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# A REVIEW ON GENUS ZIZIPHUS

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## ABSTRACT

This review explores the significance of Ziziphus varieties and hybrids focusing on their botanical diversity. It discusses the Ziziphus cultivation and medicinal properties. Also it delves into the diverse phytochemicals found in Genus Ziziphus of Rhamnaceae family, highlighting their potential therapeutic benefits. Additionally it discusses traditional uses across cultures and importance of Ziziphus in rituals and cuisines. Overall many species of this Genus is potential source of natural bioactive compounds with therapeutic applications.

**Keywords**: Ziziphus, Variety, Phytochemicals, Bioactive compounds

## I. INTRODUCTION

Ziziphus species which are members of the Rhamnaceae family are very valuable not just for their food value but also for their numerous uses in dry zone agroforestry systems. These uses include soil cover, wind protection, fuel wood, fodder and medicinal value. (Chandra et al., 1994). Plant varieties distinct from species, plays pivotal role in the Botanical landscape. They represent natural populations exhibiting variations from the typical morphology, often adapted to specific geographic regions. Varieties are essential in horticulture and agriculture. The significance of plant varieties is underscored by International convections like International Union for the Protection of New Varieties of Plants (UPOV), which grants legal protection to breeders and growers.

In the context of Ziziphus, hybrids offer unique combination of characteristic, aiming to improve fruit yield and resistance to biotic and abiotic stresses. The emergence of novel hybrid varieties such as Thai apple ber, exemplifies the intersection of traditional breeding methods and modern agriculture practices. This review also explores specific Ziziphus species and hybrids such as Ziziphus rugosa, Ziziphus oenoplia, Ziziphus spina- christi and Thai Apple ber elucidating their phytochemical profiles, medicinal properties and traditional uses across diverse cultures.

## II. VARIETIES

Plant variety is natural occurring population of plants in given geographic area that frequently deviates from the species usual shape. Variety is classified as taxon rank lower than species in botanical classification. The variety receives a ternary name, denoting a name with three components this phrase is misused to refer to the shapes that are created during cultivation, which are essentially referred to as cultivars. A third Latin term which is occasionally followed by the Roman abbreviation "Var" designated as a variety.

According to UPOV. (International Union for the protection of new varieties of Plants)

A legal word that comes from the UPOV convention is plant variety. When a grown plant is recognized as a variety, the grower or breeder of that plant is granted some legal protection. It is known as Plant breeder's rights, and it is partially governed by the internal laws of the signatory nation.

**A Novel variety possesses the qualities listed below**

1. The plant belongs to the lowest taxon in the group.
2. It is determined by how traits arising from a particular gene or genotype combination express themselves.
3. At least one of the mentioned characteristics set it apart from others.
4. It is regarded as a unit in terms of its appropriateness for unaltered propagation.

A natural or legal person, a scientist, a farmer, a plant man or an organization could be the breeder. Plant breeding methods can vary from traditional methods like " crossing and selection" to more contemporary approaches like genetic engineering.

**Standards for a Plant classified as a novel variety**

The following conditions must be met for variety to be protected or granted copyright

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a) Novelty: The variety cannot have been sold or otherwise disposed of in the area of the member of the union in question for more than a year before the application for a breeder's right was made. Its known as novelty period.
b) Stability: After repeated propagation, a variety should be considered stable if its pertinent properties do not change.
c) Distinctness: It needs to be well defined. It should also be easily distinguished from any other variant whose existence is currently unknown.
d) Uniformity: If a variation is experienced that might be anticipated based on specific characteristic of its transmission, the variety should be uniform. Its pertinent properties must to be sufficiently uniform.

**About Hybrids**

Conventional methods of introduction, selection or hybridization using cultivated genotypes of a species are mostly responsible for the improvement of perennial fruit crops. But most cultivars in most crops are generated with comparatively limited genetic variation. According to scientist, there has been 75% decrease in agriculture genetic diversity during the 20th century. (Singh, 2017)

Breeders have turned to techniques like mutation, Polyploidization and recombinant DNA technologies when the desired qualities are absent from the produced species. Extensive hybridization- The idea long-distance hybridization also referred to as wide or distant crosses, occurs when individuals from different species within the same genus (interspecific hybridization) or two separate genera within the same family (intergeneric hybridization) mate. It is possible to transmit the genome of one species to another by wide hybridization which alters the progenies genotypes and phenotypes. Wide hybridization also breaks down the species barrier to gene transfer. ( Anushma et al., 2021)

India has a great Genetic variety of Ziziphus with roughly 20 species occurring between 8.5-32.5º N and 69- 84º E. The ability of Ziziphus species and various / types within Mauritius to freely cross- pollinate has resulted in development of rich gene pool that illustrates heterozygosity in attributes such as morphological, physiological and phonological traits; chromosome number; resistance or tolerance to biotic and abiotic stresses and genomic DNA.

