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Glossonema variens: A Threatened Food cum Medicinal Plant of Western Rajasthan

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Abstract
Glossonema variens is threatened plant species in the Indian desert. Due to overgrazing and destruction of habitat, its population is depleting in its natural habitats. It is being one of the important traditional foods cum medicinal plants for desert inhabitants in Thar Desert, India. This paper describes its ethnic uses and potentials and highlights need for its *in situ* and *ex situ* conservation in arid rangelands.

Keywords: *Glossonema variens, threatened, traditional food, conservation*

Introduction

Plants of family Asclepiadaceae are both, economically as well as ecologically very important in the Thar desert. As food cum medicinal plants these species play a vital role in the life of the inhabitants of Thar Desert as compared to other parts of the country. Examples include species like *Caralluma edulis* (Edgew.) Benth. & Hook., *Ceropegia bulbosa* Roxb., *Glossonema variens* (Stocks) Benth. ex Hook.f., and *Leptadenia pyrotechnica* (Forsk.) Decne. Parts of these species used as food are nutritious and have traditional medicinal importance. As an important endangered desert plant, *Glossonema variens* received much attention recently in other regions (Phoboo *et al.*, 2015. Al Hadidi et. *al.*, 2017). Its *in situ* and *ex situ* conservation is vital to maintain its population and biodiversity in desert. In the present paper an attempt is made to highlight the ecological, economic importance and conservation of *Glossonema variens* in Thar Desert, India.

Results and Discussion

Distribution, Botanical and Ecological Characteristics

Glossonema varians (Stocks) Benth. ex Hook. f. (syn. *Mastostigma variens* Stocks) belongs to family Asclepiadaceae. The plant is locally known as *Dodha* and its follicles (fruit) are called as *Khiroli* in western Rajasthan. It is distributed in Arabia, Baharin Island, Iran, Pakistan (Sindh, Baluchistan) and India (Bhandari, 1990). In India it occurs in western Rajasthan, particularly, in Jaisalmer and Barmer districts.

This is a small, 8-20 cm high, erect perennial herb with milky latex. It regenerates from a perennial root-stock. It is much branched from near the base. Its stem is terete or more or less angular, pubescent, woody at base. It has fleshy, grayish-green and pubescent leaves with 1-2 cm long petiole. Its flowers are lemon-yellow, fragrant on sessile, umbellate 2-8 flowered cymes. Fruits are 2.5-5.0 cm long, ellipsoid, beaked, attenuated at base, covered with short, soft, scattered, spine-like processes. Seeds are 5-6 x 3-4 mm, broadly ovate, with much flattened and with very thin membranous margins. After the dehiscence of the ripe fruits, the leaves and stems dry and only the perennial-rootstock remains in the ground, which regenerates in suitable environmental conditions.

Ali and Ali (1996a) reported andromonoecy condition i.e. perfect (hermaphrodite) and male (staminate) flowers on the same plant in *G. variens*. They observed that certain flowers had usually small rudimentary ovaries without ovules. Ali and Ali (1996 b) studied the effect of sugar concentration on pollinium germination in eight members of Asclepiadaceae including *Glossonema variens*. They found that in hermaphrodite (perfect) flowers of *G. variens*, 15% sugar concentration showed maximum pollinium germination and 20% concentration in male (staminate) flowers. Generally, flowering and fruiting in *G. variens* occurs during August to November. Usually, it flowers once a year and remains in bloom for about one to two months depending on the availability of moisture. However, if there is sufficient rainfall during April and May, it may flower early. It usually produces 2-3 fruits per plant under sufficient moisture condition.

