

How to Cite:

Rathore, J., & Das, C. R. (2022). *Moringa oleifera*: A review of phytochemicals constituents and medicinal properties as a future source of new drugs. *International Journal of Health Sciences*, 6(S1), 6952–6976. <https://doi.org/10.53730/ijhs.v6nS1.6471>

***Moringa oleifera*: A review of phytochemicals constituents and medicinal properties as a future source of new drugs**

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Abstract--*Moringa oleifera* Lam (Moringaceae) is a highly desired plant that can be found in a variety of tropical and subtropical environments. The leaves, roots, seed, bark, and flower of this plant have anticancer, antipyretic, antiepileptic, anti-inflammatory, antiulcer, and antibacterial properties, and are used in indigenous medicine, especially in underdeveloped nations, to treat a number of maladies. The goal of this review is to give thorough information on the phytochemical compounds and pharmacological activities of *Moringa oleifera*, a therapeutic plant. The information provided in this study will be valuable in future investigations aimed at developing a revolutionary therapeutic medicine.

Keywords--*Moringa oleifera*, medicinal plants, phytochemicals constituents, pharmacological activities.

Introduction

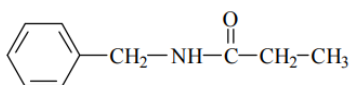
Ayurveda is an ancient Indian health-care practice that stretches back to around 5000 years. According to ancient Ayurvedic literature, it was performed during India's Vedic period, with about 700 plants mentioned in the Charaka Samhita and Sushruta Samhita during the first millennium BC. Since ancient times, plants and extracts from their various parts have been utilized for their medicinal properties and to treat specific disorders, as well as general tonics, meals, and other methods to boost the body's immunity and energy [1]. However, in recent decades, researchers' interest in understanding their specific compositions as well as exploring and establishing their potential applications in a variety of fields has risen substantially. In fact, leveraging nature's vital power to combat proliferating diseases such as cancer, heart attack, diabetes, rapid skin aging, and upcoming verities of new alarming health concerns such as recent corners of Coronavirus disease in 2019 (COVID-19), which affects the respiratory system acutely, is a

necessity of the hour [2]. The *Moringa* genus is the only one in the Moringaceae family. The genus *Moringa* has 14 recognized species that grow in the tropics. *Moringa oleifera* is the *Moringa* species that is most widely dispersed, well-known, and commonly used. Food, medicine, water purification, renewable polymer products, animal and aquaculture feeds, and even the possibility to be employed in the creation of other crops are all possibilities for *Moringa oleifera*. This chapter summarizes the current state of *Moringa* research as it pertains to its use as a culinary medicine and industrial product. The most extensively distributed *Moringa* species is *Moringa oleifera*. It is now widespread all over the tropics and is the most well-known and widely used of all *Moringa* species. The diversity of indigenous names assigned to the *M. oleifera* tree in distinct countries and areas is a measure of its value to populations all over the world. *M. oleifera* is a multipurpose tree, with the majority of its parts usable for a variety of purposes. Due to numerous applications in industry and medicine as well as diverse products used as food and feed that can be produced from the entire plant, it is a tree of enormous economic value. In the developing world, the tree is now widely recognized as a food, a medicinal plant, a coagulant, and an oil source. Humans have long consumed the *M. oleifera* plant in a number of culinary forms, depending on which section of the plant is consumed. In some parts of Zambia, the plant is referred to as the "cow plant" since almost every component of it is consumed in some fashion. Its particular composition in macro and micronutrients has been noted, and it is one of the reasons why it is recommended as part of a diet in food-insecure populations. The macro- and micronutrients in *M. oleifera* are distributed differentially along its anatomical portions, which is used to prepare and treat the plant components for ingestion. Traditional literature claims that *M. oleifera* is effective against a wide range of ailments. *M. oleifera* has a long history of medicinal significance. Various sections of this versatile tree have been attributed with medicinal and therapeutic effects. Its numerous portions have been examined for a variety of pharmacological activities and have been recognized for a variety of pharmacological qualities. Although the oral history for *Moringa*'s therapeutic benefits is extensive, it has received far less scientific attention, thus it is critical to assess the level of evidence available for the more well-documented claims and analyze the claims that have been made. In many cases, in-vitro (cultured cells) and in-vivo (animal) studies provide mechanistic support for claims made in traditional medical literature. Many reports of *Moringa*'s efficacy in humans are not backed by placebo-controlled, randomized clinical trials, nor have they been published in high-profile journals, according to others. *M. oleifera* is now included in a number of commercially available formulations, including Rumalaya and Septilin, Orthoherb, Kupid Fort, and Livospin, which are used to treat a variety of ailments. The phytochemical compositions and possible therapeutic effects of the plant's many sections, such as seeds, roots, stem, bark, leaves, flower, and fruits, vary. *Moringa* comes in a range of species that are used for a variety of purposes all over the world. *Moringa longituba*, *Moringa drouhardii*, *Moringa ovalifolia*, and other *Moringa* species are examples.[3] *Moringa oleifera* is a highly valued plant with a wide range of medical benefits and a high nutritional value, which is why it has been utilized as part of the Indian diet for centuries. It has been used in Ayurvedic medicine since the time of Sushruta. Many of its elements, such as drumstick leaves, fruits, and oils, provide significant health advantages for a variety of systems, including the digestive, cardiovascular, and circulatory

systems. Phytochemicals are plant-derived chemicals produced from secondary metabolic components.[4]

