



A review on the potential wild edible plants with antioxidant and antidiabetic properties used in Type II Diabetes management

Shubham A Rathod^{1*}, Manjusha R Wath²

¹ Department of Botany, Shri Shivaji College of Arts, Commerce and Science, Government Vidarbha Institute of Science and Humanities, Akola, Maharashtra, India

² Department of Botany, Government Vidarbha Institute of Science and Humanities (Autonomous), Amravati, Maharashtra, India

Corresponding Author: Shubham A. Rathod

Abstract

Diabetes mellitus is one of the most common chronic metabolic disorders affecting millions of people worldwide. It is characterized by prolonged high blood glucose levels caused by inadequate insulin production, impaired insulin action, or both. Although several synthetic drugs are available for the treatment of diabetes, their prolonged use may lead to undesirable side effects and increased economic burden. As a result, there is growing interest in traditional and ethnobotanical approaches that offer safer, affordable, and naturally derived therapeutic options.

Wild edible plants (WEPs) have long been used by local communities as both food and medicine and are now gaining scientific attention for their potential role in the management of Type II diabetes mellitus. These plants are rich sources of bioactive phytochemicals such as flavonoids, alkaloids, saponins, phenolics, and tannins, which are known to possess significant antidiabetic and antioxidant properties. The hypoglycemic effects of these plants are mainly associated with mechanisms such as inhibition of α -amylase and α -glucosidase enzymes, improvement of insulin sensitivity, and reduction of oxidative stress.

The present review focuses on the documentation and therapeutic significance of wild edible plants found in the Western Vidarbha region. Special emphasis has been given to plants exhibiting antioxidant and antidiabetic activities, highlighting their ethnomedicinal value and their potential for future pharmacological and nutraceutical applications.

Keywords: Wild edible plants, Type II Diabetes, α amylase, α - glucosidase, Western Vidarbha, ethnobotany

Introduction

Type II Diabetes Mellitus (T2DM) accounts for more than 90% of diabetes cases worldwide and has emerged as a major public health challenge. India, often referred to as the "Diabetes Capital of the World," possesses a rich heritage of traditional medicinal knowledge that has long been utilized for the management of metabolic disorders. Among these traditional resources, Wild Edible Plants (WEPs) hold significant importance. These plants grow naturally in self-sustaining populations without deliberate human cultivation and are consumed as food by local communities. Owing to their dual role in nutrition and therapy, WEPs are increasingly recognized as valuable nutraceutical resources (Prabha, *et al.*, 2010 and Shirsat *et al.*, 2023) [45, 72].

The present study reviews approximately 38 wild edible plant species for their potential antidiabetic properties, particularly their ability to inhibit α -amylase and α -glucosidase enzymes, enhance insulin sensitivity, and exhibit antioxidant activity. The reviewed plants were found to be rich in diverse bioactive phytoconstituents, predominantly flavonoids and phenolic compounds, along with alkaloids, tannins, saponins, glycosides, and terpenoids. In addition, several important compounds such as triterpenoids, steroids, anthraquinones, coumarins, quercetin, gallic acid, and β -sitosterol were reported in these

plants. Nutritional constituents including proteins, amino acids, vitamins, and lipids also contribute significantly to their therapeutic potential.

Collectively, these phytochemicals and nutrients play an important role in reducing oxidative stress, improving glucose and lipid metabolism, enhancing insulin function, and minimizing diabetes-associated complications. Therefore, wild edible plants represent promising natural alternatives for the prevention and management of Type II diabetes mellitus and may serve as potential sources for future antidiabetic drug development.

Materials and Methods

This review was conducted through an extensive survey of published scientific literature, including research articles, review papers, and ethnobotanical reports retrieved from electronic databases such as Google Scholar, PubMed and ScienceDirect. Relevant information regarding wild edible plants, their traditional uses, phytochemical composition, and reported biological activities was carefully collected, critically analyzed, and systematically compiled. Particular emphasis was placed on studies describing antidiabetic and antioxidant properties, as well as the presence of bioactive phytoconstituents responsible for their therapeutic potential.

Table 1: Wild Edible Plants of Western Vidarbha with Antidiabetic Potential

Sr. No.	Botanical Name	Local / Marathi Name	Edible Plant Parts Used	Active Compounds	Reference
1.	<i>Abrus precatorius</i>	Gunja (Marathi), Ratti (Hindi), Gurivinda (Telugu),	Leaves	Flavonoids: Quercetin, Kaempferol, Vitexin, Taxifolin-3-glucoside.	(Karthikeyan <i>et al.</i> , 2018;

