

Ecomorphology, Biology and Medicinal Importance of *Tribulus terrestris* *Linn.- A Review*

K.S. Dahiya

Professor, Faculty of Basic and Applied Sciences,
Madhav University, Pindwara (Sirohi)
e-mail: dahiyaks55@gmail.com

Abstract

Tribulus terrestris L., commonly known as Gokharu, is a herbaceous, prostrate and perennial herb. It occurs on almost every type of soils and can survive in dry conditions, which is mainly due to deep root system and large root volume. *T. terrestris* reduces soil erosion and is used to improve soil texture and water holding capacity of the soil. The plant is useful in treatment of urinary stones, Parkinson's disease, liver and eye diseases. It can also improve physical as well as sexual strength. The plant is considered to act as diuretic and is useful in kidney, bladder, urinary tract and uro-genital related diseases.

Keywords: *Tribulus terrestris*, Gokharu, Soil binder, Drought resistant, Diuretic, Parkinson's disease.

Introduction

Tribulus terrestris Linn. is generally an annual herb but becomes perennial in warm climate. It is native of the Mediterranean region and widespread throughout the world from latitude 35 S to 47 N (Holm et al., 1977).

Classification

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| Kingdom | : Plantae |
| Phylum | : Spermatophyta |
| Sub- Phylum | : Angiospermae |
| Class | : Dicotyledonae |
| Order | : Geraniales |
| Family | : Zygophyllaceae |
| Genus | : <i>Tribulus</i> |
| Species | : <i>terrestris</i> |

Tribulus is from the Latin 'tribo', means 'to tear' and was the Latin name for 'caltrop' referring to the similarity in shape between the fruit of the plant and the spiked metal ball, used in medieval warfare as a weapon thrown under the feet of horses. *Terrestris* is Latin for "of the earth" and refers to the plant's prostrate growth habit (Parsons and Cuthbertson, 1992). The plant has many common names like Gokharu (Hindi), Goshurah (Sanskrit), Nerinci (Tamil), Palleru (Telugu), Dhakte Gokharu (Marathi) and Goxuri (Bengali).

Habitat

T. terrestris is a taprooted herbaceous perennial plant. It can thrive even in desert climates and poor soil. It is one of the obnoxious weeds in thar desert. A network of fine rootlets arise from the taproot to catch soil moisture from surrounding, which helps in survival in arid conditions.



Fig. 1 Flowering twig of *T. terrestris*



Fig. 2 Fruits of *T. terrestris*

Morphology

The stems are greenish-red, upto 2m long, branched, radiating from the central axis and covered with fine hairs. The stems are generally prostrate but becomes erect in shade or when competing with other plants. The leaves are in opposite pairs with one of the pair is slightly smaller than the other. They are 3 to 7 cm long. Each leaf consists of 3 to 8 pairs of opposite, oblong- lanceolate leaflets. The size of leaflet being 5-15 mm long and 3-5 mm wide. The upper surface of leaflets is more darker than the lower surface. The joints as well as the axes of compound leaves can move in phototropic responses and bear C-4 photosynthetic pathway (Yang and Yu, 1981).

The flowers are yellow, bear 5 petals and 7 to 15 mm in diameter. They are borne on short stalks in the axils of the smaller of each pair of leaves. The flowers open in the morning and close or become shed their petals in the afternoon.

The fruit is a woody burr, 1cm in diameter which splits into 4 to 5 wedge-shaped segments- nutlets or burs. Each nutlet is hard and bears 2 to 4 sharp spines (10mm long and 4-6mm broad). These nutlets resemble to goat or bulls heads. The horny spines are sharp enough to puncture bicycles tires. They can cause painful injury to bare feet. Each nutlet contain 1 to 4 seeds. Seeds are yellow, having different shapes but more or less ovoid and 2-5 mm long.

Ecology

The germination of *T. terrestris* starts with the onset of first rain in rainy season, within 5 to 7 days of late spring or early summer in India (Misra, 1962). The rate of germination declines with depth and heaviness of soils. The seeds can also germinate on the soil surface. The seeds can remain dormant for 3 to 6 years (Goeden and Ricker, 1973). *T. terrestris* occurs on almost any soil type but prefers to grow in dry, loose, sandy soils and prospere near sand dunes or loose blown soil around field margins. It also grows in heavier soils and on compact soils along roadsides (Holm et al., 1977).

The survival of *T. terrestris* in dry conditions is mainly due to deep root system (2m or more) and large root volume, which is capable of tapping soil moisture efficiently. The plant can have a root volume of 5.3 m and is able to extract 14.1 kg of water per plant in excess of the rainfall received (

Davis and Wiese, 1964). It requires 96 kg of water for production of 1 kg of dry matter. Because its water requirements are low, it can survive droughts (Davis et al., 1965). *T. terrestris* is cultivated in India to reduce soil erosion and loss of water. It is also used to improve soil texture and water holding capacity in wastelands (Brajeswar,2002)

Medicinal Uses of *T. terrestris*

In India, *T. terrestris* is used in folk medicine as a tonic and diuretic. It is used for the treatment of painful urination, calculous affections and Bright's disease. The leaves are rich in Calcium, provide a cheap supplement to rice diets (Ambusta,1986). *T. terrestris* has potential and is used in treatment of urinary stones (Al Ali et al.,2003), Parkinson's disease (Badmaev,2002), liver and eye diseases and benign prostatic hyperplasia (Lokesh et al.,2001). The plant can improve male sexual function (Gauthaman et al., 2002) and the performance of athletes (Krcik, 2001).

In Siddha medicine, *T. terrestris* is used in the form of decoction to treat urinary tract infections, urolithiasis, dysmenorrhoeal and edema. In Ayurveda, the powder of fruits of *T. terrestris* is used for overall physical strength as well as sexual strength by building all the tissues, especially Shukra dhatu (reproductive tissue) but it is not considered as a particular vajikarana (sexual functions) herb (Ayurveda Glossary, 2017). It is considered to be useful in kidney, bladder, urinary tract and urogenital related conditions- act as diuretic. In Kashmir, a tea is made out to treat all kinds of fevers.

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