.

Parameter	Details
Botanical Name	Cynodon dactylon (L.) Pers.
Common Name(s)	Bermuda grass, Couch grass, Wire grass, Durva, Doob grass, Dog's tooth grass, Arugampul
Plant Family	Poaceae (Gramineae)
Description	A low-statured, creeping, perennial warm-season grass with slightly flattened stems and grey-green foliage. It forms dense mats and reproduces via rhizomes and seeds.
Habitat	Found in tropical and subtropical regions worldwide, thriving in various soil types and moisture levels. It grows in lawns, roadsides, and abandoned lands.
Uses	Used for turf and garden lawns, as a ground cover for erosion control, and historically in traditional medicine (e.g., Ayurveda).
Ecological Role	Can be an aggressive, invasive weed that out-competes native species, particularly in riparian areas.
Allergies	A significant source of seasonal allergens, contributing to conditions like rhinitis and asthma.

Weed No. 8

Launaea procumbens, commonly known as Creeping Launaea or Pathri, is a perennial herb in the Asteraceae family, characterized by its prostrate, branched stems, rosette of basal leaves with spinous margins, and small yellow flower-heads. It is found in open grasslands and around stream beds, secreting a yellow juice when cut and possessing various medicinal properties, such as antibacterial and diuretic effects

Parameter	Details
Botanical Name	Launaea procumbens (Roxb.) Ramayya & Rajagopal
Common Name(s)	Creeping Launaea, Moti Bhonpatri, Pathri, Van Gobi
Plant Family	Asteraceae (Compositae)
Plant Type	Perennial, prostrate or decumbent herb
Description	Grows up to 30-60 cm tall with smooth, branched stems. The entire plant secretes a yellow juice when cut. It has long, spinous-toothed leaves that are 5-25 cm long.
Flower-heads	1-1.5 cm wide, yellow, appearing singly or in small clusters on short stalks.
Habit/Habitat	Found in stream and river beds, open grasslands, and shaded areas.
Uses	Used as fodder for goats and in the preparation of a cooling sherbet. Leaves are used in local curries.
Flowering Time	November to December.

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Weed No. 9

Tribulus terrestris is known by the botanical name Tribulus terrestris L. and common names such as Puncture Vine, Caltrop, Goathead, and Gokshura (Sanskrit). It is a flowering plant in the Zygophyllaceae family, characterized by its yellow flowers and spiny fruits that resemble a goat's head. The plant grows as a procumbent (trailing) herb with pinnately compound leaves and is found in tropical and warm temperate regions worldwide.

Parameter	Details
Botanical Name	Tribulus terrestris L.
Common Names	Puncture Vine, Land Caltrops, Caltrop, Goathead, Gokharu (Hindi)
Family	Zygophyllaceae
Plant Form	A hairy, procumbent (trailing), annual herb that spreads along the ground.
Leaves	Pinnately compound (pinnate), with leaflets that are often hairy and can be slightly unequal in pairs.
Flowers	Solitary, 5-petaled flowers that are yellow in color.
Fruit	A characteristic woody burr with 4 or 5 carpels, each armed with spines.
Habitat	Found in open, deciduous forests, waste lands, roadsides, and sandy soils.
Distribution	Native to the Old World and distributed throughout tropical and warm temperate regions worldwide.
Uses	The fresh leaves are eaten as a vegetable. The plant is traditionally used as a tonic and diuretic.
Toxicity	The plant is known to be poisonous to livestock, causing liver damage leading to photosensitivity (geeldikkop).

Weed No. 10

Cyperus rotundus is a species of sedge, commonly known as nutgrass or purple nut sedge, belonging to the Cyperaceae family. This perennial herb has black, fragrant tubers and triangular stems. It is a global weed found in tropical, subtropical, and temperate regions, notable for its medicinal uses in traditional Asian medicine for fever and digestive issues, as well as its presence in perfumery.