G. variens appears usually along runnels on shallow sandy gravelly soils and in depressions of rocky and gravelly areas of arid rangelands of Thar Desert. In its natural habitat, it forms association with grasses, leguminous and non-leguminous perennial herbs and also grows under the canopy of under-shrubs and shrubs. It is associated frequently with perennial grasses like *Dactyloctenium sindicum* Boiss., *Ochthochloa compressa* (Forsk.) Hilu and also with *Cymbopogon jwarancusa* (Jones) Schult. in the rocky situations and with *Lasiurus sindicus* Henr in sand deposition/sandy soils (Plate 1). Among herbaceous leguminous species, it is very much associated with *Tephrosia uniflora* Pers., which is a suffruticose leguminous perennial herb that occurs exclusively on open rocky slopes. *Indigofera cordifolia* Heyne ex Roth is one of the associated annual leguminous species. Among the non-leguminous perennial herbaceous species *Boerhavia diffusa* L., *Tribulus terrestris* L. are the main associated species. *Dipcadi erythraeum* also noticed as associate of *G. variens* in rocky-gravelly areas. The under-shrubs like *Heliotropium rariflorum* Stocks and *Seddera latifolia* Hochst. & Steud. are also associated with *G. variens* on open rocky slopes. It also grows under the canopy of the shrub species like *Leptadenia pyrotechnica* (Forsk.) Decne. and *Ziziphus nummularia* (Burm.f.) Wt. & Arn.

Plate 1: Associated plant species with Glossonema variens (Top left: Ochthochloa compressa and Dactyloctenium sindicum: Top right: Lasiurus sindicus; Below left: Tephrosia uniflora; below right: with Seddera latifolia

In the protected rangelands, *Glossonema variens* exhibits the remarkable diversity in plant types, particularly, in size and shape of leaves, flower colour and also in size of fruits. Generally plants with crisped margin leaves with light yellow flowers are common in rocky with less moisture situation. These types of plant have leaves with more length as compared to width. With little bit high moisture with sand deposition or sandy conditions plants with entire leaf margin with dark yellow flower were noticed in the rangelands. In this type, more width of leaves is observed as compared to length.

Economic importance:

Food: Its tender fruits (follicles) are known as *Khiroli* and are eaten raw by the inhabitants and supposed to have nutraceutical properties (Plate 2). The fruits collected from the rocky rangelands by the villagers are for their own consumption, however, rarely sold in the local market. Unripe tender fruits are eaten raw also used as vegetable and are very delicious. Its tender leaves are also used as vegetable. Its seeds are also edible and cooked by native Quatari people (Batanouy, 1981, Al Hadidi *et. al.*, 2017). Its fruits are reported to contain essential and non-essential amino-acids, carbohydrates, fatty acids, flavonoids having high nutritive value (Rizk et al., 1983, 1984)

Fodder: The plant is grazed by wild and domestic animals like sheep and goats, however, the plants are not generally grazed by the cattle.

Medicine: Traditionally, it is supposed one of the important medicinal plant of Thar Desert. The fruits are well known to be body tonic and energetic. The fruit juice is used in treating painful muscles, cough and sore throat. In coastal areas of Pakistan, the infusion of leaves is given for painful urination (Qasim *et al.*, 2014). Phoboo *et al.* (2015) reported moderate levels of anti-oxidant potential, soluble phenolics and ACE inhibitory activity in *Glossonema edule* from Qatar, which may be useful for potentially managing hypertension and oxidation-linked vascular complications

Plate 2: Fruits of Glossonema variens

Conservation and People Participation

Most of the threatened plant species in western Rajasthan are found in rangelands with sandy, gravelly and rocky substratum, therefore more attention is to be paid to preserve the specific niche i.e. micro and macro habitat. There is need to create the awareness among the desert inhabitants on economic and ecological importance of such type of species for their sustainable utilization and conservation. It is vital to recognize the rangeland areas with distinctive patches of *Glossonema variens* as Preservation Plot/Protected Areas particularly in its natural distribution cover particularly in Jaisalmer district.

The existence of *Glossonema variens* in the arid rangeland is threatened due to multitude of factors such as low rainfall, over-grazing by domestic animals, destruction of habitats, dilution in traditional conservation practices and changes in climatic condition. These factors have created an increased pressure on the existing natural populations of the species which finally led to decrease in the vegetation cover. Normally, it regenerates from the perennial-rootstock in the field after receiving good rainfall but it flowers in the less rainfall event, and again it requires sufficient moisture for fruiting. If soil and water conservation measures are used in its natural patches, then required moisture will be available for its regeneration and optimum growth for fruiting and availability of seeds. Therefore, conservation measures like soil and moisture conservation suitable to the habitat are to be taken up on priority to reduce soil erosion, a main cause of habitat loss. Further, actual potential of this species as food cum medicinal plant have not yet been realized. But its young shoots and fruits have attained immense importance in the recent years. The gray areas of the species where research attention required are nutritive value of its tender fruits and its medicinal aspects.

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