



## ***EPHEDRA KARUMANCHIANA* S. K. PATEL, S. M. PATIL, RAOLE & K. S. RAJPUT *SP. NOV.*;: A NEW DISTRIBUTIONAL RECORD IN JHUNJHUNU DISTRICT OF RAJASTHAN, INDIA**

PAPITA CHOUDHARY, POOJA MANGAL, DEEPANSHU KUMAWAT, JAI SINGH, SHIKHA GUPTA and AMIT KOTIYA\*

Department of Botany, University of Rajasthan, Jaipur, Rajasthan, India.

\*Corresponding Author Email: kotia.amit@gmail.com

The present study reports a new distributional record of *Ephedra karumanchiana* S. K. Patel, S. M. Patil, Raole & K. S. Rajput *sp. nov.* from the semi-arid region of Rajasthan, India, there by extending its previously known geographical range. *Ephedra foliata* is known species so far recorded from Rajasthan. Field explorations conducted during 2022–2024 across Rajasthan resulted in the collection of specimens morphologically conforming to *E. karumanchiana*. Identification was confirmed through comparative taxonomic examination with type material and reference herbarium specimens, supported by diagnostic morphological characters. Detailed phenological observations, photo plates, line illustrations, and a GIS-based distribution map are provided to document. This record not only enriches the floristic diversity of the region but also emphasizes the importance of continued botanical surveys in underexplored habitats. Future research may explore its phytochemical and pharmacological properties to enhance understanding of its medicinal potential.

**Keywords:** Distribution, *Ephedra*, Gymnosperm, Jhunjhunu, Rajasthan.

### **Introduction**

The genus *Ephedra*, is a significant group of gymnosperms known for its ecological and medicinal value, belonging to the seed bearing non flowering family Ephedraceae and is distributed across arid and semi-arid areas of Asia, Europe, Northern Africa, Southwestern North America, and South America. These gymnosperms are xerophytic shrubs or climbers, adapted to harsh environmental conditions<sup>1</sup>.

*Ephedra karumanchiana* has been previously recorded in parts of North Gujarat, arid region (Banaskantha Dist., Ramsan, Dhroba, Dhakha, Vasan) and Southern Rajasthan (Jalor Dist., Panseri, Pooran)<sup>2</sup>. This study aims to document the

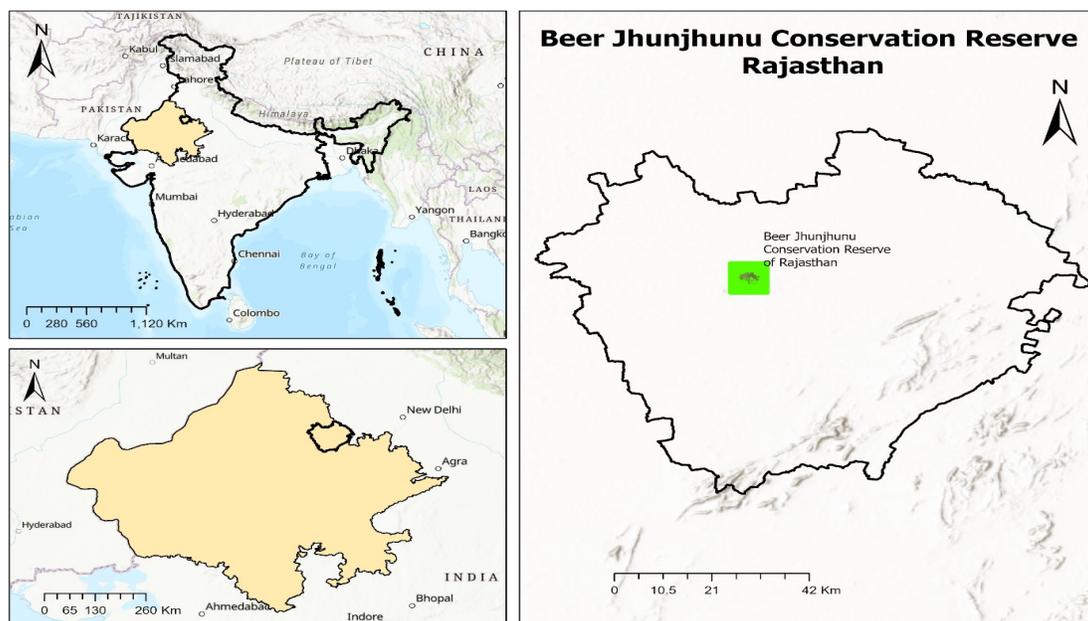
newly discovered population of recently introduced species *Ephedra karumanchiana* in Rajasthan.

### **Materials and Methods**

A detailed field assessments were conducted during 2022-2024 in arid and semi-arid regions for identification, distribution, population status and threats of *Ephedra* species in Rajasthan State, India. Random quadrat method<sup>3</sup> is followed for population assessment and plant association characterization. The location of *Ephedra karumanchiana* is shown in Figure 1.