Anti-Bacteria And -Fungi Properties of Moringa Oleifera

A wide range of pharmacological properties, including antibacterial activity, have been discovered in several components of the *M. oleifera* plant. The juice from *M. oleifera*'s leaves and stem bark inhibits *Staphylococcus aureus* but not *Escherichia coli*. Fresh leaf juice inhibits pathogenic *Pseudomonas aeruginosa* and *Staphylococcus aureus*. The bark extract has antifungal and antitubercular effects. A Niaziridin-rich fraction of *M. oleifera* pods boosts the bioactivity of commonly used antibiotics as rifampicin, tetracycline, and ampicillin against gram(+) and (-) bacteria. Extracts of *M. oleifera* show antifungal properties. *Trichophyton rubrum*, *Trichophyton mentagrophytes*, *Epidermophyton floccosum*, and *Microsporium canis* are all susceptible to ethanol extracts of *M. oleifera* Lam seeds and leaves in vitro. Pterygospermin ($C_{22}H_{18}O_2N_2S_2$, m.p. 15°C) is an antibiotic isolated from *M.oleifera*'s root bark. Antibacterial and antifungal activities are found in Pterygospermin. 4-(α -L-Rhamnosyloxy) benzyl isothiocyanate, which has been recognized as a potent antibacterial agent, has been found in the seeds of *M. oleifera* and *M. stenopetala*. *M. oleifera* roots contain the antibacterial chemicals 4-(α -L-rhamnosyloxy) benzyl isothiocyanate and benzyl isothiocyanate, but not pterygospermin. In the presence of ascorbic acid, water extracts of defatted and shell-free *M. oleifera* seeds contain roughly 8–10 percent 4-(α -L rhamnosyloxy)benzyl isothiocyanate. In vitro, these compounds exhibit bactericidal doses of 40 μ mol/L for *Mycobacterium phlei* and 56 μ mol/L for *Bacillus subtilis*, making them effective against a wide range of bacteria and fungi. An aglycone of deoxy-niazimicine (N-benzyl, S-ethyl thioformate) obtained from the chloroform fraction of an ethanol extract of the root bark is responsible for the antibacterial and antifungal effects. *M. oleifera* aglycon has antibacterial and antifungal properties.



Deoxy-niazimicine (N-benzyl,S-ethyl thioformate)

Against *shigella boydii*, *shigella dysenteriae*, and *staphylococcus aureus*, the aglycone has a good antibacterial activity. The minimal inhibitory concentration (MIC) for *B. megaterium*, *Staphylococcus aureus*, *Sh. Dysenteriae*, and *Sh. Boydii* is 32 to 128 μ g/mL. *Candida albicans* and *Aspergillus flavus* both demonstrate considerable antifungal activity when exposed to the aglycone. A coagulant cationic protein produced from water and salt extracts with a pI greater than 9.6 and a molecular mass less than 6.5 kDa has antibacterial action. The coagulant protein displays antibacterial activities of 1.1–4.0 log reduction against *E. coli*, *B. thuringiensis*, and *P. aeruginosa*. This *Moringa* polypeptide (named Flo) has bactericidal properties and can disinfect severely contaminated water. *E. coli* growth suppression is only temporary, with growth resumed after 3–6 hours. With an IC50 value of around 1 mg/mL, Flo treatment reduces the number of restored cells considerably. Viable cell count is reduced by three orders of magnitude at Flo

concentrations of 6 mg/mL and above, indicating cell lysis, with approximately 99 percent of the remnant particles being non-viable.

Flo is antibacterially selective against a wide range of Gram-positive and Gram-negative bacteria. The MIC values for Flo and *Moringa* sp. seed extract against a number of human pathogens, including *Staphylococcus aureus*, *Streptococcus pyogenes*, *Streptococcus pneumoniae*, and *L. pneumophila*, range from 0.8 to 5.0 mg/mL for Flo and 5 to 20 mg/mL for *Moringa* sp. seed extract. Bactericidal (killing) action has also been proven against a variety of human illnesses, including antibiotic-resistant strains of *Staphylococcus*, *Streptococcus*, and *Legionella*. As a result, Flo has antibacterial efficacy against a wide range of human illnesses, including Gram-positive and Gram-negative. The molecular underpinnings and structural factors of the Flo's antibacterial activity were investigated in a structure-function investigation. polypeptide reveals that antibacterial activities are mediated by partially overlapping structural determinants. A sequence prone to generating a helix-loop-helix structural motif is required for bactericidal action. Hydrophobic proline residues within the projecting loop are needed for bactericidal action, as revealed by amino acid replacement. According to vital dye staining, peptides containing this motif cause bacterial membrane damage. Low doses kill bacteria like *Pseudomonas aeruginosa* and *Streptococcus pyogenes* without hurting human red blood cells, therefore adding multiple copies of this structural motif to a branching peptide improves antibacterial activity. For bactericidal activity, bacterial membrane instability caused by a hydrophobic loop would be necessary. The antibacterial capabilities of Flo may be linked to a motif consisting of two amphipathic helices separated by a hydrophobic and kinked structure, and multimeric variants of this motif are more efficient and selective antibacterially.