		Kunni (Tamil), Gulaganji (Kannada)		Alkaloids: Trigonelline. Phenolic compounds: Thymol, Carvacrol, Cinnamaldehyde. Triterpenoids and saponins: Glycyrrhizic acid, Sophoradiol. Polyols: D-Pinitol.	Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
2.	<i>Acacia nilotica (L.) Willd. ex Delile</i>	Babhul (Marathi), Babul (Hindi), Karuvelam (Tamil), Nallatamma (Telugu), Jali (Kannada)	Leaves, Bark, Gum	Flavonoids: Quercetin, Isoquercitrin, Astragaline, Leucocianidol. Phenolic compounds and tannins: Gallic acid, Methyl gallate, Tannic acid, 3,4-Dihydroxybenzoic acid. Triterpenoids and phytosterols: Lupeol, alpha-Amyrin, beta-Amyrin, Betulin, beta-Sitosterol, alpha1-Sitosterol.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
3.	<i>Achyranthes aspera L.</i>	Aghada (Marathi), Apamarga (Hindi/Sanskrit), Nayurivi (Tamil), Uttareni (Telugu), Uttarani (Kannada)	Seeds/Leaves	Alkaloids and amino acid derivatives: Betaine, 1-Methylpyrrolidine-3-carboxylic acid. Phytoecdysteroids: Ecdysone, 20-Hydroxyecdysone. Triterpenoids and saponins: Oleanolic acid, Saponin A, Saponin B. Phytosterols: beta-Sitosterol..	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
4.	<i>Amaranthus spinosus L.</i>	Kate math (Marathi), Kantanatiya (Hindi), Mullukeerai (Tamil), Mullutotakura (Telugu), Mulludantu (Kannada)	Leaves	Flavonoids: Quercetin, Kaempferol, Rutin. Alkaloids and amino acid derivatives: Betaine, Trigonelline, Nicotinic acid. Carotenoids and pigments: beta-Carotene, 1'-OH-gamma-carotene glucoside, Betalains. Phytosterols and sterols: alpha-Spinasterol, beta-Sitosterol, Campesterol, Stigmasterol, Cholesterol.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
5.	<i>Amaranthus viridis L.</i>	Tandulja (Marathi), Chaulai (Hindi), Araikeerai (Tamil), Totakura (Telugu), Harive soppu (Kannada)	Leaves, Stem	Flavonoids, Alkaloids, Quinones, Tannins, Terpenes, Coumarins, Phenols	Chauhan <i>et al.</i> , (2022) ^[14]
6.	<i>Bauhinia purpurea L.</i>	Kanchan (Marathi), Kachnar (Hindi), Mandarai (Tamil), Devakanchanam (Telugu), Basavana paada (Kannada)	Flower buds	Flavonoids and flavonoid glycosides: Quercetin, Isoquercitrin, Astragaline, Apigenin, Cosmoisin, Rutin, Quercitrin, 5,6-Dihydroxy-7-methoxyflavone 6-O-beta-D-xylopyranoside. Anthocyanins and pigments: Pelargonidin 3-glucoside, Flavylum. Phenolic compounds and tannins: Tannic acid.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
7.	<i>Bauhinia racemosa Lam.</i>	Apta (Marathi), Aapta (Hindi), Aathi (Tamil), Arechetti (Telugu), Arasinamara (Kannada)	Leaves	Flavonoids and flavonoid glycosides: Quercetin, Isoquercitrin. Triterpenoids and phytosterols: beta-Amyrin, beta-Sitosterol. Phenolic compounds and chromans: Racemosol, 2,2-Dimethylchroman, Pacharin.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
8.	<i>Bauhinia vahlii Wight & Arn.</i>	Mahul (Marathi), Mahul bel (Hindi), Siali (Odia), Addaku (Telugu), Mahuli creeper (Kannada)	Leaves, Seeds, Pods	Flavonoids and flavonoid glycosides: Quercetin, Kaempferol, Agathisflavone, Quercetin-3-glucoside, Rutin, Quercitrin, 3,3',4',5,7-Pentahydroxyflavone 3-beta-D-glucofuranoside. Phenolic compounds and tannins: Tannic acid. Triterpenoids: Betulinic acid. Phytosterols: Campesterol, beta-Sitosterol, Stigmasterol.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
9.	<i>Bauhinia variegata L.</i>	Kanchan (Marathi), Kachnar (Hindi), Mandarai (Tamil), Erradevakanchanam (Telugu), Kempu mandara (Kannada)	Flowers, Shoots	Flavonoids and flavonoid glycosides: Quercetin, Kaempferol, Apigenin, Taxifolin, Astragaline, Cosmoisin, Rutin, Quercitrin, Hesperidin, Myricetin, Isorhamnetin. Anthocyanins and pigments: Peonidin-3-glucoside, Malvidin, Cyanidin. Phenolic compounds: cis-Caffeic acid. Triterpenoids and phytosterols: Lupeol, beta-Sitosterol, Stigmasterol.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
10.	<i>Boerhavia repens L.</i>	Punarnava (Marathi/Hindi), Mukkarattai (Tamil), Atikamamidi (Telugu), Kommeberu (Kannada)	Whole plant	Flavonoids and flavones: Eupalitin, 3,3',5-Trihydroxy-7-methoxyflavone, 4',7-Dihydroxy-3'-methylflavone. Rotenoids and phenolic compounds: Boeravinone A, Boeravinone B, Boeravinone C, Boeravinone D, Boeravinone E, Boeravinone F, Punarnavoside. Alkaloids: Liriodenine, Lunamarine. Triterpenoids and sterols: Ursolic acid, beta-Sitosterol, Stigmasterol, Boerhavisterol. Ecdysteroids: 20-Hydroxyecdysone. Phenolic and antioxidant compounds: Xanthone, Ascorbic acid, beta-Carotene.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
11.	<i>Bombax ceiba L.</i>	Katesawar (Marathi), Semal (Hindi), Ilavam (Tamil),	Leaves, Flowers, Buds,	Flavonoids and flavonols: Quercetin, Kaempferol, beta-Glucogallin, 3,5,7-trihydroxy-6-	(Karthikeyan <i>et al.</i> , 2018;

		Buruga (Telugu), Boorugamara (Kannada)	Calyx, Bark, Gum	[(2S,3R,4R,5S,6R)-3,4,5-trihydroxy-6-(hydroxymethyl)oxan-2-yl]-2-(2,4,5-trihydroxyphenyl)chromen-4-one. Phenolic compounds and tannins: Gallic acid, Tannic acid, Ethyl gallate, 1,4-Naphthoquinone, 7-Hydroxycadalene. Triterpenoids and phytosterols: Lupeol, beta-Sitosterol, beta-Sitosterol-beta-D-glucoside.	Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
12.	<i>Butea monosperma</i> (Lam.)	Palas (Marathi), Palash (Hindi), Parasa (Telugu), Muttuga (Kannada), Porasu (Tamil)	Leaves, Flowers	Flavonoids, chalcones and flavanones: Butein, Butin, Butrin, Isobutrin, Coreopsin, Isocoreopsin, Monospermoside, Isomonospermoside, Palasitrin, Prunetin, Medicarpin, (+)-Leucocyanidin, Leucocianidol. Phenolic compounds and coumarins: Gallic acid, Coumarin. Triterpenoids and phytosterols: Lupeol, Lupenone, alpha-Amyrin, beta-Sitosterol, beta-Sitosterol-beta-D-glucoside, Daucosterol, Stigmasterol.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
13.	<i>Casearia tomentosa</i> Roxb.	Kali karai/Kesa (Marathi), Chilla (Hindi), Konda manga (Telugu), Kaattu manga (Tamil), Kaadu manga (Kannada)	Root bark, Cotyledons, Fruits	Alkaloids: Alkaloids Flavonoids: Flavonoids Carbohydrates and glycosides: Carbohydrates, Glycosides, Cardiac glycosides Steroids and phytosterols: Steroids, Phytosterols Terpenoids and related compounds: Terpenoids, Diterpenoids, Sesquiterpenoids, Phytol, Di-epi-alpha-cedrene, Beta-bisabolene, β -Caryophyllene	Talukdar <i>et al.</i> , 2021 ^[57]
14.	<i>Cassia fistula</i> L.	Bahava (Marathi), Amaltas (Hindi), Konnai (Tamil), Rela (Telugu), Kakke mara (Kannada)	Flowers, Pods	Anthraquinones and related compounds: Rhein, Anthraquinone, Chrysophanol, Aloe emodin, Emodin, Physcion, Barbaloin, Sennoside A, Sennoside B. Flavonoids, flavanols and proanthocyanidins: Kaempferol, Quercetin, Aromadendrin, Clitorin, Procyanidin B2, Cianidanol, (-)-Epicatechin, (-)-Epiaphzelechin, Leucopelargonidin, Leucopelargonidin tetramer, Leucodelphidin, Kaempferol-3-O-glucorhamnoside. Phenolic acids and tannins: Gallic acid, Ellagic acid, Tannic acid, 3,4-Dihydroxybenzoic acid. Triterpenoids and phytosterols: Lupeol, Betulinic acid, beta-Sitosterol, beta-Sitosterol-beta-D-glucoside, Fucosterol, Stigmasterol.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
15.	<i>Cassia tora</i> L.	Tarota (Marathi), Chakunda (Hindi), Tagarai (Tamil), Tagedu (Telugu), Tagache (Kannada)	Seeds, Leaves	Anthraquinones and related compounds: Chrysophanol, Aloe emodin, Rhein, Emodin. Flavonoids and phenolic compounds: Quercetin. Triterpenoids and phytosterols: beta-Sitosterol.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
16.	<i>Celosia argentea</i> L.	Kurdu (Marathi), Safed murga (Hindi), Kozhi keerai (Tamil), Gunugu kura (Telugu), Anne soppu (Kannada)	Leaves, Seeds	Betalains, flavonoid pigments and anthocyanidin-related compounds: Isoamaranthin, Isocelosianin II, Celosianin II, Amarantin, Betanidin, Betanine, Flavylum. Phenolic acids and antioxidant compounds: Ferulic acid, 4-Hydroxybenzoic acid, 3,4-Dihydroxybenzoic acid. Triterpenoids and phytosterols: Triterpenoid, beta-Sitosterol, delta7-Avenasterol, 24-Ethyllathosterol. Alkaloids and amino acid derivatives: Hordenine, Ancistrocladine, 2-Aminobutyric acid.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
17.	<i>Coccinia grandis</i> (L.) Voigt	Tondali (Marathi), Kundru (Hindi), Kovakkai (Tamil), Dondakaya (Telugu), Tondekayi (Kannada)	Fruit/Leaves	Flavonoids and phenolic compounds: Kaempferol, Quercetin, Caffeic acid. Triterpenoids and phytosterols: Lupeol, beta-Amyrin, alpha-Amyrin, beta-Amyrin acetate, Taraxerol, Taraxerone, Cycloartanol, 24-Methylenecycloartanol, Cycloartenol, Euphol, Betulin, beta-Sitosterol, Fucosterol, Schottenol, Desmosterol.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
18.	<i>Cocculus hirsutus</i> (L.) W. Theob.	Vasan vel (Marathi), Jaljamni (Hindi), Kattukkodi (Tamil), Dusari teega (Telugu), Dagadi balli (Kannada)	Whole plant	Alkaloids and isoquinoline derivatives: Coclaurine, Trilobine, Isotrilobine, Magnoflorine, Hirsutine, Pendulin, 1,3-Dibenzylisoquinoline, Oxyacanthan-12'-ol derivative, Jamtine-N-oxide. Lignans and phenolic compounds: (+)-Syringaresinol. Phytosterols and lipid-related compounds: beta-Sitosterol, Hirsudiol, (S)-nonacosan-10-ol.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
19.	<i>Colocasia esculenta</i> (L.)	Chamkura (Marathi), Arbi (Hindi), Seppankizhangu	Rhizome, Corm, Young	Flavonoids and anthocyanidin-related compounds: Luteolin, Apigenin, Flavylum, Cyanidin 3-glucoside.	(Karthikeyan <i>et al.</i> , 2018;