**Taxonomical Classification of Ziziphus**

Kingdom : Plantae
Division : Tracheophytes
Subdivision : Angiosperms
Order : Rosales
Family : Rhamnaceae
Genus : Ziziphus

**Ziziphus rugosa Lam**

This huge family of flowering plants belonging to the Rosales order is made up primarily of trees, shrubs and some vines. It is knowns as the buckthorn family. The primary habitat of Ziziphus rugosa Lam is dry deciduous woodlands. Stretching up to three meters in height, it is huge, straggling, thorny, evergreen shrub or small tree with rounded leaves at the base. The leaves are alternating, dark-green, broadly elliptic, serrated, oblique or subcordate. The tree has reddish-brown, fairly hard wood and fruits that range in color from orange to black. The oblong- globose or subglobose fruits are 9-12 mm in length and 8-10mm in width 6-7. (Gamble J, 2014)

This herb was used to cure menorrhea, diarrhea, ulcers, skin condition, coughing and hypertension. Locals even sell the fruit of Z. rugosa which is widely reffered to as famine edible. To make dosa the natives ground the ripe fruit. The fruit is said to be demulcent or treating Broncho pulmonary irritation and throat discomfort and dried fruit and leaf powder is applied topically to treat boils. The upper Ghat villages of Salkani and Killara, as well as two coastal villages Murur and Kallabbe in the Central Western Ghats of Karnataka, India used the fruit as cooler and to stay hydrated. The Kodava population in the Kodagu region of the Western Ghats consumes raw and matured fruit as a source of sustenance. This plant serves as both a food source for Deer and Elephant as well as a host to the parasitic scale bug Laccifer lacca.

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The presence of tannins, Quinines, phenols, flavonoids, Alkaloids, terpenoids, saponins, glycosides, protein, fiber and carbs was revealed by phytochemical and pharmacological study. A few potent chemical components were identified and assessed for potential therapeutic use. Ziziphus rugosa was found to have numerous benefits, including those related to Diabetes, antioxidants, anti-inflammatory, analgesics, anti-cancer, Central nervous system(CNS) depressants, and antimicrobials, antiparasitic, dermatological and many more.

Ziziphus rugosa Lam- bark contains variety of flavonoids, including luteolin-7-O-glucoside, kaempferol-4-methylether and luteolin ( Singh et al., 2009)

This species is used to treat diarrhea, menorrhea, bleeding, and rheumatism and wound healing. Salmonella typhi, streptococcus pyrogens and very few other bacteria are all significantly inhibited by Z.rugosa bark exhibits good medicinal properties and good activity in scavenging free radicals. Pericarp's methanol extract has recently been discovered to have antibacterial and insecticidal properties. The nutritional makeup of Z.rugosa Lam is the subject of the current investigation ( Huang CW et al., 2002)

**Ziziphus oenoplia (L.) Mill.**

The green blooms of Z. oenoplia's straggling shrub are borne in sub sessile axillary cymes. One globose, shinning, black seed with drupe form is present in each fruit when it is ripe. ( Mourya P et al., 2016)

Found throughout the hotter regions of Srilanka , Pakistan, India , Malaysia and tropical Asia. It is well-known as Makai in Hindi and Jackal Jujube in English (pullaiah et al., 2002)

The Z.oenoplia plant is commonly used in Ayurveda to cure a variety of ailments, including ulcers, stomachaches, obesity and asthma. ( Suryakant et al., 2011)

It also possesses astringent, digestive, antibacterial, hepatoprotective, wound- healing and diuretic properties. Ziziphus plants are used astringent, bitter tonic , anthelmintic, digestive and antiseptic used in hyperacidity and wound healing.

They are also traditionally used as medicine for treating a variety of diseases, including digestive disorders, urinary troubles, diabetes, skin infections, diarrhea, fever, bronchitis, liver complaints, anemia ( Mishra et al., 2014)

This plant possess some pharmacological properties like- Methicillin- resistant staphylococcus epidermidis , multidrug-resistant staphylococcus aureus, Escherichia coli, streptococcus pyogenes, Pseudomonas aeruginosa and MDR Acinetobacter baumannii were among the Z. oenoplia wound pathogens against which the antibacterial activites of the component materials were tested. Because of its antimicrobial qualities , conventional medicine is supported in treating bacterial skin infections ( David , 2010)

Hepatoprotective efficacy of Z. oenoplia roots ethyl acetate fraction against paracetamol- induced liver damage in albino rats. The discovered that ethyl acetate fraction had an excellent hepatoprotective impact against paracetamol-induced hepatic injury in rats.( Rao et al ., 2015)

**Ziziphus spina – christi (L.) wild**

The plant has pubescent on young branches, with one straight and one curved thorn, evergreen tree or shrub growing to height of 3 to 8 meters. The leaves are glabrous or pubescent on the lower surfaces and they are ovate-spheric or elliptic, measuring up to 3.5cm in length and width. Inflorescence pubescent cyme , drupe round , green or yellow , red or dark brown.

