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An overview on wild plant *Grewia villosa* (Malvaceae)

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Abstract
Grewia villosa is a scrambling plant belonging to the family Malvaceae. *G. villosa* is harvested in the wild for local consumption as food, medicine, and building material. The tree is naturally distributed in Tropical Africa, Arabia, Pakistan, East Indies and India, mostly found on uplands, lower valley, along road side and field boundaries. Scientific investigation has been reported to exhibit biological activities like, antioxidant, anticancer, antibacterial, antimicrobial and cytotoxicity etc. Fatty acids and steroids are abundantly present in this plant. Uvaol and ursolic acid were isolated for the first time from Grewia. The current review provides a summary of the state of understanding of morphology, Traditional applications, their chemistry, claimed therapeutic characteristics, and pharmacological activities.

Keywords: *G. villosa*, traditional uses, phytochemistry, pharmacological activities

Introduction
It is generally known that populations experiencing acute food shortages during natural and man-made calamities may become very dependent on wild food plants for life [1]. While traditional agriculture is making every effort to increase food production, there is currently a great deal of interest in the potential for utilising the enormous quantities of less familiar plant materials that are present in the wild [2]. *G. villosa* is a wild scrambling plant, In honour of the English plant anatomist and physiologist Nehemiah Grew, Linneaus established the genus Grewia in 1737. Latin in origin, the particular name means "having long weak hairs [3]." It has about 280 species, most of which are found in warm parts of the Old World [4]. Of these, 31 species are found in India [5].
G. villosa is a scrambling shrub that rarely grows taller than 4 m. The leaves are large, serrated, and heart-shaped [6]. The tree is harvested in the wild for local use as a food, medicine, and material source. The main medicinal action is found in the leaves, stems, and roots, which have soothing and healing properties. The plant can be consumed as a simple infusion or decoction, applied topically as a poultice, or the mucilage extracted from the plant, if necessary, by maceration and then decoction [7].

Taxonomical classification

Kingdom	:	Plantae	 **Fig 1:** *Grewia villosa* plant
Subkingdom	:	Viridiplantae	
Superdivision	:	Embryophyta	
Division	:	Tracheophyta	
Class	:	Magnoliopsida	
Super order	:	Rosanae	 **Fig 2:** *G. Villosa* Fruits

Synonyms [8]

• *Balmeda corylifolia Nocca*	• *Grewia villosa var. glabrior K. Schum*
• *Grewia corvlifolia* A. Rich	• *Grewia echinulate Delile*
• *Grewia orbiculate* G. Don	• *Grewia chaunothamnus K. Schum*
• *Tridermia papillosa Ra* fin	

Vernacular names

➢ Telugu	:	Banta, Cemula, Chenula
➢ Hindi	:	Gangeti, Baliogangarin, Chatak chainari
➢ Tamil	:	Kullai
➢ Kannada	:	Jaane mara, Karakele, Murike
➢ Malayalam	:	Thottukalla
➢ Marathi	:	Kharmati
➢ English	:	Mallow raisin

Geographical distribution

The tree is naturally distributed in Tropical Africa, Arabia, Pakistan, East Indies and India (particularly Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Punjab, Maharashtra, Tamil Nadu, Rajasthan and Uttar Pradesh) where it is found mostly on uplands, lower valley, along road side and field boundaries [9].

Botanical Description of Plant [8]

It is a shrub and plant up to with 4 meters in height, having moderate growth and yellow flowers.

Branches: Older branches are smooth.

Stem: These are ash-grey bark, young twigs covered with dense fine stellate tomemtum.

Leaves: Leaves are about 8×9.5cm alternatively arranged, soft hairs on both sides. They are ovate-orbicular, serrulate or crenate at margins, transverse, nerve concentric, villosus, membranous, base cordate to subcordate, round to abruptly acuminate at apex, pubescent.

Flower: Flowers yellowish-red brown, in small clusters

Fruits*:* Fruit 1.5 cm across, light red, entire or somewhat 4-lobed, rind fibrous.

Cultivation

A plant found at altitudes of up to 1,200 metres in the drier tropical regions. It grows in Tanzania where the average annual rainfall ranges from 900 to 1,200mm [10]. The plant can withstand extremely high temperatures as well as a mean annual rainfall of 200 to 800 mm [11]. Thrives in sedimentary soils and black cotton soil, grows naturally on stony, rocky, ferrous soils [12] succeeds in areas that experience seasonal flooding a plant that grows very slowly.