	<i>Schott</i>	(Tamil), Chamadumpa (Telugu), Kesavina gedde (Kannada)	leaves, Petiole	Phytosterols and triterpenoid compounds: beta-Sitosterol, Stigmasterol. Terpenoids and volatile antioxidant compounds: Linalool, alpha-Terpineol, Geraniol, Nerol, Nerolidol, Limonene, Geranylacetone, Damascenone. Phenolic and aromatic compounds: Methyl salicylate, Guaiacol, 2-Methoxy-4-vinylphenol, Benzyl alcohol, Benzophenone.	Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
20.	<i>Ficus racemosa L.</i>	Umbar (Marathi), Gular (Hindi), Aththi (Tamil), Medichettu (Telugu), Atti mara (Kannada)	Fruit and receptacle	Flavonoids, phenolic compounds and coumarins: Kaempferol, Coumarin, Bergenin, Ferulic acid, Caffeic acid, Bergaptol, Bergapten. Triterpenoids and phytosterols: Lupeol, Lupeol acetate, alpha-Amyrin, beta-Amyrin, alpha-Amyrenyl acetate, Friedelin, Taraxasterol, Gluanol, Lanosterol, beta-Sitosterol, beta-Sitosterol-d-glucoside, Daucosterol, Stigmasterol, Fucosterol, Campesterol.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
21.	<i>Ipomoea aquatica Forssk.</i>	Harankhuri (Marathi), Kalmisaag (Hindi/Bengali), Vallalkeerai (Tamil), Thutikura (Telugu), Neeru soppu (Kannada)	Flowers, Buds, Leaves, Young shoots	Flavonoids, phenolic compounds and coumarins: Kaempferol, coumarin, bergenin, ferulic acid, caffeic acid, bergaptol and bergapten. Triterpenoids and phytosterols: Lupeol, lupeol acetate, alpha-amyrin, beta-amyrin, alpha-amyrenyl acetate, friedelin, taraxasterol, gluanol, lanosterol, beta-sitosterol, beta-sitosterol-D-glucoside, daucosterol, stigmasterol, fucosterol and campesterol.	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
22.	<i>Momordica charantia L.</i>	Karale (Marathi), Karela (Hindi), Pavakkai (Tamil), Kakarakaya (Telugu), Hagalakayi (Kannada)	Whole plant	Phenolic compounds and flavonoids: Kaempferol, quercetin, luteolin, ferulic acid, vanillic acid, salicylic acid, 4-hydroxybenzoic acid, 3,4-dihydroxybenzoic acid, 4-hydroxycinnamic acid, syringaldehyde and ellagic acid are key phenolics responsible for strong antioxidant activity and protection against oxidative stress. Triterpenoids and phytosterols: Beta-sitosterol, stigmasterol, campesterol, cycloartenol, cyclooleucanol, 24-methylenecycloartanol, alpha-spinasterol, lanosterol and oleanolic acid contribute to lipid regulation, anti-inflammatory effects and secondary support in diabetes management. Alkaloids and nitrogen-containing compounds: Vicine, serotonin,	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
23.	<i>Momordica cymbalaria (Hook., Fenzl)</i>	Kadvanchi (Marathi), Kadukarela (Hindi), Athalakkai (Tamil), Adavi kakara (Telugu), Karchikai (Kannada)	Fruit	Terpenoids and terpene derivatives: Linalool oxide, (-)-Isopulegol, Aspidospermidin-17-ol derivatives, Spirot-8-en-11-one derivatives, Lupeol, Lanosta-7,9(11)-dien-18-oic acid derivatives Phenolic compounds: 2-Methoxy-4-vinylphenol Steroids and phytosterols: Androstan-17-one, Cholesterol, Cholestanol, Cholestan-3-ol-2-methylene, Stigmasterol, β -Sitosterol, Ethyl iso-allocholate, 5 β -Cholestane pentol derivatives, Stigmasta-3,5-dien-7-one	Mohammed, <i>et al.</i> , 2024 ^[36]
24.	<i>Momordica dioica Roxb. ex Willd.</i>	Kartoli (Marathi), Kakora (Hindi), Athalakkai (Tamil), Agakara (Telugu), Kaadu hagalakayi (Kannada)	Fruit	Phenolic compounds: Ellagic acid, Syringaldehyde, 4-Hydroxybenzoic acid, 3,4-Dihydroxybenzoic acid, 4-Hydroxycinnamic acid Flavonoids and isoflavonoids: Daidzein, Chalcone Sterols and triterpenoids: Beta-sitosterol, Sterol fractions, Momodicaursenol Alkaloids and nitrogen-containing compounds: 2-Acetyl-5-chloropyrrole	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
25.	<i>Moringa oleifera Lam.</i>	Shevga (Marathi), Sahjan (Hindi), Murungai (Tamil), Munagaku (Telugu), Nugge mara (Kannada)	Pods/Leaves	Flavonoids: Kaempferol, Quercetin, Luteolin, Apigenin, Myricetin, Rutin, Gossypetin, Epigallocatechin, Epicatechin Phenolic acids: Gallic acid, Caffeic acid, Ferulic acid, Chlorogenic acid, Ellagic acid, 4-Hydroxybenzoic acid, Vanillin Alkaloids: Trigonelline, Niaziminin A, Niaziminin B, Niazimicin, Niazinin, Niazirin, Benzylamine Isothiocyanates: Benzyl isothiocyanate, Isobutyl isothiocyanate, Isopropyl isothiocyanate Terpenoids: Limonene, Linalool, Myrcene, α -Pinene, β -Pinene, Geraniol, Nerolidol, Camphene Sterols: β -Sitosterol, Stigmasterol, Campesterol	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) ^[25, 66]
26.	<i>Opuntia elatior Mill.</i>	Nivdung (Marathi), Nagphani (Hindi), Sappathi	Phylloclade, Fruits	Flavonoids: Isoquercitrin, Narcissin Phenolic compounds: Gallic acid, Betanine	(Karthikeyan <i>et al.</i> , 2018;

