

***EPHEDRA YANGTHANGENSIS* (EPHEDRACEAE), A NEW SPECIES FROM  
HIMACHAL PRADESH, INDIA**

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*Keywords: Ephedra; Gymnosperm; Himachal Pradesh; India; New Species; Taxonomy.*

**Abstract**

A new species *Ephedra yangthangensis* Prabha Sharma & Rita Singh is described, and illustrated from Himachal Pradesh, India. This new species is most similar to *E. intermedia* Schr. & Meyer, from which it is distinguishable by its smaller male strobili, shorter length and curved synangiophore, yellowish orange fleshy bracts of bigger female strobili, fade orange scale leaves and light green robust stem as compared to the other flourishing species *E. intermedia*.

**Introduction**

*Ephedra* L., commonly known as joint fir, is the single genus of the family Ephedraceae. *Ephedra* is one of the few gymnosperms adapted to extreme aridity and, as such, is highly reduced vegetatively and a morphologically distinct genus of ca. 50-65 species of climbers, shrubs or rarely small trees (Price, 1996). It is widely distributed in temperate areas of Eurasia, northern Africa, southwestern North America, and western South America and is often abundant in dry and open habitats such as deserts, rocky slopes, grasslands and maritime areas (Stapf, 1889; Price, 1996).

Eight species have been described to occur in India (Sahni, 1990). Four additional species - *E. pangiensis* Singh & Sharma, *E. kardangensis* Sharma & Uniyal, *E. khurickensis* Sharma & Uniyal, *E. sumlingensis* Sharma & Uniyal have recently been added from the Western Himalaya (Sharma and Uniyal, 2008; Sharma *et al.*, 2010; Sharma and Singh, 2015). Extensive field explorations during the past thirteen years were carried out. Each population of *Ephedra* from Uttarakhand, Himachal Pradesh Ladakh has been surveyed and documented. During field studies in 2004 some populations near Yangthang to Ka, Leo, Nako, Chango, Chulling, Sumdo, Hoorling and Lira (District Kinnaur), Himachal Pradesh, found to be unique in morphological features. These unusual populations of *Ephedra* could not be assigned to any of the existing Western Himalayan species. At this elevation, *E. intermedia* is a dominant species but, these unusual populations differ from that species. On the basis of several critical morpho-anatomical features of vegetative and reproductive parts, these unusual *Ephedra* populations of the Yangthang are hereby segregated as a new taxon.

***Ephedra yangthangensis* Prabha Sharma & Rita Singh, sp. nov.**

**(Figs 1 & 2).**

**Diagnosis:** *Ephedra yangthangensis* can be distinguished from *E. intermedia* by its smaller male strobili, shorter length and curved synangiophore, yellowish orange fleshy bracts of bigger female strobili, orangish scale leaves and light green robust stem as compared to the other species *E. intermedia* that flourishes in this area.

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*Type* : India, Yangthang, Kinnaur district, 2 September 2004, Freitag, Singh & Sharma 0219 (*Holotype*: IPUH; *Isotypes*: DD, DUH).

Plant dioecious, about 1.0 m in height, erect, with dark brown bark and light green branchlets, ca. 2.5 mm in diameter, internodes, ca. 3–5 cm. Leaves triangular, two, opposite decussate, sometimes 3 to 4 arranged in whorls, confined to nodes, open part of the leaves triangular and obtuse, orange, becoming dark brown scaly at maturity, ca. 2.5–3.5 mm in length,  $\frac{1}{2}$  connate. Male strobili sessile, 10–12 arranged in whorls at the nodes, ovoid, ca. 3.5–5.0  $\times$  2 mm, 4–5 pairs of flowers, 4–5 pairs of bracts, bracts, ca. 2–4  $\times$  2–3 mm, mucronate with hyaline margins, connate, connation of bracts varied  $\frac{1}{4}$  lower and middle,  $\frac{1}{2}$  upper, perianth obtuse with elevated apex, ca. 2.0  $\times$  1.5 mm bearing synangiophore with synangia, ca. 3.5–4  $\times$  0.3 mm, exserted, synangia ca. 6–8, sessile. Pollen grains golden yellow, polymorphic, ellipsoidal or broadly ellipsoidal, polyplcate. Female strobili ca. 10–12 in number, occur in whorls at the nodes, sessile, very broadly ovoid, ca. 5.5–6.0  $\times$  6.0 mm, with four pairs of mucronate bracts having white hyaline margins, ca. 8–10 mm, connate,  $\frac{1}{2}$  lower, middle and upper, at maturity becomes fleshy yellowish orange in colour. Tubillus twisted, exserted, ca. 3–5 mm in length. Seeds two, light to dark brown, ovate, ca. 4.0–4.5  $\times$  2.0 mm.