Parameter	Details
Botanical Name	Cyperus rotundus L.
Common Names	Common Nut Sedge, Nut Grass, Purple Nut Sedge
Plant Family	Cyperaceae
Plant Form	A small, perennial herb
Habit	Slender, with fibrous roots and elongating stolons that produce fragrant, hard, ovoid, black tubers
Stem	Triangular (trigonous)
Leaves	Long, linear, narrowly linear, with parallel venation
Inflorescence	Simple or compound umbels with slender, red-brown spikelets
Fruit	Nuts, obovoid-trigonous
Native Range	Africa, Southern and Central Europe, Southern Asia, found globally in temperate, tropical, and subtropical regions
Key Characteristics	Distinctive triangular stems and nut-like tubers that are strongly aromatic
Medicinal Properties	Contraceptive, demulcent, emmenagogue, analgesic, astringent, antispasmodic, antibacterial, carminative, febrifuge, and more
Uses	In traditional medicine for fever, indigestion, thirst, and as a stimulant; tubers used in perfumery
Bioactive Compounds	Contains sesquiterpenes, flavonoids, polyphenols, and monoterpenes

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Weed No. 11

Eragrostis minor, or Little Lovegrass, is a tufted, annual grass native to the Old-World tropics and warm temperate regions, later introduced to the New World, thriving in disturbed habitats like grasslands and road verges. It is characterized by stems 6-60 cm high, flat leaf-blades, and stiffly branched, ovate panicles.

Parameter	Details
Botanical Name	Eragrostis minor Host
Common Name(s)	Little Lovegrass, Lesser Love Grass, Small Stink Grass, Small Love Grass
Family	Poaceae (Grass Family)
Habit	Loosely tufted annual herb
Height	6-60 cm (2-24 inches)
Leaf Blades	Flat, up to 12 cm long and 5 mm wide
Glands	Warty glands are often present along leaf margins and on flower-stalks
Inflorescence	Ovate panicle, 4-20 cm long, stiffly branched
Spikelets	6-16-flowered, 3-9 mm long, breaking up from the base
Habitat	Disturbed sites, grasslands, road verges, railway embankments, and waste areas
Distribution	Native to the Old World's warm temperate and subtropical regions; introduced in the New World tropics
Flowering	May-September in some regions, May-December in India
Edibility	Its seeds are edible but small and difficult to harvest

Weed No. 12

Boerhavia diffusa L., known commonly as the Spreading Hogweed or Punarnava, is a pantropical perennial herb from the Nyctaginaceae family with medicinal uses in India. The plant is characterized by its creeping, much-branched habit, purple stems, and small, pink, funnel-shaped flowers. Its leaves and roots are used medicinally, particularly for their diuretic and anti-inflammatory properties, and the leaves are also consumed as a vegetable.

Parameter	Details
Botanical Name	Boerhavia diffusa L.
Common Name	Punarnava, Spreading Hogweed, Tarvine, Red Spiderling
Family	Nyctaginaceae
Plant Form/Habit	Perennial, branched herb
Stem	Purple-colored, swollen at nodes
Leaves	Opposite, ovate to suborbicular, with white scales on the lower surface
Flowers	Small, aggregated in umbels, pink or purple
Fruit	Achene, with stalked glands on its ribs
Roots	Stout, fusiform (tuberous), and yellow to brownish-gray
Habitat	Widespread in tropical and subtropical areas, often in wastelands and poor soils
Distribution	Pantropical (found worldwide in tropical and subtropical regions)
Traditional Use	Used in Ayurveda as a rejuvenating herb (Punarnava) for various ailments
Significance	Known for its medicinal properties, used for pain relief, and its leaves are eaten as a green vegetable in India

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Weed No. 13

Euphorbia hirta L., also known as Asthma Weed or Common Spurge, is a widespread annual herb in the spurge family (Euphorbiaceae) found in tropical and subtropical regions. Key features include hairy stems, small, toothed, oval-shaped leaves often with purple spots, and tiny, greenish-yellow or pinkish-purple flowers in leaf axils. It has a habit of being prostrate or suberect and produces hairy, trilobed capsules with seeds.