Ethano-pharmacological uses

- Mucilage, which is present in the leaves, stems, and roots and has been proved to have calming and healing characteristics, appears to be the primary source of the plant's medicinal action.
- It is frequently taken internally to treat diarrhoea and dysentery, and it is applied topically to treat wounds, cuts, ulcers, irritations etc [13].
- The herb can be consumed as a straight forward decoction or infusion.
- The bark is used to cure wounds, syphilis, and smallpox. The juice of the fresh bark is used to treat urinary problems, bladder discomfort, and gonorrhea [14].
- In the Western Sudan, Grewia villosa's aqueous extract is combined with *Grewia tenax* and *Grewia flavescens* to cure cutaneous tuberculosis.

Other uses

- The inner bark can be used to produce fibre of high grade used to create ropes.
- Tobacco leaves are adhered using an extract from the bark.
- The tiny stems are employed in the construction of granaries, walking sticks, spearshafts, and bows [15].

Pharmacological activities

Antioxidant activity

Antioxidant activity of *G. villosa* plant (ethanolic extract) was examined. Using a common phytochemical screening approach, the phytoconstituents of ethanolic extracts were evaluated. DPPH radical scavenging and iron chelating tests were then used to quantify the antioxidant activity of the extracts. The typical drug used was doxorubicin. The study's findings for alkaloids, flavonoids, sterols, and carbohydrates were positive, With % RSA values of 61±0.04, *G. villosa* demonstrated the highest DPPH radical scavenging activity [16]. *G. villosa* root extracts in ethyl acetate and hydro-alcoholic form were tested for antioxidant activity against superoxide, hydroxyl and DPPH free radicles. The *G. villosa* extracts demonstrated the presence and absence of several phytochemical components as well as concentration-dependent percentage reductions on measured free radicles. The hydro-alcoholic extract was more active than the ethyl acetate extract, and it was more active against the DPPH free radical than it was against other free radicles. The current research supports *G.villosa* root extracts antioxidant activity, and more research is necessary to pinpoint the bioactive chemicals from these extracts that are responsible for the decrease of oxidative stress and other detrimental disorders [17].

Anticancer activity

In order to assess the antibreast cancer activity, MCF7 cell line was used. Using GRAPH PAD PRISM 5 SOFTWARE, the IC50 values of plant ethanolic extract at various doses (5, 12.5, 25, 50 g/ml) were calculated. With 21.5 µg/ml, the ethanolic extract of *G. villosa* significantly outperformed the reference control drug doxorubicin in terms of cytotoxicity against MCF7 cells [16].

Antibacterial activity

This study was aimed to evaluate the *in vitro* antibacterial activity of crude methanolic extracts of *G. villosa* plants using Agar well diffusion and broth dilution methods against four bacterial species including *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, and *Klebsiella pneumoniae*. *Results*, extracts of *G. villosa* did not show any inhibitory activity [18].

Antimicrobial activity

G. villosa seed oil was evaluated for antimicrobial activity using cup plate agar diffusion assay against *Klebsiella pneumoniae*, *Staphylococcus aureus*, *Pseudomonas aeroginosa Escherichia coli* and *Candida albicans*. The studied oil showed significant activity against *Klebsiella pneumoniae* [19].

Microdilution method was employed to evaluate antimicrobial activity of *G. villosa* plant extracts. The minimum inhibition concentration (MIC) was found to be 0.391-25 mg/mL, against *S. typhi* and *K. oxytoca* [20].

Cytotoxicity

Brine shrimp lethality test was used for cytotoxicity studies. where the *G. villosa* stem chloroform extract was the most cytotoxic with fifty percent lethal concentration (LC50) of 48.432 µg/mL [20].

Phytochemicals reported

The isolation and identification of different sugars present as polysaccharides and reducing sugars in the wild *G. villosa* seed has been reported. By use of paper chromatographic examination, their existence was verified. It was discovered that mannose made up the polysaccharide, while the carbohydrates included lactose, fructose, glucose, arabinose, and rhamnose [21].

Chromatographic and spectroscopic techniques performed for the methanol extract of *G. villosa* showed presenc of harman, harmine, harmol, harmalol, harmaline, galactose and glucose [22].