Fig. 1. *Ephedra yangthangensis* Prabha Sharma & Rita Singh growing in natural habitat.

*Phenology*: Flowering - August; Fruiting – September - October

*Etymology*: The specific epithet of the new taxon is based on the locality of occurrence Yangthang.

*Distribution*: INDIA. Himachal Pradesh : Yangthang to Ka, Leo, Nako, Chango, Chulling, Sumdo, Hoorling and Lira (District Kinnaur).

*Habitat:* Open; dry loose gravel soil, as well as rock crevices, above 3500 m elevation in the North West Himalaya. Most of the studied populations grow in association with *Artimisia* (Asteraceae) and *Chenopodium* (Chenopodiaceae),

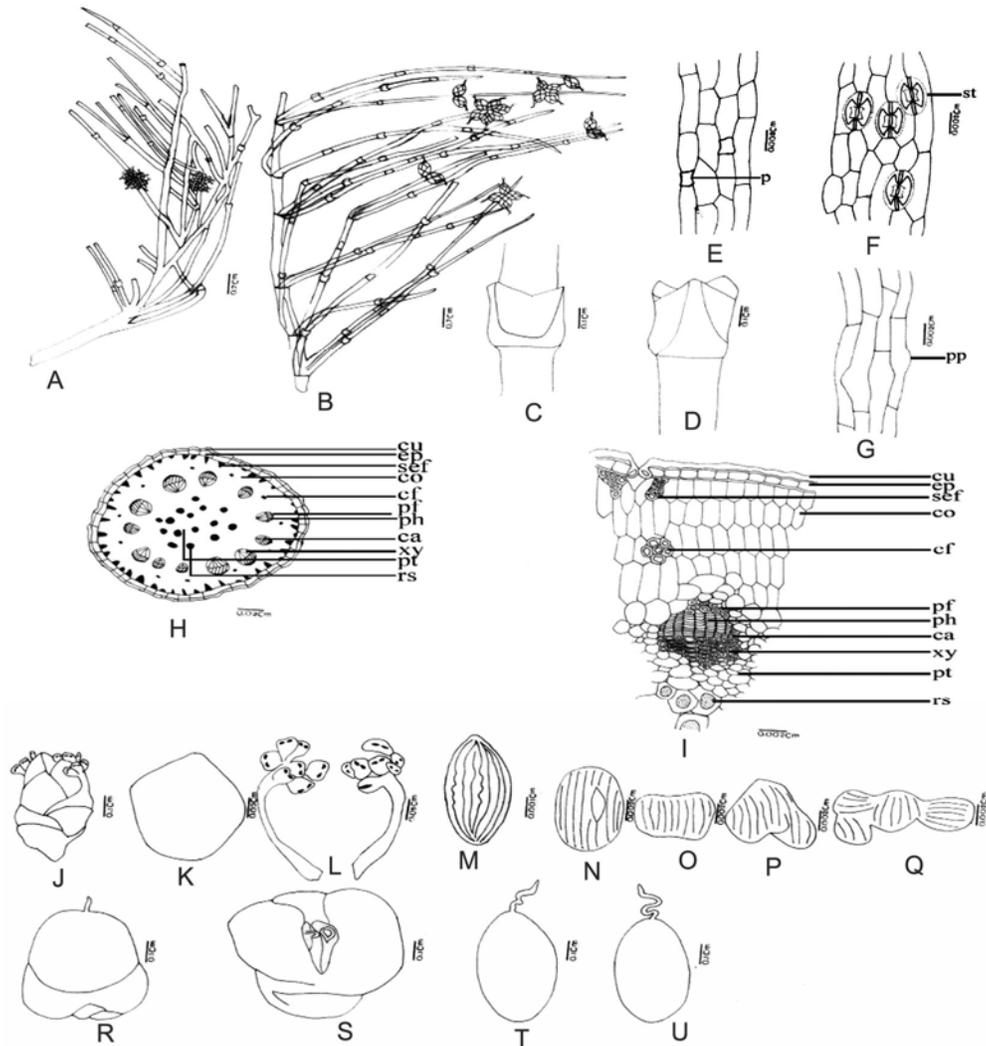


Fig. 2. *Ephedra yangthangensis* Prabha Sharma & Rita Singh. A. A twig showing male strobili arranged in whorls at the nodal region. B. A twig showing female strobili arranged in whorls at the nodal region. C. Stem with scale leaf (front view). D. Stem with scale leaf (side view). E. Surface view of epidermis showing external pore (p). F. Surface view of epidermis, furrow region showing stomata (st). G. Surface view of epidermis, ridge region showing prominent papillations (pp). H. T.S stem *E. intermedia* var. *lutea* (Diagrammatic). I. T.S stem *E. intermedia* var. *lutea*, a portion enlarged, cu- cuticle, st-stomata, ep- epidermis, sef- subepidermal fibres, co-cortex, cf – cortical fibres, pf- pericyclic fibres, ph-phloem, x-xylem, pt-pith, rs- resinous substance. J. Male strobilus. K. Perianth. L. Synangiophore with synangia (front and side view). M. Normal striate ellipsoidal pollen grain with highly undulated ridges. N. An abnormal monocolpate pollen grain. O. A diad. P. A triad. Q. Pollen grains in a joint tetrad. R. Female strobilus. S. Female strobilus enclosing two seeds with twisted tubillus. T. Seed (Upper surface with twisted tubillus). U. Seed (Lower surface with twisted tubillus).