Anti-Viral Properties of *Moringa Oleifera*

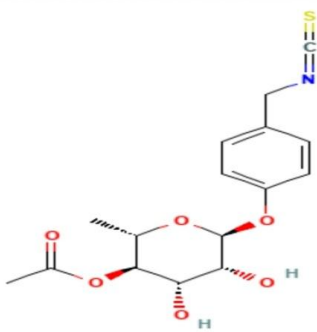
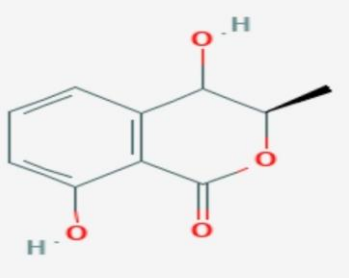
In a plaque reduction assay, Anti-herpes simplex virus type 1 (HSV-1) plaque formation is reduced by more than 50% when *M. oleifera* extracts are used at 100 µg/ml. *M. oleifera* extracts are also efficient against HSV-1 viral strains that lack thymidine kinase and those that are resistant to phosphonoacetate. At a daily intake of 750 mg/kg body weight, the extract of *M. oleifera* considerably slows the formation of skin lesions, increases mean survival periods, and lowers mortality in HSV-1 infected mice. *M. oleifera* extracts, when compared against the synthetic chemical acyclovir, delay the onset of skin lesions and had similar mean life periods.

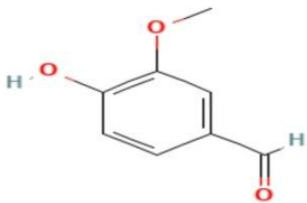
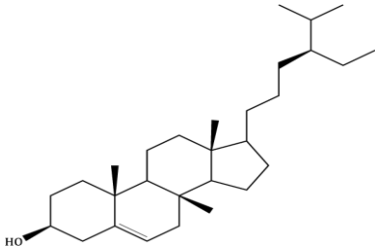
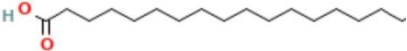
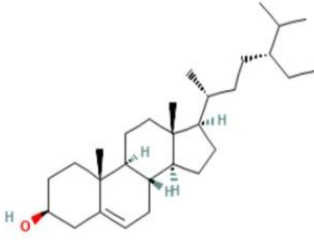
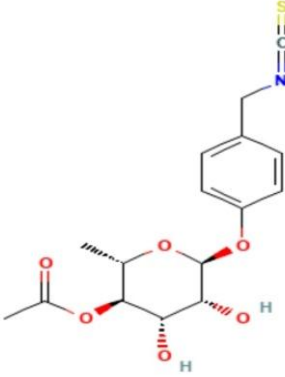
Anti-Inflammatory and Antihepatotoxic Activities of *Moringa Oleifera*

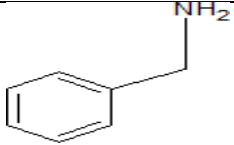
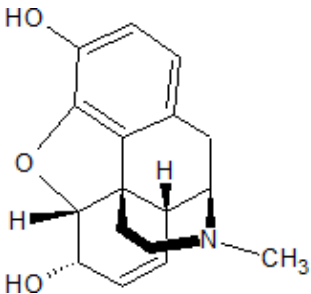
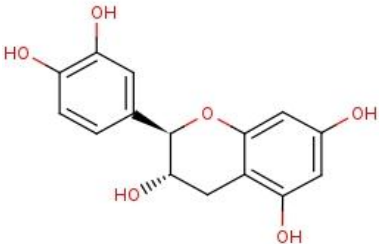
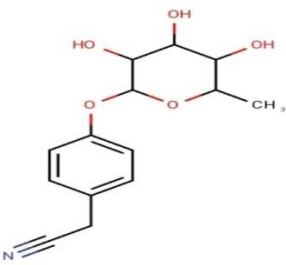
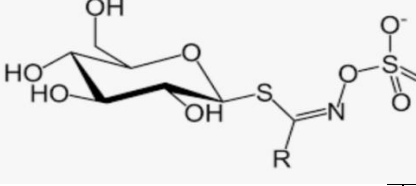
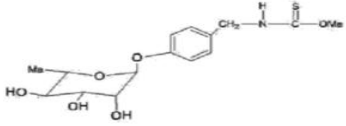
M.oleifera leaves, flowers, roots, gums, fruits, and seeds are all used to treat inflammation, as are the flowers, roots, gums, fruits, and seeds. Anti-inflammatory and hepatoprotective effects have been found in various *M. oleifera* tissues. The antiinflammatory activities of *M. oleifera*'s ethanol and hexane fractions are more potent. A crude *M. oleifera* ethanol extract of dried seeds decreases carrageenan-induced inflammation in the hind paws of mice by 85 percent at a dose of 3 mg/g body weight, while mature green seeds suppress it by 77 percent. The hexane fraction of the crude ethanol extract of the dried seeds