		kalli (Tamil), Nagajemudu (Telugu), Cactus gida (Kannada)		Sterols: β -Sitosterol	Vivek-Ananth <i>et al.</i> , 2023) [25, 66]
27.	<i>Oxalis corniculata</i> L.	Ambuti (Marathi), Khatti booti (Hindi), Puliyaari (Tamil), Pullampeta (Telugu), Huli soppu (Kannada)	Whole plant	Vitamins and antioxidant compounds: Ascorbic acid, Vitamin E, beta-Tocopherol Carotenoids: alpha-Carotene Flavonoids: Isovitexin, Vitexin	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) [25, 66]
28.	<i>Plumbago zeylanica</i> L.	Chittrak (Marathi/Hindi), Kodiveli (Tamil), Chitramoolam (Telugu), Chitramula (Kannada)	Roots, Leaves	Naphthoquinones and quinone derivatives: Plumbagin, Isozeylanone, Plumbazeylanone, Zeylanone, Droserone, Chitranone, Methylnaphthazarin, Plumbagic acid, 3-Chloro-5-hydroxy-2-methylnaphthalene-1,4-dione, (2,2'-Binaphthalene)-5,5',8,8'-tetrone-1,1'-dihydroxy-6,6'-dimethyl-, 5-Hydroxy-8-(4-hydroxy-7-methyl-5,8-dioxonaphthalen-1-yl)-2-methylnaphthalene-1,4-dione Phenolic compounds and phenolic acids: Vanillic acid, Cinnamic acid, 4-Hydroxybenzaldehyde Triterpenoids and sterols: Calendol, alpha-Amyrin, beta-Amyrin, Lupeol, Taraxasterol, beta-Sitosterol Indole derivatives and alkaloidal compounds: Indole-3-carboxaldehyde, Isoshinanolone	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) [25, 66]
29.	<i>Rivea hypocrateriformis</i> (Desr.) Choisy	Phang/Phandi (Marathi), Rivea creeper (Hindi), Kattukodi (Tamil), Adavi tippa teega (Telugu), Kaadu balli (Kannada)	Leaves, Flowers	Pyrrrolizidine alkaloids: Macrophylline, Meteloidine, Symlandine Tropane alkaloids and related alkaloids: Cochlearine, Darlingine, Tigloidine, Serratanidine, Hypocretine 1, Hypocretine 2, Pyrimethanil Glycosides: Bergenin, Norbergenin, Rivebergenin A, Rivebergenin B, Lucuminic acid, Oleandrose Flavonoids and flavonoid glycosides: Quercetin, 3'-Deoxymaysin, 6-C-Glucopyranosylpilloin, Peruvianoside II, Morusin Xanthenes: Dulciol B, Mangostenone B Coumarins: Tomentolide A, Calophyllolide, Desmethylbergenin hemihydrate	Mukim <i>et al.</i> , 2021 [37]
30.	<i>Schleichera oleosa</i> (Lour.) Oken	Kusum (Marathi/Hindi), Pusuku (Telugu), Kusumamara (Kannada), Kusumbam (Tamil)	Leaves, Seeds	Phenolic compounds and tannins: Tannic acid Triterpenoids: Betulinic acid, Lupeol, Lupeol acetate, Betulin Sterols: beta-Sitosterol, Campesterol, Stigmasterol, Brassicasterol, Cholesterol	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) [25, 66]
31.	<i>Solena amplexicaulis</i> (Lam.)	Gometi/Ghorkakadi (Marathi), Creeping cucumber (Hindi), Kattu peerkangai (Tamil), Adavi dosa kaya (Telugu), Kaadu southekayi (Kannada)	Leaves, Flowers, Fruits	Terpenoids and diterpenes: Phytol, Carane Phenolic compounds: 4-(1-Methylpiperidin-4-yl)benzene-1,2-diol Ketones: 1,3-Cyclopentanedione	(Karthikeyan <i>et al.</i> , 2018; Vivek-Ananth <i>et al.</i> , 2023) [25, 66]
32.	<i>Tinospora cordifolia</i>	Gudvel (Marathi), Giloy (Hindi), Seenthil kodi (Tamil), Tippa teega (Telugu), Amruthaballi (Kannada)	Leaves and Stem	Anthocyanins: Cyanidin 3-O-sambubiosyl 5-O-glucoside Flavonoids and flavonoid glycosides: Hesperetin 7-Rhamnoglucoside, Quercetin 3-O- β -xylopyranosyl-(1 \rightarrow 2)-O- β -galactopyranoside, Quercetin-3-glucuronide, Catechin/Epicatechin-(epi)gallocatechin dimer Phenolic glycosides: Verbascoside Terpenoid glycosides: Blumenol C malonylglycosyl galacturonide Phenolic compounds: Catechin, Epicatechin, Gallocatechin derivatives	Sonkamble, and Kamble, 2015 [54]

Indian Wild Edible Plants with Antioxidant and Antidiabetic Properties

Ethnobotanical traditional knowledge has long supported the use of wild edible plants as valuable sources of both food and medicine. Indigenous communities have relied on these plants for the management of various ailments, including diabetes mellitus, due to their nutritional richness and therapeutic potential. Several ethnobotanical studies have documented numerous wild edible plants possessing significant antidiabetic properties (Duguma, 2020; Kumar *et al.*, 2021; Jacob *et al.*, 2025) [15, 22, 28]. Such traditional claims have opened new avenues of research focusing on

the authentication, standardization, pharmacological validation, and therapeutic applicability of wild edible plants in diabetes management.

Plant extracts rich in antioxidant compounds are widely recognized for their antidiabetic effects, primarily through the reduction of oxidative stress, which plays a crucial role in the onset and progression of diabetes. Excessive production of free radicals can damage pancreatic β -cells, impair insulin secretion, and contribute to insulin resistance. Antioxidants help neutralize these reactive oxygen species, thereby protecting β -cell integrity and improving glucose metabolism (Tangvarasittichai, 2015; Yesupatham and

Saraswathy, 2025) [59, 69]. In addition, bioactive phytochemicals such as phenolics and flavonoids have been reported to inhibit carbohydrate-hydrolysing enzymes, including α -amylase and α -glucosidase, resulting in delayed glucose absorption and reduced postprandial blood glucose levels. These compounds also enhance insulin sensitivity and exhibit anti-inflammatory activity, thereby contributing to the maintenance of overall glucose homeostasis (de Paulo et al., 2021; Guerrero-Becerra et al., 2023).

The above-mentioned pharmacological properties make many wild edible plant species promising candidates for the development of plant-based antidiabetic therapeutics. Numerous researchers have reported that the phytochemical constituents of wild edible plants significantly contribute to their antioxidant and antidiabetic activities. In India, several wild edible plants traditionally consumed by rural and tribal communities have been scientifically validated for both antioxidant and antidiabetic potential. Prabha et al. (2010) [45] documented 42 wild edible plant species used by tribal and local communities of the Melghat region in the Amravati district of Maharashtra, India. Among these, many commonly consumed species have been reported in scientific literature for their notable antidiabetic properties and are therefore included in the present review.

***Abrus precatorius* (Fabaceae) – Gunj**

The leaves of *Abrus precatorius*, traditionally used as a mouth freshener, have demonstrated significant antihyperglycemic and insulin secretagogue activities in streptozotocin-induced diabetic models. The leaf extract showed dose-dependent antihyperglycemic effects, significantly reducing fasting blood glucose levels comparable to metformin, while also improving antioxidant status in diabetic rats. These findings support its traditional use as an effective herbal antidiabetic agent (Umamahesh & Veeresham, 2016) [62]. In addition, the methanolic leaf extract exhibited strong α -glucosidase inhibitory activity (up to 84.6%) along with moderate inhibition of glucose diffusion *in vitro*, suggesting its role in delaying intestinal glucose absorption and controlling postprandial hyperglycemia (Al-Moalemi et al., 2020).

