



BIOECOLOGICAL PROPERTIES OF EPHEDRA EQUISETINA BUNGE

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ABSTRACT

This article discusses the bioecological properties, habitat, phenological periods, and medicinal value of Ephedra equisetina Bunge. The plant's adaptation to natural conditions and conservation status are analyzed

Introduction

Currently, the study of medicinal plants and the determination of their bioecological properties are of great importance for the rational use of natural resources and the preservation of biodiversity. *Ephedra equisetina* Bunge is one of the plants that have been used for medicinal purposes since ancient times, and is mainly native to the regions of Central Asia.

Uzbekistan is a landlocked Central Asian country. Among the three *Ephedra* species listed in JP17, *E. intermedia* and *E. equisetina* are distributed in Uzbekistan. In 2017-2021, ephedra herb was studied in the natural habitat of plants belonging to the *Ephedra* genus in Uzbekistan, and we confirmed that plants such as *E. strobilacea*, *E. equisetina*, *E. regeliana*, *E. foliate*, *E. distachya* grow in natural conditions in Uzbekistan. However, currently, ephedra herb is not collected in Uzbekistan. Although Uzbekistan is one of the most important habitats for *Ephedra* plants worldwide, the characteristics of *Ephedra* plants growing there have not yet been closely studied. Therefore, this study presents basic research on the cultivation of *E. equisetina*, among which the most common plants[1].

Botanical description

Ephedra equisetina is an evergreen, perennial shrubby plant belonging to the *Ephedraceae* family. Its body consists of numerous, cylindrical, knotted and thickened green stems. The leaves are small, spreading and attached to the lower part of the body, and photosynthesis occurs mainly in the stem. The flowers are inconspicuous, simple in structure, with separate female and male flowers. The fruit is a seed pod, often covered with a mucous layer. This plant grows in arid and semi-arid climates, especially in foothills, rocky and sandy areas. It is found in the southern and southwestern parts of Uzbekistan, in the dry zones of

Kazakhstan, China and Afghanistan. It also grows successfully on soils with good sunlight, low in nutrients. It is highly resistant to soil salinity and drought.

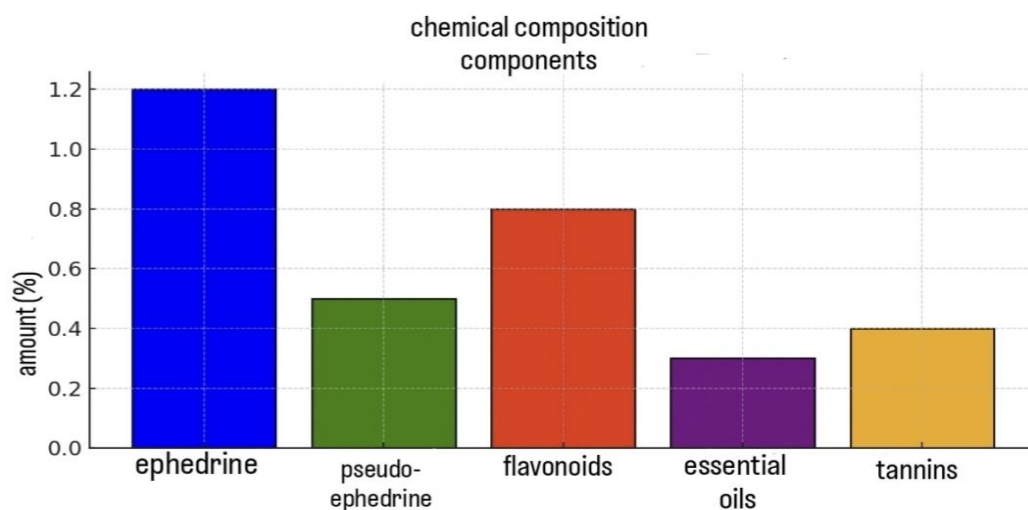
Phenological periods: Ephedra equisetina enters the growing season in early spring. The flowering period is mainly in April–May. The fruits ripen in late summer and autumn. It reproduces by seeds, but vegetative propagation is also possible. [2].

The table below shows the annual phenological phases of the Ephedra equisetina plant.