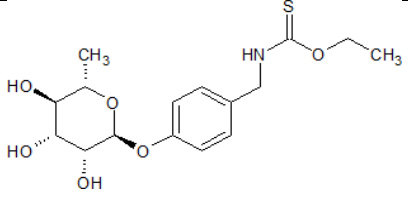
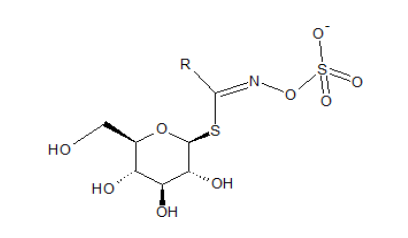
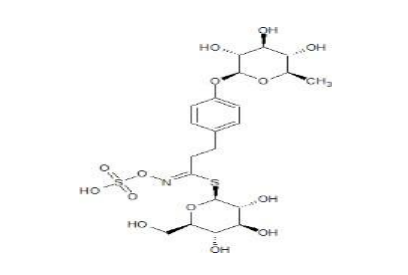
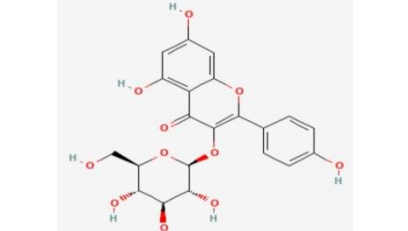
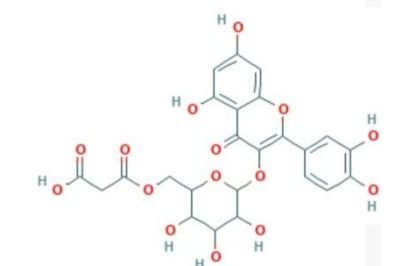
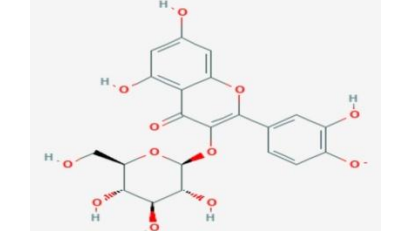
lowers inflammation by 77% at the same dosage, whereas the butanol and water fractions only suppress inflammation by 34%. When given orally at 3 mg/g BW, the ethyl acetate fraction, on the other hand, causes a 267 percent rise in inflammation and is toxic to mice. Oral treatment of *M. oleifera* extracts inhibits carrageenan-induced rat paw edema in a dose-dependent manner, with a 50% inhibitory concentration - IC_{50} (dose generating 50% inhibition) of 660 mg/kg. In the rat 6-day air pouch inflammatory models, *M. oleifera* extract is significantly more effective, with IC_{50} values of 302.0 mg/kg for cellular accumulation and 315.5 mg/kg for fluid exudation, respectively. The maximum levels of inhibition achieved with 600 mg/kg are 83.8 percent and 80.0 percent, respectively. When delayed (chronic) inflammation is induced in the 6-day air pouch model using Freund's complete adjuvant, the extract is still helpful, though not as much as in acute inflammation. The acute form of air pouch inflammation was decreased by a moderate dosage of indomethacin (5 mg/kg), but not the delayed version. The oedema suppressant activity of methanolic extract from the roots of *Moringa pterygosperma* Gaertn against carrageenan-induced paw oedema is comparable to that of indomethacin, a synthetic oedema suppressant. *M. pterygosperma* Gaertn aqueous and methanolic extracts have antihepatotoxic action comparable to that of synthetic antihepatotoxic drugs such as paracetamol and rifamicin. Aqueous and alcoholic extracts of *M. oleifera* root and flower show antihepatotoxic activity in albino rats given paracetamol. Table.1 shows phytochemical constituents of *Moringa oleifera* from different part. And Table 2 shows medicinal uses of *Moringa oleifera*

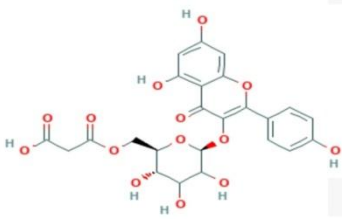
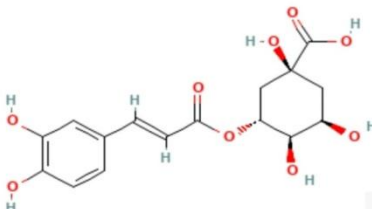
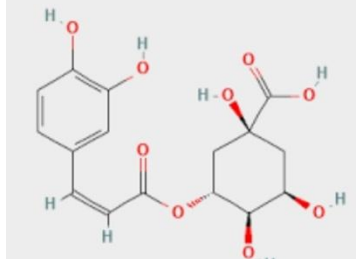
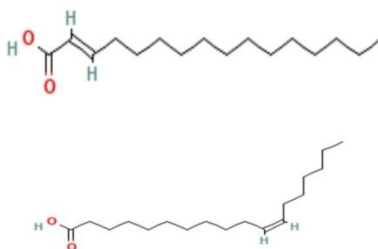
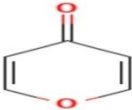
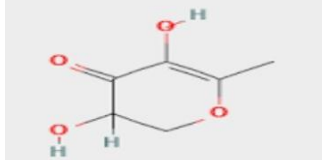
Table 1
Phytochemical constituents of *Moringa oleifera* from different part

