

Grewia tenax (Frosk.) Fiori – popularization, conservation and utilization of lesser known multipurpose shrub

Grewia tenax, belonging to the family Tiliaceae is a tropical deciduous shrub that is widely distributed in arid and semi-arid regions of the world. It is a multipurpose underutilized species having potential to fulfil food, fodder, medicine, fibre, fuel wood and a wide range of traditional medicinal properties for human and animal ailments. It is locally called as ‘Gangerun and Gangan’ in India and ‘Guddaim’ in Sudan (Africa). The other common names include Phalsa Cherry, White Cross berry and Raisin Bush. *Grewia* is native to Africa, Asia and Australia and consists of 150 species of old-world climbers, shrubs or trees, out of which 40 species occur in India¹. It is distributed in Gujarat, Rajasthan, Andhra Pradesh, Bihar, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu, Jammu and Kashmir and more abundantly in North-west arid and semi-arid region².

Grewia tenax is a multi-stemmed sub-erect to erect shrub which grows up to 3 m height (Figure 1 a). Bark is ash grey in colour, creamy white flowers (Figure 1 b) and orangish yellow drupe (Figure 1 c). Flowering and fruiting mostly occur between August and November. The flower is hermaphrodite and pollination occurs particularly through honey bees. It is commonly found in wild patches in association with other underutilized arid shrubs, viz. pilu (*Salvedora oleoides*), guggal (*Commiphora wightii*), kair (*Capparis decidua*), khejri (*Prosopis cineraria*), kumat (*Acacia senegal*), neem (*Azadirachta indica*), *Acacia nilotica*, babul (*Prosopis juliflora*) and *Acacia tortolis*, *Ziziphus nummularia*, *Grewia villosa*, *Calligonum polygonoides*, *Euphorbia caducifolia*, etc. Mostly this shrub is found in eroded rocky, sandy, stony, gravelly and lateritic soils.

The fruits, bark, leaves, stem and roots of *Grewia tenax* have high economic value due to their nutritional, medicinal and ecological applications. *Grewia tenax* has potential to yield 4–5 kg fruits per year. The fruit pulp contains 40–50% of the whole fruit and is rich in calcium and iron. Edible fruits contain nutritionally balanced, fibre (8.5–22.50%), protein (6.3–8%), carbohydrates (51.7–85%), lipids (1.7%), 1.6% sucrose,

21.0% D-glucose and D-fructose^{3–7}. The drupe also possesses amino acids, pectins and minerals such as manganese (0.9 mg/100 g), potassium (800 mg/100 g), sodium (30 mg/100 g), copper (1 mg/100 g)⁸. The iron content of the fruit (7.25 mg/100 g in peel and pulp and 3.65 mg/100 g in seeds) is 20–30 times more than orange fruit, therefore, it is used as iron supplement for anemic women and children⁹. The harvested green fruits can be stored for long time as it contains less moisture (10–15%). In African countries like Sudan, Guddaim juice and Nesha porridge are recommended for lactating mothers to improve their health.

In Arid region, animal husbandry plays a key role in the livelihood of farmers and majority of the livestock in these regions are raised extensively on the open pasture/rangelands. This shrub has good fodder value and able to provide 4 t/ha dry matter forage and it increases gradually from June to January.

Under irrigated condition, cutting of *Grewia tenax* shrub at 30 cm above ground level proves its coppicing ability which helps to obtain optimum edible foliage. In arid western Rajasthan, *Grewia tenax* is browsed by small ruminants such as sheep and goat and is slightly palatable in dry season. The combination of livestock population per unit area and non-availability of fodder in arid region has laid the highest browsing pressure on this species which lead the overgrazing.

In the encyclopaedia of ayurvedic medicinal plants, *Grewia tenax* is listed in 250 most important medicinal plants. Leaves and twigs are an important component of folk medicine for the treatment of trachoma, tonsillitis and infections. Traditionally, in Thar desert of India, roots and leaves are used for treatment of fracture and stone problem/Urticaria. Root bark powder is boiled in water and taken orally thrice for dysentery. Similarly, green leaves are also boiled in water and decoction is given for cure of fever and hepatitis. In Kenya,