Months	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Vegetation				■	■	■	■	■	■	■	■	
Budding						■	■	■				
Flowering					■	■						
Fertilization							■	■				
Seed collection								■	■			

Medicinal value: The plant contains alkaloids - ephedrine and pseudoephedrine, which are widely used in medicine for bronchial asthma, allergic rhinitis, nasal congestion and other respiratory diseases. Ephedrine is also used as a cardiovascular stimulant. Therefore, Ephedra equisetina is of great importance in the pharmaceutical industry.

The main chemical components of the Ephedra equisetina plant are distributed as follows.[3]



Conservation status: The natural population of Ephedra equisetina is declining due to overexploitation of natural resources. For this reason, the plant is protected in some regions of Uzbekistan and is listed in the Red Book. In order to restore its resources, artificial propagation, cultural cultivation, and gene pool conservation are important. [4]

Ecological characteristics:

Climate adaptation: the plant is mainly adapted to continental, semi-desert and foothill climatic conditions.

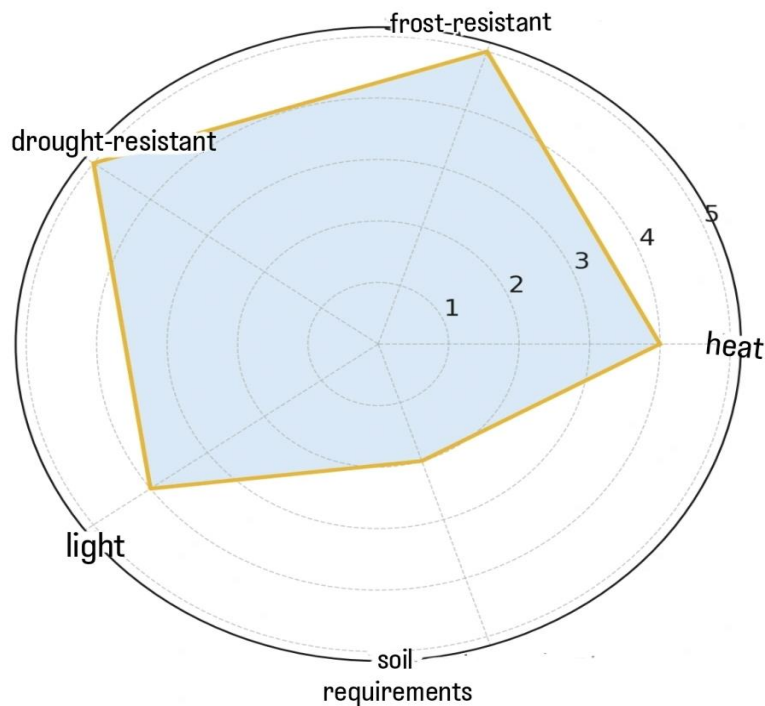
It is highly drought-resistant and can also endure long periods of drought. It can withstand sharp temperature changes (up to +40°C during the day and +10°C at night).

Light and temperature: it is a photophilous plant and grows well in open areas, under direct sunlight. In shaded areas, its development slows down or may stop altogether.

Soil requirements: mainly found on rocky, sandy or gravelly soils. It is not demanding on

nutrients, it can also grow on saline and carbonate soils. Well-drained soil is important for its root system.

Humidity and water requirements: It can survive in low humidity conditions, which makes it suitable for desert and semi-desert areas. It has physiological characteristics that conserve water due to its adaptation to water scarcity. The reduction of its leaves and the greenness of its stems are adaptations aimed at conserving water by reducing transpiration. The diagram below shows the ecological requirements spectrum of the plant *Ephedra equisetina*. [5]



Main distribution areas in Uzbekistan: Mountainous regions: Kashkadarya region - southern slopes of the Hissar ridge, found on rocky and sandy soils.

Surkhandarya region - widespread around the Boysun and Sherabad ridges, especially in rocky valleys.

Semi-desert and desert regions:

Navoi region - in desert and semi-desert zones along the Zarafshan River.

Bukhara region - in the Lower Zarafshan Valley and sandy areas.

Republic of Karakalpakstan - Ustyurt Plateau, South Ustyurt, along the Amu Darya River.



Nukus district, around Lake Achchiq.

Soil and climate compatibility: grows mainly on sandy, rocky, well-drained soils.

Very well adapted to arid climatic conditions.

Grows well at altitudes of 800–3000 meters.

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