***Acacia nilotica* (Fabaceae) – Babhul**

Acacia nilotica is an underutilized leguminous plant traditionally consumed as a functional food. According to Vadivel and Biesalski (2012) [63], the seeds possess strong antioxidant activity along with moderate inhibition of carbohydrate-digesting enzymes. Such balanced enzyme inhibition is beneficial, as excessive inhibition may produce gastrointestinal side effects, whereas controlled inhibition helps regulate blood glucose levels effectively. Processing methods such as sprouting and oil-frying further enhance its antioxidant potential and optimize α -amylase and α -glucosidase inhibitory activities.

Ojo et al. (2024) [41] reported that different parts of *Acacia nilotica* exhibit distinct functional roles in diabetes management. Seed extracts showed stronger antioxidant activity and potent α -glucosidase inhibition, making them effective in controlling postprandial hyperglycemia. In contrast, the pods demonstrated comparatively better α -amylase inhibition, thereby contributing to delayed carbohydrate digestion. These findings suggest that the combined use of different plant parts may provide a broader and more balanced antidiabetic effect. The study also highlighted a strong correlation between phenolic content

and biological activity, emphasizing the importance of phytochemicals in its therapeutic potential.

***Achyranthes aspera* (Amaranthaceae)- Apmarg**

Achyranthes aspera is a shrub commonly found in open areas and wastelands, and its leaves are traditionally consumed as vegetables by tribal communities (Pradeepkumar et al., 2015) [46]. The aqueous extract of its aerial parts demonstrated significant anti-obesity activity in high-fat diet-induced obese rats. Treatment with the extract reduced body weight, fat accumulation, glucose, insulin, leptin, and lipid levels, while improving antioxidant status, indicating its potential as a natural therapeutic agent against obesity and associated metabolic disorders (Athesh et al., 2020) [6]. Furthermore, the methanolic extract exhibited stronger antioxidant, α -amylase inhibitory, α -glucosidase inhibitory, and DPPH radical scavenging activities than the petroleum ether extract, highlighting its promising antidiabetic potential in the management of diabetes and oxidative stress (Priyamveda et al., 2022) [18].

***Amaranthus spinosus* (Amaranthaceae) – Kante-Math**

Amaranthus spinosus L., a commonly consumed wild leafy vegetable, has demonstrated significant antidiabetic and antioxidant activities in diabetic animal models. Administration of its extract (450 mg/kg) markedly reduced plasma glucose levels and improved carbohydrate metabolism, lipid metabolism, and antioxidant defense mechanisms. These findings support its potential role in managing diabetes-associated metabolic disorders (Bavarva & Narasimhacharya, 2013) [8].

***Amaranthus viridis* (Amaranthaceae) – Tandulkundra, Tandulja**

The leaves and stems of *Amaranthus viridis* are traditionally consumed as edible vegetables in the Melghat region of the Amravati division. Methanolic leaf extracts exhibited dose-dependent α -glucosidase inhibitory activity. Although the inhibitory effect was less potent than acarbose, related species demonstrated strong enzyme inhibition even at lower concentrations, indicating the plant's potential role in controlling postprandial hyperglycemia (Jayanetti et al., 2024). Gunasekaran et al. (2024) [19, 24] further reported the presence of flavonoids, alkaloids, quinones, tannins, terpenes, coumarins, and phenols in the plant, along with significant α -amylase inhibitory activity.

***Bauhinia purpurea* (Caesalpiniaceae) – Kachnar, Koilari**

The flower buds of *Bauhinia purpurea* are widely consumed as vegetables after removal of the calyx. The plant is traditionally valued for both nutritional and medicinal purposes, with different plant parts providing essential nutrients such as dietary fiber, vitamins, and minerals. Experimental studies have shown that its extracts possess significant antidiabetic activity, producing dose-dependent reductions in blood glucose levels in diabetic models. The hypoglycemic effect is believed to result from enhanced cellular glucose uptake, improved pancreatic β -cell function, and reduced intestinal glucose absorption (Tambe et al., 2025) [58].

***Bauhinia racemosa* (Caesalpiniaceae) – Apta**

Tender shoots and flowers of *Bauhinia racemosa* are traditionally consumed as wild edible foods. The leaf extract has demonstrated significant antidiabetic activity in

streptozotocin-induced diabetic models by effectively reducing blood glucose levels, thereby indicating its potential role in managing diabetes and related metabolic disorders (Kumar *et al.*, 2017) [30].

***Bauhinia vahlii* (Caesalpiniaceae) – Mahulvel**

Bauhinia vahlii is a wild edible plant whose young pods and roasted seeds are traditionally consumed by tribal communities. Studies on tribal pulses have revealed that the plant is rich in proteins, amino acids, and minerals, making it a valuable high-energy dietary source with potential benefits for metabolic health (Rajaram & Janardhanan, 1991). In addition, leaf extracts of *Bauhinia vahlii* exhibited high phenolic content, particularly in aqueous extracts (168.47 mg GAE/g), indicating strong antioxidant potential. Methanolic extracts and their fractions also demonstrated significant α -amylase inhibitory activity, supporting their role in regulating carbohydrate digestion and glucose metabolism (Lohani & Sharma, 2023) [32].

***Boerhavia repens* var. *diffusa* (Nyctaginaceae) – Punarnava**

Shrivastava *et al.* (2017) [53] reported that *Boerhavia diffusa* is a phytochemically rich wild leafy vegetable containing diverse bioactive compounds such as alkaloids, flavonoids, tannins, and terpenoids. The presence of these phytoconstituents indicates its strong nutritional and therapeutic potential, particularly in antioxidant activity and metabolic regulation, thereby supporting its traditional use as both a food and medicinal plant among tribal communities.

Boerhavia diffusa exhibits multi-mechanistic antidiabetic activity through both pancreatic and extra-pancreatic pathways. It not only lowers blood glucose levels but also improves glucose metabolism by enhancing hexokinase activity and reducing gluconeogenic enzyme activity. Furthermore, the plant has been reported to regenerate pancreatic β -cells while reducing oxidative stress and cortisol levels, highlighting its potential in managing hyperglycemia and associated diabetic complications. These findings suggest that *Boerhavia diffusa* acts as a comprehensive phytotherapeutic agent targeting multiple aspects of diabetes management (Kumar *et al.*, 2018) [29].

***Bombax ceiba* L. (Malvaceae) – Katesawar**

In many cultures, edible flowers are incorporated into traditional diets because of their mild sweetness, attractive appearance, and nutritional value. In India, the young flowers and buds of *Bombax ceiba* are commonly used in the preparation of regional delicacies, with culinary practices varying across different states. Their use in traditional cuisine reflects the diversity of indigenous food systems and emphasizes the importance of native plant resources in local diets. Besides enhancing flavour and texture, these floral parts also possess cultural and aesthetic significance.

Beyond their culinary value, the flowers of *Bombax ceiba* exhibit notable antidiabetic potential. The methanolic flower extract (BCE) has demonstrated significant hypoglycemic activity, primarily attributed to its strong antioxidant properties. This activity is associated with several bioactive compounds, including isoorientin, vitexin, isomangiferin, quercetin, mangiferin, isovitexin, and related glycosides. Xu *et al.* (2017) reported that BCE significantly reduced fasting blood glucose levels and improved oral glucose tolerance in

type II diabetic rats, indicating its promising therapeutic potential in diabetes management (Bisht & Gupta, 2024) [10].