Saponin , glycosides were detected in the butanol extract from Z.spina – christi leaves ( Mahran GH et al.,1996)

The Ethanolic and Ethyl acetate extracts contained significant groups of secondary metabolites , including flavonoids, tannins, alkaloids and cardiac glycosides , according to preliminary phytochemical investigation. Both extracts lacked saponins , protein and aminoacids . whereas terpenoids and steroids were present in fruit extract , they were absent in seed extract. Phytochemical analysis was done on the ethanolic extract, ethyl acetate extract and alkaline ethyl acetate extract in our investigation. Alkaloids, Flavonoids, terpenoids, carbohydrates, saponin glycosides and tannins were found in abundant amounts in the ethanolic extract. However there were no mixed or free anthraquinones. The diethyl ether extract lacked carbohydrates as well.

Pharmacologically, none of the fruit extracts tested showed any efficacy against any of the tested organisms in petroleum ether, chloroform, or aqueous form. The methanol extract of the substance shown significant activity

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(20mm) refers as zone of inhibition, against Proteus vulgaris , S.aureus (18mm), and Bacillus subtilis (17mm). Meanwhile the petroleum ether extract of the leaves demonstrated high activity (19mm) against B.subtilis. Proteus vulgaris, E-coli and B.subtilis were all susceptible to the high activity ( 16mm) of its chloroform extract. These bacterial organisms were not susceptible to aqueous extract.

Ziziphus spina-christi's leaves had the highest level of activity in its methanol extract, followed by the fruits, stem and seeds which had the lowest levels of activity. Secondary metabolites may be the cause of the elevated activity of the methanol extracts from all of the components.

**Thai Apple Ber**

The Assamese region produces low-quality ber fruit with inconsistent yields, primarily because of poor germplasm quality, poor variety selection, and poor orchard management practices by farmers. However the introduction of hybrid ber fruit known as " Thai Apple Ber" which was developed in Thailand, has significantly improved farmers lives because of its prolific yield, high yield, fruit color, quick return and fruit size. This Thailand ber hybrid is result of jujube and green apple crossbreeding. The term " Green apple" or " Thai Apple ber" refers to the fruit's size and look, which is why it bears the nickname. With a higher economic return and longer shelf life than traditional ber farming is currently very popular. This apple ber fruits resemble apples in that they are juicy, crunchy, sweet and tasty. Therefore the goal of the current studies was to provide fundamental knowledge about the physio-chemical properties and phonological traits of Thai Apple Ber that is grown in various conditions throughout Assam.

It was discovered that Thai Apple Ber fruit is ovate and oblong in shape. Nonetheless the color of the pulp and mature fruit was the same. Mature fruit and pulp were found to be light green and creamy white in all of the ber collections. Likewise no differences were seen in the fruit's apex and base, which were discovered to be round with a little dip and depressed, gently ridged surface. ( Li et al., 2016)

Plant breeders purposefully cross-pollinate two distinct plant species in order to develop a hybrid that combines the best characteristic of both parents. This process is known as pollination. These are genuine unusual varietals with tasty flavor and nutritious benefits for the diet. The goal of the hybrid Ziziphus mauritiana fruit, Apple ber was to increase the fruits flavor and prolong its shelf life. Therefore there is lack of information regarding the phytochemical characteristics of these fruits and consequently their potential medical applications. Fruit consumption is known to give wide range of flavonoids , which reduce the risk of cardiovascular disease and cancer , hence have a preventive function ( Hollman et al .,1996)

The hybrid Ziziphus mauritiana extracts in both methanolic and aqueous form were found to contain flavonoids in this investigation. It is commonly recognized that Ziziphus mauritiana wild type has antioxidant qualities ( Lamien- Meda et al ., 2008)

According to the current study, these hybrid fruits are sufficiently rich in antioxidants to combat a wide range of disorders caused by reactive oxygen species.

## III. CONCLUSION

The discussion on plant varieties and hybrids of Ziziphus underscores their importance in horticulture and agriculture, emphasizing the need for legal protection and breeding advancements. With continued research, Ziziphus stands poised to contribute significantly to the development of novel therapeutic agents and agricultural practices, benefiting both human health and food security.

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