The *G. villosa* root's petroleum extract provided a variety of hydrocarbons (C14-C35), sterols and.alpha.-amyrin in both its free and esterified forms. Grewia was used to successfully isolate uvaol and ursolic acid for the first time [23].

From the roots of *G. villosa*, 19-hydroxyuvaol, quinovic acid, and.beta.-sitosterol-3-O-glucoside were extracted and recognized [24]. Oleic and Linoleic acid are also present in the plant.

The proximate composition table indicated that the proportion of dry matter, ash, nitrogen, crude protein, crude fat, crude fibre, carbohydrate, cellulose and gross energy (kcal) in *G. villosa* was 94.50%, 12.67%, 2.10%, 13.15%, 3.12%, 34.44%, 31.10%, 29.20% and 204 (kcal) respectively [25].

Fruits of *G. villosa* were examined for their nutritional content. It was determined the approximate composition as well as the amount of amino acids, minerals (K, Ca, Mn, Fe, Cu, and Zn), tannin, and pectic materials. According to the findings, which were expressed as percentages of dry weight, *G. villosa* included 14% moisture, 25.5% crude fibre, 4.0% ash, and 84% carbohydrates. The protein and lipid content of *G. villosa* was low, ranging from 6.7% to 6.8%. There are also trace levels of amino acids. In the *G. villosa* species, potassium, with a range of 966 mg/100 g, was the most abundant mineral. The Grewia species had an astonishingly high iron content of 29.6 mg/100 g. Low and variable tannin content was 2.46%. Content of pectic compounds was 11.72%. The findings of this study show that certain regional traditional fruits may have a significant impact on both rural and urban populations' nutritional status [26].

G. villosa oil was evaluated by GC-MS in this study. The analysis showed 21 components. Major constituents are: i) 9, 12- octadecadienoic acid (Z, Z)-, methyl ester (48.65%) ii)-hexadecanoic acid, methyl ester (18.33%). iii)9- octadecenoic acid (Z)-, methyl ester (16.15%). iv)- methyl stearate (9.45%) [19].