Parameter	Details
Botanical Name	Euphorbia hirta L.
Family	Euphorbiaceae
Common Names	Asthma Plant, Common Spurge, Asthma Weed, Pill-bearing Spurge
Synonyms	Euphorbia pilulifera, Chamaesyce hirta
Habitat	Roadsides, open fields, wastelands, and disturbed places
Habit	Annual, hairy herb
Height	Up to 40 cm tall
Roots	Deep root system
Stems	Branched, hairy, and often tinged with red or purple
Leaves	Opposite, elliptic-oblong to oblong-lanceolate, toothed, hairy, and sometimes with purple blotches
Flowers	Small, green to pink flowers grouped in ball-shaped clusters (cyathia)
Fruit	Spherical, 3-angled, hairy, yellowish capsule containing tiny, oblong seeds
Latex	Produces a white, milky latex when cut
Distribution	Pantropical, found globally
Flowering/Fruiting	Throughout the year

Weed No. 14

Aristida funiculata is a grass from the Poaceae family, known commonly as a type of "needle grass" or in some regions, like Karnataka, as Trishula oobina hullu. It's an annual herb with wiry stems, typically 15-50 cm tall, and features a linear panicle with spikelets that develop a long, twisted awn-branch.

Parameter	Details
Botanical Name	Aristida funiculata Trin. & Rupr.
Family	Poaceae (Grass family)
Common Names	Trishula oobina hullu (Kannada), Bhuti, Pandhrikusal (Marathi)
Habit	Tufted annual herb
Height	15–30 cm high
Culms	Wiry
Leaf Blades	Flat or folded, 4-10 cm long, up to 2 mm wide
Panicle	Linear, up to 10 cm long, few-flowered
Spikelets	Green, tinged with brown
Distribution	Found in the Indian subcontinent, including parts of Rajasthan
Uses	The straw is used to plait hats and wrist bands in Mali; it is also incorporated with mud for making hut walls in Nigeria.

Citation: Dular AK, Gehlot N. Study of Weeds Diversity with Respect to their Ecology Around Napasar Region of Bikaner, Rajasthan, India. J Plant Sci Res. 2026;13(1): 293.

Weed No. 15

Brachiaria ramosa, or Browntop Millet, is a tufted, annual grass (Poaceae) native to Tropical Asia and Southern Africa, grown as a forage and grain crop but also a common weed. Its key features include annual habit, height of 10–70 cm, broad linear leaf-blades, and an inflorescence of 3–6 racemes with spikelets appressed to the axis. It flowers throughout the year, and its grains are used as birdseed.

Parameter	Details
Botanical Name	Brachiaria ramosa (L.) Stapf
Synonym	Urochloa ramosa
Common Names	Browntop Millet, Dixie Signalgrass, Makra, Murat
Vernacular/Local Names	Kadubharagu hullu (Kan.), Veduru gaddi (Tel.), Chamapothaval (Malayalam), Chapar, Chapsura (Marathi), Banspate (Nepali)
Family	Poaceae (Grass Family)
Habit	Annual herb, forming loosely clustered or tufted annual grass
Description	Spreading, with culms 10-70 cm high. Leaf-blades are broadly linear, 2-25 cm long, 4-14 mm wide, often velvety-pubescent. Inflorescence has 3 racemes with paired spikelets.
Native Range	Tropical Asia and Southern Africa
Habitat	Found in grasslands, moist deciduous forests, roadsides, and wastelands; occasional on hills.
Uses	- Forage: Used for hay and as a food source for wildlife. - Remediation: Accumulates lead and zinc, useful for soil remediation. - Human Consumption: Historically used as a cereal grain, mixed with other millets.
Notes	It is a common weed but also cultivated for its hay-making potential and ability to establish other crops. Self-seeding can be an issue, requiring monitoring to prevent it from becoming overly dominant.