***Butea monosperma* (Lam.) (Fabaceae) – Palas**

Butea monosperma is an important multipurpose tree widely utilized by tribal communities, particularly for its flowers and young fruits. The plant occupies a significant place in traditional medicinal systems such as Ayurveda, Unani, and Siddha, where it is used for the treatment of various ailments. Almost all parts of the plant—including roots, leaves, fruits, stem bark, flowers, gum, and young branches—are employed for diverse purposes such as medicine, food, fibre production, natural dyes, fodder, fish poison, and the preparation of household utensils.

The plant exhibits a broad spectrum of biological activities and considerable therapeutic potential. Different parts of *Butea monosperma* have been reported to possess antioxidant, antidiarrhoeal, wound healing, antidiabetic, antistress, anticonvulsant, antihepatotoxic, nootropic, antiestrogenic, and anthelmintic properties. Additionally, the roots exhibit antimicrobial and lens-protective activities (Burli & Khade, 2007) [12].

Shrivastava *et al.* (2022) [21] highlighted the multifaceted antidiabetic potential of *Butea monosperma*, which acts through both metabolic and biochemical pathways. Flower extracts were found to improve glucose tolerance, significantly reduce blood glucose levels, and enhance lipid profiles by lowering cholesterol and increasing HDL levels. Simultaneously, its antioxidant properties help alleviate oxidative stress, a major factor contributing to diabetic complications. These findings strongly support the potential of *Butea monosperma* as a promising plant-based therapeutic agent for diabetes management (Badole *et al.*, 2006; Ameena *et al.*, 2023; Chambhare, 2025) [7, 13, 27].

***Casearia tomentosa* Roxb. (Salicaceae) – Kali Karai, Kesa**

Bhagat *et al.* (2016) [9] reported that the fruit pulp of *Casearia tomentosa* is traditionally valued for its diuretic and mild laxative properties, which aid in detoxification and digestive regulation. Its ethnomedicinal applications highlight its importance as a natural therapeutic resource with both nutritional and pharmaceutical relevance.

Casearia tomentosa is considered a medicinal plant of significant ethnopharmacological importance due to the presence of a wide range of bioactive phytoconstituents, including alkaloids, flavonoids, carbohydrates, glycosides, proteins, steroids, phytosterols, terpenoids, lipids, and essential oils. The leaves have been identified as a potential natural source of antioxidant, antidiabetic, and antibacterial agents, thereby supporting its traditional medicinal applications (Talukdar *et al.*, 2021) [57].

***Cassia fistula* (Caesalpiniaceae) – Bahava**

The flowers of *Cassia fistula* are traditionally consumed as vegetables and are widely recognized for their medicinal benefits. Experimental studies have demonstrated that extracts obtained from its pods and flowers possess significant antidiabetic activity. In diabetic rat models, pod extracts effectively reduced blood glucose and HbA1c levels, improved body weight, and increased liver glycogen content. The extracts also enhanced glucose tolerance, exhibiting effects comparable to the standard antidiabetic drug glibenclamide.

Similarly, flower extracts showed dose-dependent blood glucose-lowering activity, particularly in postprandial conditions, although their efficacy was slightly lower than standard pharmaceutical agents. In addition, the plant is rich in natural antioxidant compounds that help reduce oxidative stress, an important factor in the progression of diabetes. Collectively, these findings indicate that *Cassia fistula* possesses promising antidiabetic and antioxidant properties, thereby supporting its traditional use as a medicinal food plant (Rahman *et al.*, 2020) ^[49].

***Cassia tora* (Caesalpiniaceae) – Tarota**

The seed and leaf extracts of *Cassia tora* have demonstrated strong antidiabetic and antioxidant activities. These extracts help lower blood glucose levels, reduce oxidative stress, and improve insulin function. The antidiabetic effect was found to increase in a dose-dependent manner and, at higher concentrations, showed activity comparable to the standard drug metformin.

The therapeutic properties of the plant are mainly attributed to the presence of bioactive compounds such as alkaloids, flavonoids, saponins, tannins, and glycosides. Overall, *Cassia tora* exhibits considerable potential as a natural antidiabetic agent with comparatively fewer side effects (Warabe & Oladosu, 2023) ^[68].

***Celosia argentea* (Amaranthaceae) – Kurdu**

Celosia argentea is a wild edible plant whose young leaves, especially those of red varieties, are commonly consumed as vegetables. Studies have shown that the alcoholic seed extract possesses significant antidiabetic activity. In alloxan-induced diabetic rats, the extract reduced blood glucose levels by up to 38.8% and also prevented body weight loss. Furthermore, the extracts demonstrated strong α -amylase and α -glucosidase inhibitory activities comparable to acarbose, suggesting their effectiveness in controlling postprandial hyperglycemia. These findings indicate that *Celosia argentea* may serve as a promising natural antidiabetic agent through both enzyme inhibition and regulation of blood glucose levels (Vetrichelvan *et al.*, 2002; Telagari & Hullatti, 2015) ^[60, 65].

***Coccinia grandis* (Cucurbitaceae) – Tondali**

The fruit extract of *Coccinia grandis* possesses high nutritional value due to the presence of alkaloids, phenols, flavonoids, proteins, and dietary fibre, along with strong antioxidant activity. Experimental studies have demonstrated significant antidiabetic activity in streptozotocin-induced diabetic rats. Administration of the fruit extract reduced plasma glucose and glycosylated hemoglobin levels, enhanced glycolytic enzyme activity and glycogen content, and decreased gluconeogenic enzyme activity. These effects were comparable to those of glibenclamide, indicating its potential as a functional food for diabetes management (Packirisamy *et al.*, 2018) ^[42].

In vitro and in silico studies further revealed moderate α -glucosidase inhibitory activity and antioxidant potential, suggesting that the fruit may serve as a valuable natural source for antidiabetic and health-promoting therapeutics (Manikandaselvi *et al.*, 2025) ^[34].

***Cocculus hirsutus* (Menispermaceae) – Vasan Vel**

The stems of *Cocculus hirsutus* are traditionally used for making baskets, while the purple berries are either consumed directly or utilized as natural dyes for colouring

basket materials. The leaves are also consumed as vegetables by certain tribal communities, including the Tsonga people. The ripe fruits contain anthocyanins that impart a bluish-purple colour, making them a potential natural food colourant for various food applications (Logesh *et al.*, 2020; Sadhu *et al.*, 2023) ^[31, 51].

Studies have reported that leaf extracts of *Cocculus hirsutus* exhibit dose-dependent antihyperglycemic activity in alloxan-induced diabetic mice by significantly reducing serum glucose levels. The extracts also improved glucose tolerance, highlighting their potential as natural antihyperglycemic agents.

***Colocasia esculenta* (L.) Schott (Araceae) – Chamkura**

The corms, petioles, and leaves of *Colocasia esculenta* are rich sources of dietary fibre, minerals, proteins, and ascorbic acid, and are extensively utilized in various culinary preparations (Varghese *et al.*, 2024). The plant is widely recognized as a nutritious edible tuber with significant medicinal value. Nur-Hadirah *et al.* (2021) ^[39] reported that *Colocasia esculenta* possesses high phenolic content and strong antioxidant activity, particularly in methanol and ethanol extracts.