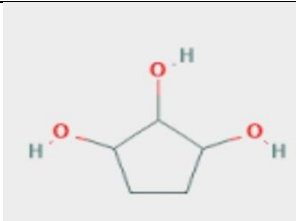
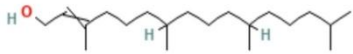
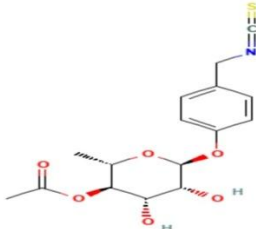
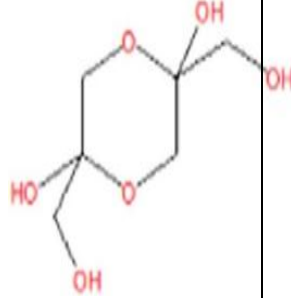
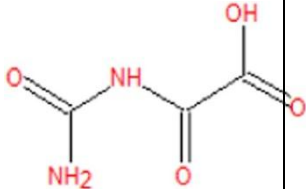
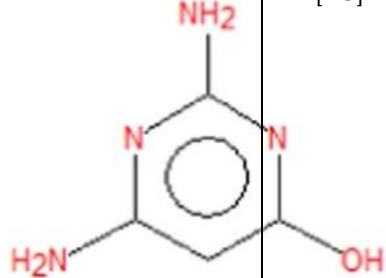
Parts	Phytochemical constituents	Structure	References
Roots	4-(α -L-rhamnopyranosyloxy)-benzylglucosinolate and benzylglucosinolate		[5]
Stem	4-hydroxymellein		[6]

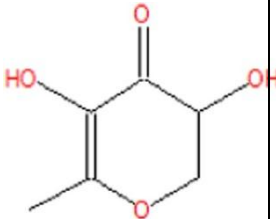

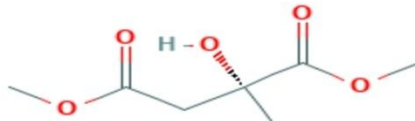

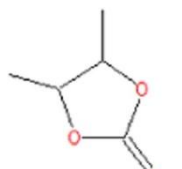
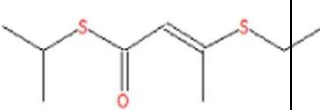
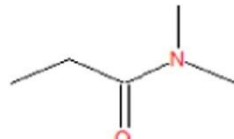
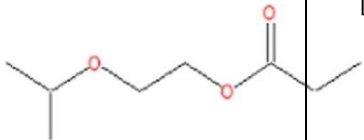
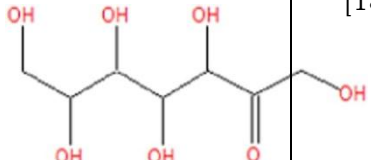
	Vanillin		[6]
	β -sitosterone		[6]
	Octacosanic acid		[6]
	β -sitosterol		[6]
Bark	4-(α -L-rhamnopyranosyloxy)-benzylglucosinolate		[5]

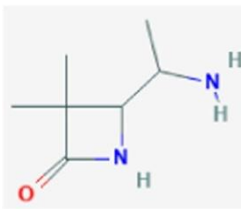
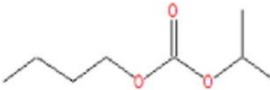
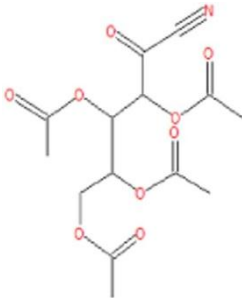
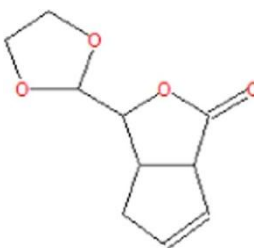
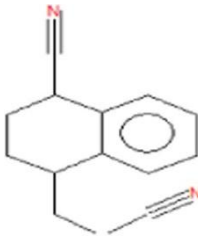
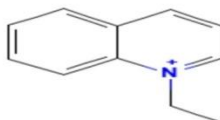
	Morignine		[7]
	Morphine		[8]
Whole gum Exudates	leucoanthocuanin		[9,10]
Leaves	Glycoside niazirin		[11]
	Three mustard oil glycosides		[11]
	4-[4'-O-acetyl-a-L-rhamnosyloxy]benzyl Isothiocyanate		[11,12]