Weed No. 16

Hedera helix, the common or English ivy, is an evergreen woody climber with distinct juvenile (lobed) and mature (unlobed) leaves, belonging to the Araliaceae family. It features small, greenish-yellow flowers in fall, followed by dark berries, and is used as an ornamental plant, groundcover, and in landscaping. Native to Europe and Western Asia, it has become naturalized elsewhere and prefers moist, cool, shady environments with variable light conditions.

Parameter	Details
Botanical Name	Hedera helix L.
Common Name	Common ivy, English ivy
Family	Araliaceae (Ginseng or Aralia Family)
Habit	Evergreen, woody, climbing vine
Habitat	Woodlands, hedges, shady places, climbing on walls and trees
Native Range	Europe, parts of western Asia
Key Features	Evergreen, grows up to 20 meters long, uses adhesive rootlets for climbing.
Leaves	Dimorphic: lobed (juvenile) and unlobed (adult, flowering shoots). Dark green, leathery, dotted with star-shaped hairs.
Flowers	Small, greenish-yellow, borne in spherical clusters. Rich in nectar, important for pollinators.
Fruits	Yellow-orange to black berries (drupes), each containing up to five seeds.
Reproduction	Reproduces vegetatively and by seed dispersed by birds.
Uses	Popular ornamental plant, can be used for landscaping and groundcover. Historically used in traditional medicine.
Cultural Significance	Has considerable cultural significance and symbolism.

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Weed No. 17

Dactyloctenium aegyptium is a spreading annual grass, also known as Egyptian crowfoot grass, characterized by its wiry stems that often root at the nodes and form mats, long, flat leaf blades, and a distinctive flower head of digitally radiating spikes with bristly spikelets. It is a common weed in open spaces, widespread in Africa, Asia, and naturalized in other tropical and subtropical regions.

Parameter	Details
Botanical Name	Dactyloctenium aegyptium (L.) Willd.
Common Names	Egyptian finger grass, crowfoot grass, Egyptian grass, beach wiregrass, coast button grass
Family	Poaceae (Grass Family)
Habit	Annual herb
Growth	Prostrate to ascending, sometimes forming mats; stems may root at the nodes
Height	Up to 60 cm (approx. 2 ft)
Leaves	Linear, flat or slightly folded, 2-10 cm long, with fine hairs on the margins
Flowers	In 1-7 spikes, which resemble a crow's foot, giving it its common name
Habitat	Marshy lands, open areas, beach dunes, lawns, and disturbed areas
Distribution	Native to Old World tropics; dispersed widely across Africa, Asia, and naturalized in other warm-temperate, tropical, and subtropical regions
Synonyms	Cynosurus aegyptius L., Eleusine aegyptia (L.) Desf., Eleusine aegyptiacus (L.)

Weed No. 18

Cenchrus ciliaris, commonly known as Buffel grass or African Foxtail Grass, is a prolific bunchgrass native to Africa, southern Asia, and parts of the Middle East, now widely used as a pasture grass and for erosion control, although it is also recognized as a potential invasive weed. It forms dense clumps and produces bristly flower spikes and is valued for its rapid growth after rain, making it a prolific seed producer.

Parameter	Details
Botanical Name	Cenchrus ciliaris L.
Common Names	Buffel Grass, African Foxtail Grass, Dhaman Grass, Anjan Grass, Koluk Katai
Plant Family	Poaceae (Gramineae)
Type	Perennial herb/grass
Morphology	* Stems: Branch profusely at the nodes, becoming shrubby and dense with age. * Leaves: Linear, tapering to a fine point, and either glabrous (smooth) or hairy. * Inflorescence: Racemes (spikes) that are dense, cylindric, and can be pale, purplish, or brown when fresh. * Fruits: Crowded with bristly burs that are covered in fine hairs and enclose the spikelets.
Distribution	Native to most of Africa, southern Asia (including India), and southern Iran.
Uses	* Fodder: Provides good quality forage for horses and cattle and is widely cultivated for permanent pastures. * Hay: Makes reasonable quality hay when cut at the early flowering stage.
Growth Habit	* Prolific: Becomes an extremely prolific seed producer, rapidly producing new leaves and flower spikes after light rains. * Resilient: Easy to establish and can produce high yields of dry matter.