Experimental studies demonstrated significant dose-dependent antihyperglycemic activity of the methanolic extract. At doses of 50, 100, 200, and 400 mg/kg, blood glucose levels were reduced by 22.5%, 23.8%, 25.7%, and 35.9%, respectively, while the standard drug glibenclamide reduced blood glucose by 44.7% in glucose-loaded mice (Akter *et al.*, 2013). Furthermore, Mohammad *et al.* (2025) ^[1, 35] evaluated the antidiabetic and diuretic activities of the methanolic flower extract and reported strong inhibition of α -amylase and α -glucosidase enzymes, indicating antidiabetic activity comparable to acarbose.

***Ficus racemosa* (Moraceae) – Umbar**

The ripe fruits of *Ficus racemosa* are traditionally consumed by local communities as an edible wild fruit. Scientific studies have demonstrated that methanolic fruit extracts possess significant antidiabetic activity. Pant *et al.* (2025) ^[43] reported that the extract reduced glucose levels by approximately 68.10% in *in vitro* studies and 31.20% in *in vivo* experimental models. The fruit extract also exhibited inhibitory activity against the carbohydrate-hydrolysing enzymes α -amylase and α -glucosidase, thereby helping to regulate glucose absorption and control hyperglycemia. These therapeutic effects are mainly attributed to the presence of bioactive phytoconstituents such as flavonoids, alkaloids, phenolics, saponins, and terpenoids. Collectively, these findings suggest that *Ficus racemosa* possesses considerable potential as a natural antidiabetic agent.

***Ipomoea aquatica* (Convolvulaceae) – Harankhuri**

Ipomoea aquatica, commonly known as water spinach, is a wild edible aquatic plant that grows abundantly in ponds, marshy areas, and wetlands, particularly during the monsoon season. The fresh leafy shoots are widely consumed as a nutritious vegetable by local communities. Studies have shown that crude extracts of *Ipomoea aquatica* exhibit strong inhibitory activity against carbohydrate-digesting enzymes, particularly α -amylase and α -glucosidase. Such enzyme inhibition may help delay carbohydrate digestion and glucose absorption, thereby contributing to the control of postprandial blood glucose levels. These findings indicate the potential of *Ipomoea*

aquatica as a functional food with antidiabetic properties (Nakade & Nasare, 2024) [38].

***Momordica charantia* (Cucurbitaceae) – Karela**

Momordica charantia is a well-known edible plant with considerable medicinal importance. The red arils surrounding the ripe seeds are edible, while the immature fruits are commonly soaked in salt water to reduce bitterness before being cooked as vegetables. The fruits are also used in curries, pickles, and salads. Different plant parts, including fruits, leaves, seeds, and roots, are rich in phytochemicals and possess significant therapeutic value. Traditionally, the plant has been used for the management of diabetes, hypertension, obesity, infections, and liver disorders (Bortolotti et al., 2019) [11].

Experimental studies have demonstrated strong antidiabetic effects of *M. charantia* fruit juice in diabetic rats, mainly through inhibition of the α -glucosidase enzyme. Treatment significantly reduced blood glucose, cholesterol, triglyceride levels, and insulin resistance, while enhancing insulin secretion and antioxidant activity. Additionally, the extract improved pancreatic health and promoted glucose uptake in muscle tissues (Mahmoud et al., 2017; Hussain et al., 2022) [21, 33]. These findings support the traditional use of *Momordica charantia* as an effective natural antidiabetic agent.

***Momordica cymbalaria* (Cucurbitaceae) – Kadvanchi**

Momordica cymbalaria is an underutilized tuber-forming cucurbit native to the Western and Eastern Ghats of India. The plant thrives in hot and semi-arid regions and is naturally adapted to harsh environmental conditions. Tribal communities traditionally utilize its fruits and tubers both as food and in folk medicine (Anusha et al., 2025) [34].

Rajamanickam and Arunachalam (2024) [50] reported that the fruits are consumed as vegetables and are rich in minerals such as calcium, potassium, and sodium, along with vitamin C and dietary fibre. The plant possesses several medicinal properties and has traditionally been used in the treatment of diabetes, ulcers, skin diseases, diarrhoea, and rheumatism. It also exhibits significant antioxidant activity. Among its different parts, the tubers are especially recognized for their potent antidiabetic properties.

***Momordica dioica* (Cucurbitaceae) – Kartoli**

Salvi and Katewa (2015) [52] reported that the fruits of *Momordica dioica* are rich in proteins, dietary fibre, carbohydrates, vitamins, minerals, and essential fatty acids such as oleic and linoleic acids. Nutritional analyses suggested that the fruits serve as an important dietary supplement, particularly as a source of calcium, magnesium, and B vitamins, and may help improve nutritional status in rural populations dependent on cereal-based diets.

Poovotha et al. (2017) demonstrated that protein extracts obtained from the fruit pulp of *Momordica dioica* possess significant antidiabetic, antihyperlipidemic, and antioxidant activities in streptozotocin-induced diabetic rats. Treatment with the extract reduced blood glucose, cholesterol, triglycerides, and liver enzyme levels, while simultaneously improving antioxidant enzyme activity and protecting liver and kidney tissues against oxidative damage. These findings highlight the therapeutic potential of *Momordica dioica* in the management of diabetes and associated metabolic disorders.

***Moringa oleifera* (Moringaceae) – Shevga**

Moringa oleifera is a highly nutritious medicinal tree rich in essential dietary elements and diverse bioactive compounds. Numerous experimental and clinical studies have demonstrated its significant antidiabetic potential, suggesting its usefulness in the development of natural therapeutic agents for diabetes management (Wang et al., 2022) [67].

The aqueous leaf extract of *Moringa oleifera* has shown strong antioxidant activity in both *in vitro* and *in vivo* studies. The extract contains high levels of phenolics, flavonoids, and flavonols, along with significant ferric reducing antioxidant power (FRAP) activity. In both diabetic and normal rats, treatment with the extract enhanced the activity of antioxidant enzymes such as superoxide dismutase (SOD), catalase (CAT), and glutathione-S-transferase (GST), while reducing lipid peroxidation. These findings indicate its protective role against oxidative stress and diabetes-associated tissue damage (Jaiswal et al., 2013) [23].

***Opuntia elatior* (Cactaceae) – Nivdung**

Opuntia elatior is considered an emerging food resource because of its ability to thrive under dryland conditions with minimal water requirements. The fruits of *Opuntia* species, particularly *Opuntia ficus-indica* (cactus pear), are well known for their strong antioxidant and antidiabetic properties. They are rich in flavonoids, betalains, vitamin C, and polyphenols, which help reduce oxidative stress and provide protection against disorders such as cardiovascular and neurological diseases (Kathiriya et al., 2024) [26].

Studies on the cladodes (aerial parts) of *Opuntia elatior* have demonstrated significant antioxidant and antidiabetic activities. Methanolic extracts showed strong free radical scavenging potential and produced a dose-dependent reduction in blood glucose levels in diabetic rats. The extract also improved lipid profiles and insulin levels without exhibiting toxic effects, highlighting its potential as a safe natural therapeutic agent for diabetes management (Goyal et al., 2025) [16].

***Oxalis corniculata* (Oxalidaceae) – Ambushi**

Oxalis corniculata is a wild edible plant whose sour-tasting leaves are commonly consumed as salads or cooked along with dal. The plant is rich in phenolics and flavonoids and exhibits strong antioxidant activity. Studies have reported that its extracts possess significant α -amylase and α -glucosidase inhibitory activities, which may help regulate blood glucose levels.