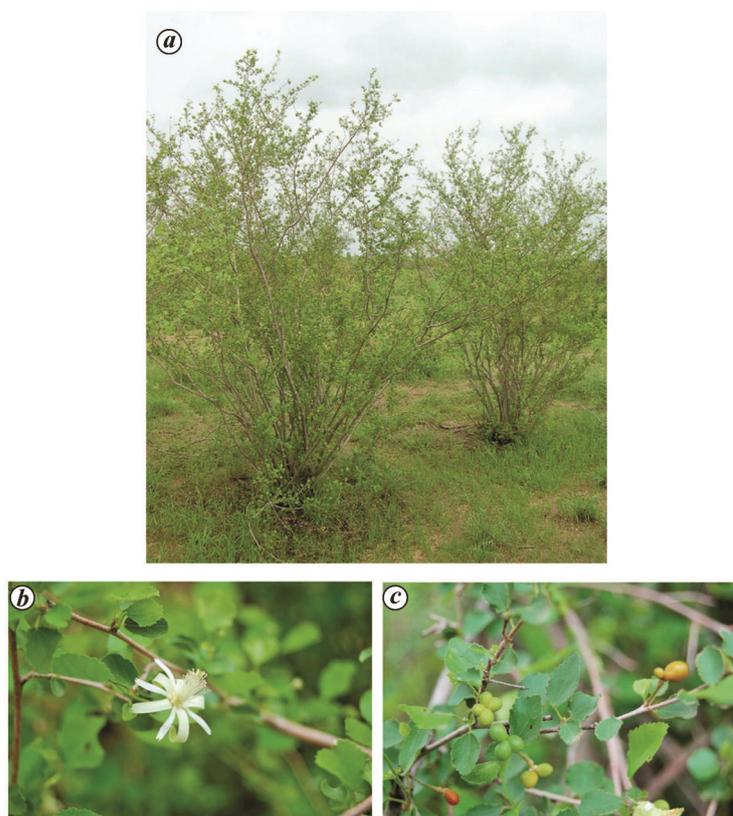


Figure 1. a, *Grewia tenax* (Frosk.) Fiori; b, Flower; c, Fruits.

parts of the plant are used as remedy for cold and chest complaints and also used as a chief constituent in typhoid remedy. Owing to its high medicinal values, *Grewia tenax* fetches high market price in local markets of Sudan.

Apart from this, *Grewia tenax* is also improving livelihood of rural populations in many parts of western Rajasthan. Bark has good tensile strength which is used to make ropes for binding purpose in house construction. Branches are used in charcoal making. Wood is also used in making weapons such as clubs, bows, arrows, baskets and for other general purposes. Moreover, ecologically, this shrub plays a vital role in rehabilitation of wastelands. It possesses deep root system and provides anchorage to the soil which ultimately stabilizes the sand dunes in arid regions. Leaf litter from the shrub improves soil physical and chemical properties.

As there is no organized cultivation and persistence of other problems like overgrazing, debarking by animals, encroachments, unsustainable utilization and other developmental activities, this multiutility shrub has been put under threatened medicinal plant species in Jharkhand and vulnerable status in Madhya Pradesh. Above all, according to IUCN Red List, this underutilized shrub falls under the Least Concern category. This wild fruit species is often referred to as neglected or underutilized but it is necessary to document genetic resources which contribute to the biodiversity of agroecosystem. Venkatesan *et al.*¹ in the wild populations of four district of Rajasthan (Barmer, Jaisalmer, Jodhpur and Pali) revealed the highest coefficient of variation in 100 seed weight (27.36) followed by seed length (8.06). There was also a difference in average height under protected (2.6–3.6 m) and unprotected area (0.95 m) which shows, the species is at higher risk due to browsing by livestock¹⁰. Despite their diverse use and potential wellspring of appealing qualities, this underutilized shrub has some limitations. Though the species has the ability to withstand harsh climatic and soil conditions, it registers poor germination which may be due to physiological dormancy and unfavourable climatic conditions. There is also an interesting

feature of seed germination, i.e. older seeds tend to germinate better. Four-year-old seeds have recorded germination percentage of 33–77 under different seed treatments¹¹. In Sudan, propagation through stem cuttings with 1500 ppm IBA treatment has resulted 51–67% rooting success. However, little information is available on early germination and seedling establishment under harsh climatic conditions. Fruits are confined to local use by women and children; there is no defined market for selling fruits. Wild populations are becoming sparse due to overgrazing. These drawbacks indicate that, multipurpose, underutilized and neglected medicinal plants need much more research attention and scientific efforts for conservation and popularization in the following aspects:

- The biology of seed, flower and fruit needs to be studied, to understand species behaviour in germination and other phenological aspects under harsh climatic conditions.
- Collection and characterization of *Grewia tenax* as underutilized shrub has been initiated at the Central Arid Zone Research Institute (CAZRI), Jodhpur and some variation in fruit colour (yellow and orange) were noticed.
- Extensive research is needed to identify elite type or superior genotype for fruit and fodder.
- Macro and micro propagation methods need to be standardized for faster multiplication which is essential for conservation of this species.
- *In-situ* conservation of this species is also a suitable method for conservation of different germplasm of *Grewia tenax*.
- Introducing the lesser known species in agroforestry system, viz. silvipasture, horti-pasture, hedge rows, agrisilvipasture and organized sole plantation will also serve the purpose of conservation and preservation.

Despite all, popularization of this species is the need of the hour to create awareness regarding cultivation and conservation, which is most essential for rural populations and also for ecosystem diversity. The current paper, aims to

open up research areas for exploring the variability in wild populations and also choose elite germplasm accessions for further improvement studies which will provide a base for conservation and sustainable utilization.

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