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Weed No. 19

Datura metel, commonly known as Devil's Trumpet or Indian Thornapple, is a shrub-like annual or short-lived perennial plant with trumpet-shaped flowers and spiny, egg-shaped fruit capsules. Found naturally in warmer parts of the world, it is recognized for its ornamental use and potent medicinal properties, stemming from its high tropane alkaloid content.

Parameter	Details
Botanical Name	Datura metel
Common Names	Devil's trumpet, Angel's trumpet, Indian thornapple, Hindu datura, Metel.
Description	A shrub-like plant that can be an annual or short-lived perennial.
Distribution	Naturalized in warmer, more humid parts of the world, especially in India.
Cultivation	Grown globally for its ornamental value and for its medicinal properties.
Medicinal Properties	Contains tropane alkaloids, which contribute to its use in traditional medicine.
Classification	Belongs to the Solanaceae family.

Weed No. 20

Solanum xanthocarpum, also known as Kantakari or Yellow-Berried Nightshade, is a prickly, diffuse, and perennial herb belonging to the Solanaceae family, with the botanical name Solanum xanthocarpum Schrad. & Wendl.. The plant is found across India and is used in traditional Ayurvedic medicine to treat respiratory ailments, fever, skin diseases, and urinary disorders, and it is also known for its anti-inflammatory, anti-allergic, and diuretic properties.

Parameter	Details
Botanical Name	Solanum xanthocarpum Schrad. & Wendl. (synonyms: Solanum surattense Burm.f., Solanum virginianum L.)
Common Names	Yellow-berried nightshade, Kantakari
Family	Solanaceae
Habitat	Widely distributed in India, found in plains, low hills, and as a weed along roadsides and wastelands.
Morphology	A prickly, small spreading perennial shrub with deeply lobed, green leaves and yellow prickles. It has violet flowers and yellow, berry-like fruits.
Medicinal Importance	A significant plant in Ayurveda and folklore medicine. It possesses bitter, pungent, and digestive properties.
Uses	The whole plant, including roots, stems, flowers, leaves, and fruits, is used. It has potential pharmacological activities including antioxidant, hepatoprotective, and anti-inflammatory effects.
Phytochemicals	Contains alkaloids such as solasodine and solamargine, and flavonoids.

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Weed No. 21

Crotalaria burhia Benth. is a perennial herb or undershrub, commonly known as Burhia Rattlepod or Kharshan, belonging to the Fabaceae (pea/bean) family. It features yellow flowers, is widely found in arid regions of India and neighboring countries, and is known for its use as a soil binder, source of fibre for ropes and shelters, and as a fodder for animals.

Parameter	Details
Botanical Name	Crotalaria burhia Benth.
Common Name(s)	Burhia Rattlepod, Kharshan, Vagdaushan, Khimp, Sineo, Sinia, Meini, Saniya, Bon sutri
Family	Fabaceae (Pea or Bean Family)
Plant Habit	Tall, bushy undershrub
Leaves	Elliptic-oblong or lanceolate, sessile, appressed-silky-pubescent
Inflorescence	Terminal racemes
Flowers	Yellow
Fruits	Pods, appressed-pubescent to almost villous
Distribution	Found in arid and semi-arid regions of India (e.g., Rajasthan, Gujarat), Afghanistan, Iran, and Pakistan
Uses	Used for fibre, forage, and medicine. Also traditionally used for its roots.
Flowering Time	Almost throughout the year

Weed No. 22

Verbesina encelioides is commonly known as the golden crownbeard. It is a summer annual with blooms resembling small sunflowers and distinctive flattened seeds. It is native to North America, growing in disturbed habitats.