**Key to the identification of some of the *Ephedra* species**

1. Climber, branches slender, scale leaves filiform, pith non-resinous, male strobili with 8-9 pair of flowers having 3 synangia, female strobili with fleshy cream beige coloured bracts with straight tubillus *E. foliata*
- Shrub or herb, scale leaves triangulate, pith resinous, male strobili with 4-6 pairs of bracts having 6-8 synangia, female strobili with fleshy coloured bracts. 2
2. Female strobili with fleshy yellowish orange coloured bracts *E. yangthangensis* **sp. nov.**
- Female strobili with fleshy red coloured bracts. 3
3. Seeds having twisted tubillus, medullary fibre cells present in the stem. 4
- Seeds having straight tubillus, medullary fibre cells absent in the stem. 5
4. Pollen grains with protrusion at the meridional poles ( $45 - 50 \times 20.0 - 22.5\mu\text{m}$ ) *E. pangiensis*
- Pollen grains without protrusions at the meridional poles ( $37.5 - 55.0 \times 17.5 - 27.5\mu\text{m}$ ). *E. intermedia*
5. Pollen grains small ( $37.5 - 40.0 \times 15 - 25 \mu\text{m}$ ) having reticulation in the furrows, seeds shiny black ( $3-4 \times 2.0 - 2.5\mu\text{m}$ ). *E. regelina*
- Pollen grains having undulations on the ridges, seeds reddish dark brown ( $5 - 6 \times 2.0 - 2.5 \mu\text{m}$ ). *E. gerardiana*

**Acknowledgements**

The authors are thankful to The Ministry of Environment and Forests, Govt. of India for providing financial aid during the tenure of this work under All India Co-ordinated Project on Taxonomy (AICOPTAX) D.O.No.J-22018/54/2000 – CSC (BC) –17<sup>th</sup> November 2000. The authors also extend their thanks to Mr. Pratap Chand Negi, Mr. Ajit Singh Negi and Mr. Satish Sharma for their generous help provided during the field work. The In-charge of herbaria of Forest Research Institute, Dehradun (DD) and Botanical Survey of India, Dehradun (BSI) are duly acknowledged for permitting to study the herbaria.

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(Manuscript received on 29 May 2016; revised on 26 July 2016)