Himaja and Das (2015) [20] demonstrated the antioxidant and hypoglycemic potential of the plant through *in vitro* studies, including DPPH radical scavenging assays. Ethanolic extracts exhibited dose-dependent free radical scavenging activity, although slightly lower than the standard antioxidant ascorbic acid. Similar observations were reported by Sowmya and Nivedhitha (2021) [55], who emphasized that the antioxidant potential of the plant may help reduce oxidative stress associated with diabetes and related complications. These findings support the therapeutic relevance of *Oxalis corniculata* as a natural source of bioactive compounds with antidiabetic potential.

***Plumbago zeylanica* (Plumbaginaceae) – Chitrak**

The young leaves of *Plumbago zeylanica* are traditionally consumed as vegetables. Methanolic leaf extracts have

shown high phenolic and flavonoid content, contributing to strong antioxidant activity as demonstrated by DPPH and nitric oxide scavenging assays. In addition, the extract exhibited significant thrombolytic activity in both *in vitro* and *in vivo* studies, along with notable thrombin inhibition, suggesting its potential as a valuable source of antioxidant and therapeutic agents (Guguloth *et al.*, 2022) ^[18].

Plumbago zeylanica has also demonstrated significant antidiabetic activity in streptozotocin–nicotinamide-induced diabetic models. Hydroalcoholic root extracts produced a marked reduction in blood glucose levels and improved antioxidant parameters such as catalase and glutathione levels. Interestingly, co-administration of the extract with a low dose of metformin resulted in enhanced hypoglycemic effects, indicating a possible synergistic interaction. These findings suggest its potential as a natural alternative or supportive adjunct to conventional antidiabetic therapy (Zia *et al.*, 2024) ^[71].

***Rivea hypocrateriformis* (Convolvulaceae) – Fang / Phandi**

Rivea hypocrateriformis is a wild edible plant whose steamed leaves and flowers are traditionally consumed as vegetables. Extracts prepared from its aerial parts have demonstrated significant antidiabetic activity in dexamethasone-induced diabetic models. Treatment with the extract provided protective effects on vital organs such as the liver, kidney, and pancreas by reducing inflammation, necrosis, and oxidative stress.

Additionally, improvements in biochemical markers including bilirubin, SGOT, and SGPT levels indicated hepatoprotective and antioxidant activities. These findings support the potential role of *Rivea hypocrateriformis* in diabetes management and protection against diabetes-associated organ damage (Kaushal *et al.*, 2023) ^[27].

***Schleichera oleosa* (Sapindaceae) – Kusum**

Schleichera oleosa is a wild edible plant in which the pinkish-copper young leaves are consumed as vegetables, while the seeds contain edible arils. Studies conducted by Goswami and Singh (2019) ^[61] demonstrated that leaf extracts possess notable antidiabetic activity through significant α -amylase and α -glucosidase inhibitory effects. Similar findings were also reported by Nursamsiar *et al.* (2025) ^[40].

These enzyme inhibitory activities suggest that *Schleichera oleosa* may serve as a promising natural source of α -glucosidase inhibitors for regulating postprandial blood glucose levels and managing diabetes.

***Solena amplexicaulis* (Cucurbitaceae) – Gometi, Ghorkakadi**

Pradhan *et al.* (2025) ^[47] reported that *Solena amplexicaulis* is an underutilized cucurbit vegetable with high nutritional value and strong potential for cultivation in tropical and subtropical regions. Nutritional studies on different genotypes revealed that the fruits are rich in proteins, vitamin C, and essential minerals such as potassium, phosphorus, calcium, magnesium, and zinc.

Yong *et al.* (2025) ^[70] further reported that extracts of *Solena amplexicaulis* possess considerable potential in reducing complications associated with hyperglycemia and hyperlipidemia, often with minimal or no adverse effects. Several studies suggest that plant-derived compounds from this species may help alleviate both microvascular

complications, including diabetic retinopathy, neuropathy, and nephropathy, and macrovascular complications such as cardiovascular diseases and atherosclerosis. These therapeutic effects are mainly attributed to bioactive phytochemicals that improve glucose metabolism, reduce oxidative stress, and enhance lipid profiles, thereby supporting overall metabolic health.

***Tinospora cordifolia* (Menispermaceae) – Gudvel**

Tinospora cordifolia is an edible medicinal plant whose leaves, stems, roots, and whole plant are widely utilized in the preparation of juices, powders, extracts, functional foods, and nutraceutical products. Its incorporation into food products is believed to enhance both nutritional and therapeutic benefits (Anjum *et al.*, 2023) ^[4].

Phytochemical profiling of *Tinospora cordifolia* has revealed the presence of diverse bioactive phenolic compounds associated with significant antidiabetic activity. Studies suggest that its antidiabetic potential may be largely attributed to compounds capable of inhibiting α -amylase and α -glucosidase enzymes, thereby regulating carbohydrate digestion and glucose absorption (Sonkamble & Kamble, 2015) ^[54]. These findings support its traditional use as a valuable medicinal plant for diabetes management.

Conclusion

Many herbal plants are traditionally consumed not only as food but also for their medicinal value. In indigenous and local healthcare systems, the boundary between food and medicine is often indistinct, as several foods are used therapeutically while many medicinal plants form an integral part of the daily diet. Wild edible plants (WEPs), therefore, represent an important category of “medicinal foods” that continue to be utilized because of their perceived health-promoting properties and therapeutic benefits.

The present review highlights that numerous wild edible plants possess significant antidiabetic and antioxidant activities due to the presence of diverse bioactive phytoconstituents such as flavonoids, phenolics, alkaloids, tannins, saponins, glycosides, and terpenoids. These compounds contribute to the management of Type II Diabetes Mellitus through multiple mechanisms, including inhibition of α -amylase and α -glucosidase enzymes, enhancement of insulin sensitivity, reduction of oxidative stress, and improvement of glucose and lipid metabolism.

For rural and tribal populations of Maharashtra, wild edible plants are not merely nutritional resources but also serve as accessible and affordable primary healthcare alternatives. Their continued traditional use reflects a rich ethnobotanical heritage and emphasizes the importance of preserving indigenous knowledge systems. Integrating traditional ethnomedicinal knowledge with modern phytochemical, pharmacological, and clinical research may provide valuable opportunities for the discovery and development of novel plant-based antidiabetic therapeutics and functional foods.

Future Prospects

The future potential of wild edible plants (WEPs) in diabetes management lies largely in the development of nutraceuticals and functional foods that bridge the gap between nutrition and medicine. Scientific validation of traditionally used WEPs may enable the identification and isolation of specific bioactive compounds and antioxidant fractions responsible for their antidiabetic properties. Such advancements could facilitate the development of

standardized, safe, and effective plant-based supplements with improved therapeutic value, while minimizing the ecological and safety concerns associated with unregulated wild plant collection and consumption.

Future research should focus on detailed phytochemical characterization, mechanism-based pharmacological studies, toxicity evaluation, and clinical validation of these plants. Modern analytical and biotechnological approaches may further help in standardizing dosage, ensuring quality control, and enhancing the bioavailability of active constituents. In addition, conservation and sustainable utilization of wild edible plant resources are essential for preserving both biodiversity and traditional ethnobotanical knowledge.

The ultimate objective is not merely to replace conventional antidiabetic therapies such as insulin, but to utilize the diverse antioxidant and metabolic regulatory mechanisms of WEPs to reduce oxidative stress, improve glucose homeostasis, and prevent long-term complications associated with Type II Diabetes Mellitus. Thus, wild edible plants hold significant promise as complementary therapeutic resources for the future management of diabetes and related metabolic disorders.

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