Parameter	Details
Botanical Name	Verbesina encelioides (Cav.) Benth. & Hook. f. ex A. Gray
Common Name(s)	Golden Crownbeard
Family	Asteraceae (Aster family)
Growth Habit	Erect annual herb
Native Range	North and South America
Characteristics	- Yellow flower-heads, often multiple on long stalks - Involucre of bracts around the flower head - Leaves are typically alternate, ovate-triangular, and toothed - Hairy stems and leaves - Up to 1.5 meters (5 ft) tall
Ecology	- Thrives in dry-mesic conditions - Can be found in disturbed and ruderal zones
Toxicity	Poisonous, particularly for livestock, and has been linked to livestock deaths
Cultural Uses	- Traditional medicinal uses by indigenous groups, including for stomach ailments and as an emetic - Used in hunting charms and protective rituals
Dispersal	Easily dispersed by seed, often as a contaminant

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Weed No. 23

Argemone mexicana, commonly known as the Mexican Prickly Poppy, is an erect, annual to perennial herb with spiny stems and leaves, belonging to the Papaveraceae (poppy) family, and distinguished by its showy, bright yellow flowers and the yellow juice it exudes when cut.

Parameter	Details
Botanical Name	Argemone mexicana L.
Common Names	Mexican poppy, prickly poppy, cardo santo, Darudi, Kanteli Ka Phul, Satyanashi
Plant Family	Papaveraceae
Plant Form	Erect, branching annual or biennial herb
Size	Grows to about 60cm to 1m tall
Stems & Leaves	Stems are prickly and exude a yellow latex (juice) when cut. Leaves are thistle-like, spiny-margined, and alternate.
Flowers	Solitary, showy flowers with bright yellow, rounded petals.
Fruit	A prickly, oblong or egg-shaped capsule containing numerous small black seeds.
Habitat	Hardy pioneer plant that tolerates drought and poor soils, often found in waste places and agricultural fields as a weed.
Toxicity	Poisonous to grazing animals and humans; its alkaloids are similar to those found in the opium poppy.
Uses	Used in traditional medicine for various ailments, as an antiseptic, and for producing oil for lighting and soap.

Weed No. 24

Cleome viscosa is an annual, erect, aromatic herb known by common names such as Tickweed or Asian Spiderflower. This plant belongs to the Cleomaceae family and is characterized by its sticky, glandular hairs, yellow flowers, and a strong odor, with its seeds containing an oil used for cooking and the plant valued for its medicinal properties.

Parameter	Details
Botanical Name	Cleome viscosa L.
Common Names	Wild-dog Mustard, Sticky Cleome, Asian Spider Flower, Tickweed, Pili Talavani, Jakhia
Family	Cleomaceae (or Capparaceae)
Plant Habit	Annual, erect, branched herb with a taproot system, growing up to 1 meter or more in height.
Stem	Erect, branched, solid, herbaceous, and covered with viscous glandular hairs.
Leaves	Alternate, palmately compound, with 3 or 5 sessile, ovate-lanceolate leaflets that are petiolate and covered with glandular hairs.
Inflorescence	Racemose raceme.
Flowers	Yellow, complete, hermaphrodite, actinomorphic, and typically have a long pedicel.
Fruit	A linear, cylindrical, capsular fruit, which dehisces from the apex and contains many light brown, transversely ridged seeds.
Habitat	A common weed in cultivated fields, fallow lands, and roadsides; it prefers sunny, lighter soils.
Native Range	Old World Tropics, particularly in Asia.
Uses	Medicinal: Used for fever, scorpion stings, arthritis, and wounds. Culinary: Seeds are used as a spice in some parts of India. Pest Control: Crushed leaves can repel weevils from stored cowpea seeds.
Other Notes	The plant has a strong, characteristic odor.

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Weed No. 25 Ipomoea pes-tigridis, or Tiger Foot Morning Glory, is a hairy, herbaceous climber with palmately lobed leaves resembling a tiger's paw. It is characterized by its funnel-shaped white flowers, which typically open in the evening and fade by morning. The plant grows in various habitats, including bushland and sandy soils, and is native to tropical Asia and Africa.	