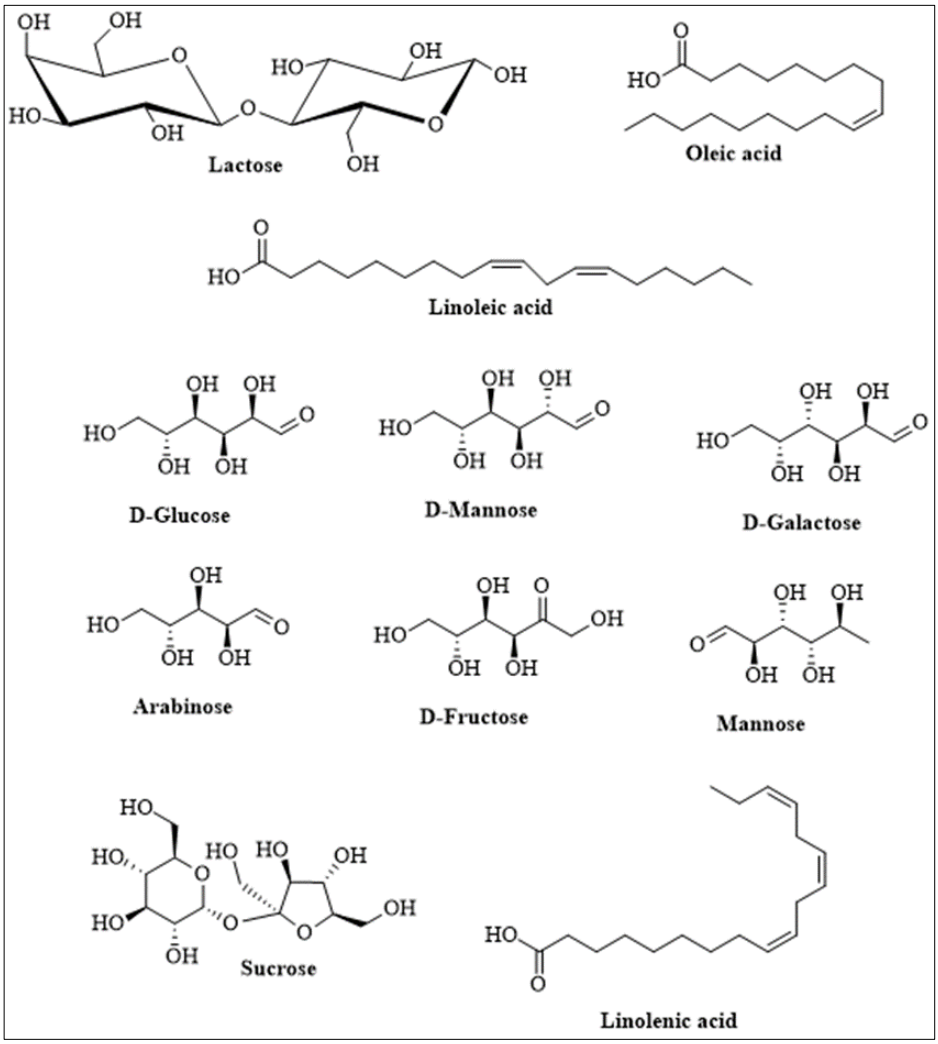

Fig 1: Structures of some fatty acids and sugars from *G. villosa*

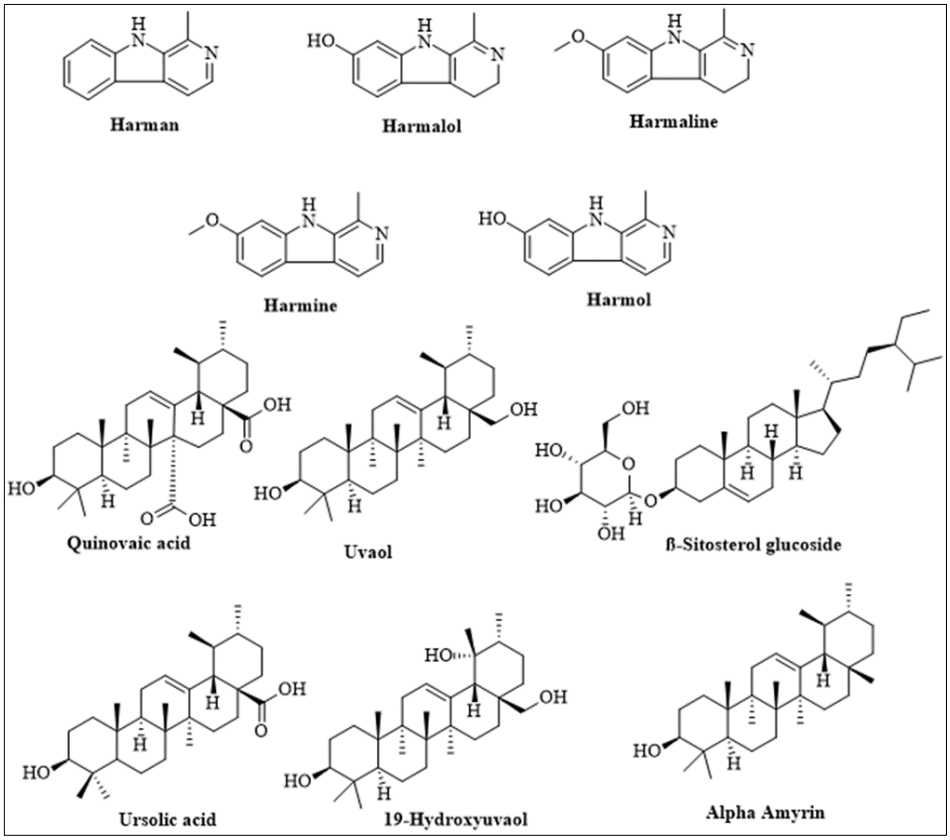

Fig 2: Structures of some steroids and alkaloids from *G. villosa*

Conclusion

Wild plants such as *G. villosa* are rich in biological activities like antioxidant, anticancer, antibacterial, and antimicrobial and cytotoxicity. It also has a good amount of nutrients in it especially potassium and iron. As it is rich in source of iron it can be used as supplements. Wild species have an appreciable role in supplementary food provision, income generation and diversification, nutritional security. Moreover, the species *G. villosa* is multi purposed can be used to produce fibre, used in the treatment of diarrhoea, dysentery, wounds etc. However, the species are underutilized and threatened by growing harvesting pressures in natural ecosystems. Farmers are in the early stages of domesticating numerous edible fruit-bearing wild species with modest yields. Further investigation on these plants to evaluate possible toxic and antinutrient factors, digestibility, *in vivo* and clinical study are still required before recommendations are made.

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