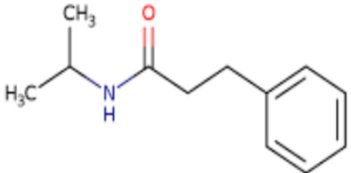
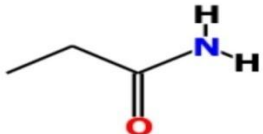
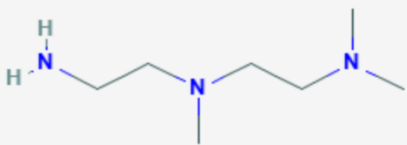
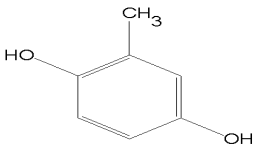
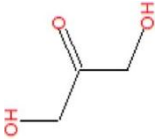
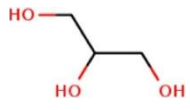
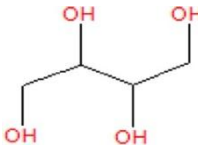
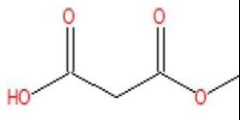
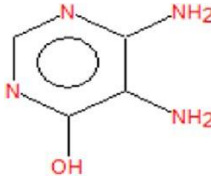
	niaziminin A and B		[12]
	Glucosinolates		[13]
	Glucomoringin		[14]
	Quercetin-3-O-glucoside		[15]
	Quercetin-3-O-(6''-malonyl-glucoside)		[15]
	9.kaempferol-3-O-glucoside		[15]

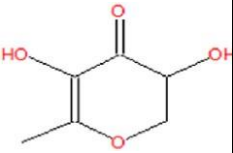
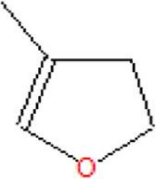
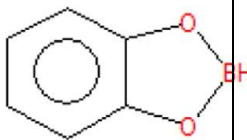
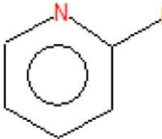
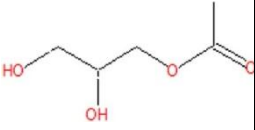
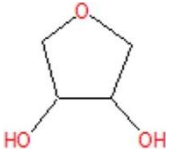
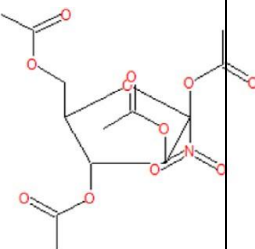
	Kaempferol-3-O-(6"-malonyl-glucoside)		[15]
	3-caffeoylquinic acid		[15]
	5-caffeoylquinic acid		[15]
	Hexadecanoic acid and Cis-Vaccenic acid		[16]
	4H-Pyran-4-one		[16]
	2,3-dihydro-3,5-dihydroxy-6-methyl		[16]




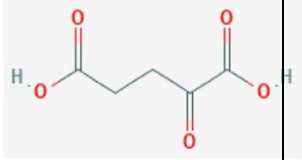
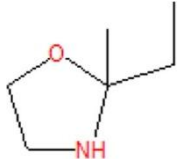

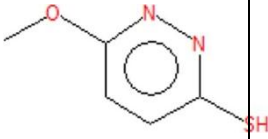
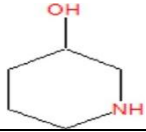
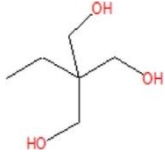
	1,2,3-Cyclopentanetriol		[16]
	3,7,11,15-tetramethylhexadec-2-en-1-ol		[16]
	4-(α -L-rhamnopyranosyloxy)-benzylglucosinolate		[17]
	1,3-Dihydroxyacetone dimer		[18]
	Acetic acid,[(aminocarbonyl)amino]oxo		[18]
	4(1H)-Pyrimidinone,2,6-diamino-		[18]

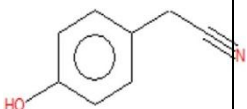
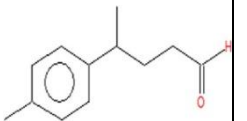
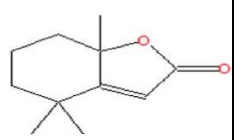
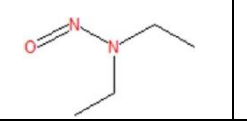

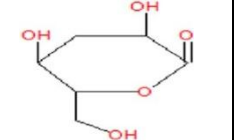
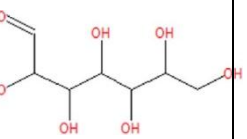
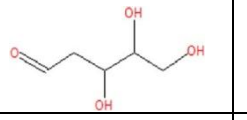
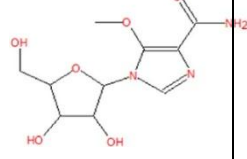
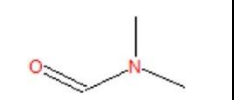
	4H-Pyran-4-one,2,3-dihydro-3,5-dihydroxy-6-methyl-		[18]
	2-Hexynoic acid		[18]
	Butanedioic acid,2-hydroxy-2-methyl-,(S)-		[18]
	1-Hexanamine		[18]
	1,3-Dioxolan-2-one,4,5-dimethyl-		[18]
	2-Butenethioic acid,3-(ethylthio)-,S-(1-methylethyl)ester		[18]
	Propanamide,N,N-dimethyl-		[18]
	2-Isopropoxyethyl propionate		[18]
	D-Mannoheptulose		[18]