#### *Study Area*

The Great Indian Thar Desert's north-eastern border area has a predominance of arid climate with uncertainty



**Figure 1.** Map showing new location of *Ephedra karumanchiana* in Rajasthan.

of rainfall and frequent occurrence of drought. The Jhunjhunu District is also part of the Thar Desert.

However, the Beer Jhunjhunu Conservation Reserve is significant for ecological richness in spite of its harsh climate.

Beer Jhunjhunu Conservation Reserve is a protected forest area situated in the east of Jhunjhunu city at the height above 320 meters from sea level. It is surrounded by village Desusar in the north; Samaspur in the south; Charanwas in the east and agriculture land adjoining the Jhunjhunu city in the west.

#### *Climate*

The area is almost plain with a semi-arid climate. Temperature is very high in summer and may reach upto 48 °C<sup>7</sup> and in winter it drops below freezing point. May and June are the hottest months. Average annual rainfall varies from 300-400 mm<sup>8</sup>. Most of the rainfall is received during monsoon (July-September) period. After rains, the forest is luxuriant in vegetation and enriched with many

medicinal, rare, endemic and threatened plants.

#### **Results and Discussion**

Some rare and threatened plants like *Enicostema hyssopifolium*, *Peganum harmala*, *Ceropegia bulbosa*, *Leptadaenia reticulata*, *Indigo feracaerulea*, *Abutilon fruticosum* and *Tecomella undulata* have also recorded at few sites of the present study. The habitat of *Ephedra karumanchiana* is shown in Figure 2.

Among recorded species most of the plants were indigenous but few exotic plants were also present in the area. *Prosopis juliflora* was intentionally introduced in the area as a tough invasive species, but now it has posed serious threat to native flora and fauna<sup>4</sup>.

During the collection of *Ephedra* species from different locations of Rajasthan, a different species, *Ephedra karumanchiana* growing naturally was collected from Beer Jhunjhunu Conservation Reserve of Jhunjhunu District in Rajasthan, India.



**Figure 2.** Habitat of *Ephedra karumanchiana*.

#### *Taxonomic Description*

Plant dioecious, terrestrial, scandent shrub, up to 5 m in height; stems 5 m height, 3-5 cm (rarely 10 cm) thick, green-brown when young, dark-brown at maturity, woody, branched, having distinct nodes and internodes; branchlets arranged in whorls, scabrous, green, having ridges and furrows; Leaves 2-4 cm long, 1-2 mm broad, 2-4 per node, scaly, whorled, green-pale green, sheath white-yellow, linear-lanceolate or connate, apex narrow, acute, base broad; Male strobili compound, like biparous- multiparous cyme, pedunculate; Single male strobilus 1.5-2 cm x 3 mm, green when young, strobili 6-12 per node in 2-4 groups, whorled, ovate-lanceolate, bracteate, bract 10-24 per strobilus, binate, bi-colours, centre dark green, margin hyaline, ciliate; male flowers 3-8mm, 6-12 pairs per strobilus; sporangiophores 1-3 mm long, pinkish-brown, with synangia, synangia usually 3-6; pollen grains golden

yellow, dimorphic, ellipsoidal or widely ellipsoidal; Female strobili 1 cm x 5 cm, 4-14, stalked, terminal, sometimes on nodal branches, bracteate, bract 3-6 pairs, opposite, pink, non-mucronate, obtuse, median bracts sub-acute, base connate; ovules 5 x 3 mm, 1-2, ovate, green-black; seeds 1-2, covered with fleshy white/pink colour bract, ovate, black with persistent micropyle. Figure 3 shows the male (A) and female plant (B), Male strobilanthus (C,D) and Female strobilanthus (E,F).

*Flowering:* January to February and

*Fruiting:* April to May.

The Indian Thar Desert is a special biogeographical region in India with its unique and endemic biodiversity. Some of the parts need to be properly explored to reach proper documentation of species. *Ephedra foliata* is a known species so far recorded from Rajasthan<sup>5,6</sup>.



**Figure 3.** *Ephedra karumanchiana* plant: **A**-Male plant; **B**-Female plant; **C**, **D**-Male strobilanthus; **E**, **F**-Female strobilanthus.

During present investigation new location documented of *Ephedra karumanchiana* S.K.Patel, S.M.Patil, Raole & K.S.Rajput *sp. nov.*, in Rajasthan, which adds a significant record for this species known geographical range. This finding underscores the need for further exploration of under-researched arid zones in India. The species presence in Rajasthan highlights its adaptability to harsh climatic conditions, making it an essential component of the desert ecosystem. Additionally, the medicinal value of *Ephedra* necessitates conservation efforts

to protect its natural populations from overexploitation. The habitat must be protected like Beer Jhunjhunu Conservation Reserve as most of the habitats are encroached by local people.

### Conclusion

This study establishes the occurrence of *Ephedra karumanchiana* in Rajasthan, India, marking a noteworthy expansion of its distribution. Conservation measures and further research on its ecological role and genetic diversity are recommended to ensure the species sustainability in arid ecosystems.

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