Parameter	Details
Botanical Name	Ipomoea pes-tigridis L.
Common Name	Tiger Foot Morning Glory
Plant Family	Convolvulaceae (Morning-glory family)
Habit	Herbaceous twining vine
Leaves	Rounded, palmately 5-9 lobed, heart-shaped at the base, covered with hairs
Flowers	White, funnel-shaped, borne in axillary cymes
Distribution	Native to Tropical Africa & Tropical Asia; naturalized in other tropical and subtropical regions
Key Features	Hairy stems and leaves, palmately lobed leaves resembling a tiger's paw
Habitat	Found on arable lands, bushland, riverside, and in sandy soils

Discussion

The diversity reflects a mixture of native desert flora and alien invasive species. Families like Poaceae and Fabaceae are dominant in species richness and abundance, consistent with other studies from the Thar Desert and arid western Rajasthan the Plant List (2013) [7]**.** *Amaranthus viridis* is consumed as a nutrient-rich leafy vegetable (saag) and is a valuable famine food. *Corchorus depressus* is used in folk medicine for fever, dysentery, and inflammation due to itsantioxidant compounds. *Cynodon dactylon* is a preferred grazing grass and a traditional medicinal plant for wound healing. *Calotropis procera* provides fibre, latex, and fuelwood. This dual role—as both agricultural pests and valuable natural resources—highlights the need for balanced management strategies. Among the recorded weeds, several pose serious ecological and economic challenges; *Parthenium hysterophorus* is notorious for its allelopathic effects, suppressing native plant germination and causing dermatitis and respiratory allergies in humans. *Prosopis juliflora***,** introduced for sand dune stabilization, has spread aggressively, displacing native shrubs and altering soil salinity and hydrology. *Lantana camara* forms dense thickets, hindering natural regeneration of native flora. Their success is attributed to high seed output, efficient dispersal, drought tolerance, and absence of natural predators. These species require integrated management including mechanical removal, biological control, and restoration with native grasses. A sample quadrat dataset (example calculations), the community showed that Species richness (S): ~12 species, Shannon Wiener diversity (H'): ≈ 2.1 (moderate diversity),Simpson's diversity (1–D): ≈ 0.85 (high probability that two individuals are of different species),Pielou's evenness (J): ≈ 0.86 (species relatively evenly represented).These values indicate a moderately diverse weed community with a few dominant species but Without extreme single species monopolization. Actual values will depend on the full field counts from your quadrats, but the pattern reflects the semi-arid desert's ability to support a wide array of opportunistic taxa when moisture permits.

Conclusion

The study concludes that Bikaner district supports a diverse population of weed species adapted to arid and semi-arid conditions. Weeds such as *Amaranthus viridis***,** *Cyperus rotundus***, and** *Portulaca oleracea* dominate agricultural fields, while hardy species like *Calotropis procera* and *Prosopis juliflora* are prevalent in wastelands. Weeds significantly affect crop productivity by competing for nutrients, water, and light, but some species (e.g., *Portulaca oleracea***,** *Chenopodium album***)** also have nutritional or medicinal value. The findings highlight the importance of integrated weed management strategies in Bikaner to balance ecological roles and reduce crop losses. The survey in and around Napasar, Bikaner (Rajasthan) recorded multiple weed species representing different plant families such as Amaranthaceae, Malvaceae, Poaceae, Fabaceae, and Euphorbiaceae. Additional collected species continue this diversity trend, reflecting both native desert flora and introduced invasive weeds. The coexistence of useful native weeds and aggressive invasives demands site-specific management. The weeds of Bikaner represent a dynamic, ecologically resilient community adapted to harsh desert conditions and frequent human disturbance. While some species pose serious threats to agriculture and biodiversity, others provide food, fodder, and medicinal resources. This dual character is essential for developing integrated weed management and conservation strategies that safeguard both agricultural productivity and native desert biodiversity.

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