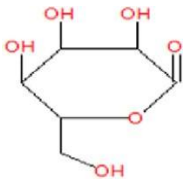
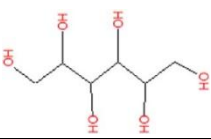
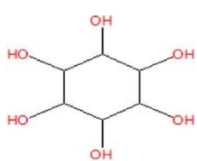
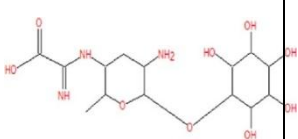
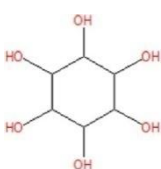
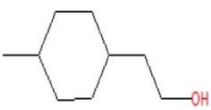
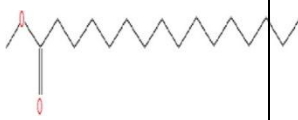
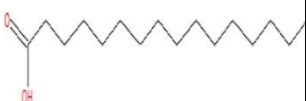
	Azetidín-2-one 3,3-dimethyl-4-(1-aminoethyl)-		[18]
	Carbonic acid, butyl 2-pentyl ester		[18]
	Tetra acetyl-d-xylonic nitrile		[18]
	1H-Cyclopenta[c]furan-3(3aH)-one, 6,6 a-dihydro-1-(1,3-dioxolan-2-yl)-, (3Ar, 1-trans, 6a-cis)-		[18]
	3-[1-(4-Cyano-1,2,3,4-tetrahydronaphthyl)]propanenitrile		[18]
	Quinolinium, 1-ethyl-, iodide		[18]

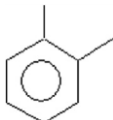
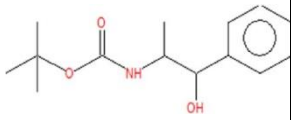
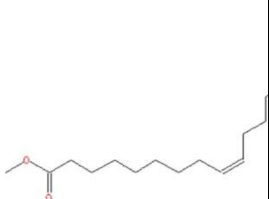

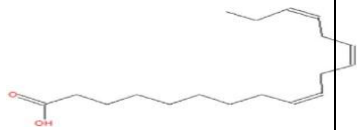
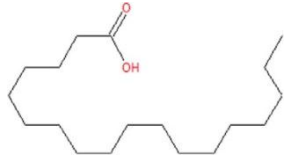
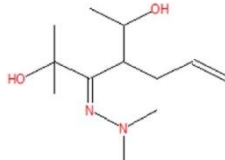
	N-Isopropyl-3-phenylpropanamide		[18]
	Propanamide		[18]
	1,2-Ethanediamine,N-(2-aminoethyl)-		[18]
	1,4-Benzenediol,2-methyl-		[18]
	Dihydroxyacetone		[18]
	Glycerin		[18]
	Erythritol		[18]
	Monomethyl malonate		[18]
	4,5-Diamino-6-hydroxypyrimidine		[18]

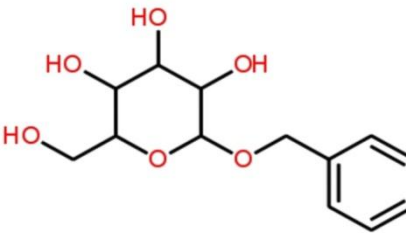
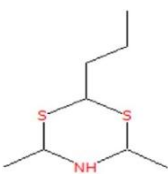
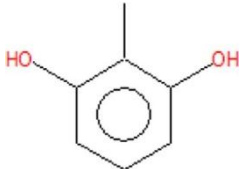
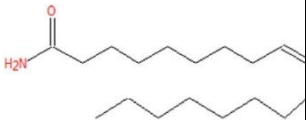
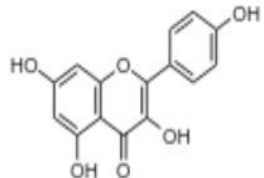
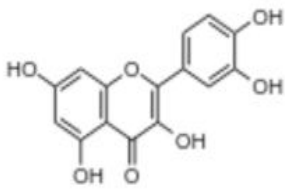
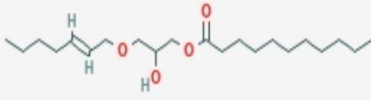
	4H-Pyran-4-one,2,3-dihydro-3,5- dihydroxy-6-methyl-		[18]
	Furan,2,3-dihydro-4-methyl-		[18]
	Catecholborane		[18]
	2-Fluoropyridine		[18]
	1,2,3-Propanetriol,1-acetate		[18]
	3,4-Furandiol,tetrahydro-,trans-		[18]
	1-Nitro-.beta.-d-arabinofuranose,tetraacetate		[18]

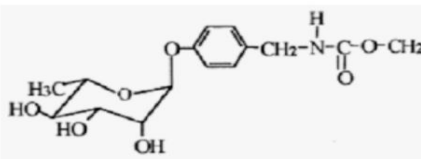
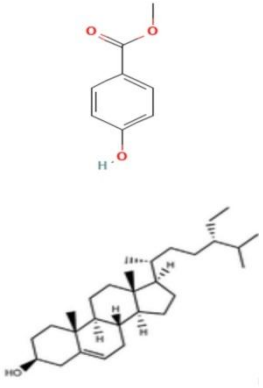
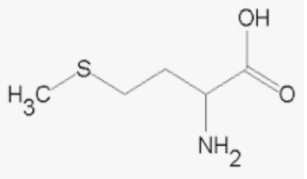
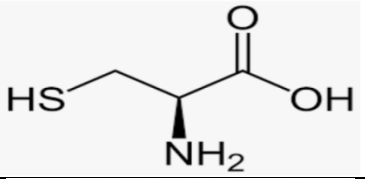
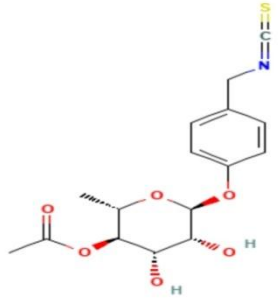
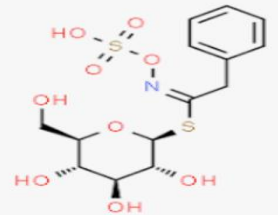
1,8-Diamino-3,6-dioxaoctane		[18]
1,7-Diaminoheptane		[18]
N,N-Dimethylacetamide		[18]
2-Oxoglutaric acid		[18]
Oxazolidine,2-ethyl-2-methyl-		[18]
Heptanal		[18]
6-Methoxy-3-pyridazinethiol		[18]
3-Piperidinol		[18]
1,3-Propanediol,2-ethyl-2-(hydroxymethyl)-		[18]

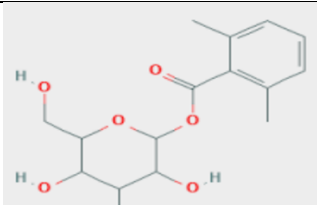
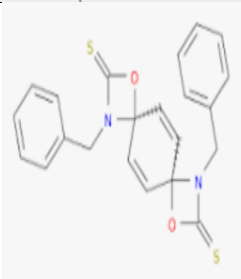
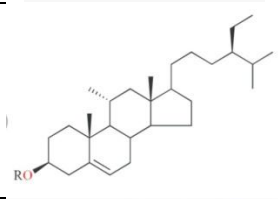
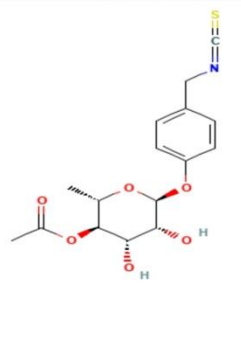
	Benzeneacetonitrile,4-hydroxy-		[18]
	Benzenebutanal,.gamma a.,4-dimethyl-		[18]
	2(4H)-Benzofuranone,5,6,7,7 a-tetrahydro-4,4,7 a-trimethyl-		[18]
	Ethanamine,N-ethyl-N-nitroso-		[18]
	Propanoic acid,2-methyl-,octyl ester		[18]
	3-Deoxy-d-mannoic lactone		[18]
	D-Glycero-D-ido-heptose		[18]
	D-erythro-Pentose,2-deoxy-		[18]
	N-Methoxy-1-ribofuranosyl-4-imidazolecarboxylic amide		[18]
	Formamide,N,N-dimethyl		[18]

	D-Talonic acid lactone		[18]
	Sorbitol		[18]
	Allo-Inositol		[18]
	D-chiro-Inositol, 3-O-(2-amino-4-((carboxyiminomethyl)amino)-2,3,4,6-tetrahydroxy-.alpha.-D-arabinose-hexopyranosyl)-		[18]
	Inositol		[18]
Leaves	Cyclohexane, 1-methyl-4-(2-hydroxyethyl)-		[18]
	Hexadecanoic acid, methyl ester		[18]
	n-Hexadecanoic acid		[18]

	Phenol,2-methyl-		[18]
	(1S)-Propanol,(2S)-[(tert. butyloxycarbonyl)amino]-1-phenyl-		[18]
	9-Octadecenoic acid(Z)-,methyl ester		[18]
	Phytol		[18]
	9,12,15-Octadecatrienoic acid,(Z,Z,Z)-		[18]
	Octadecanoic acid		[18]
	4-Allyl-3-(dimethylhydrazono)-2-methylhexane-2,5-diol		[18]

	Benzyl β -d-glucoside		[18]
	4,6-dimethyl-2-propyl-1,3,5-dithiazinane		[18]
	1,3-Benzenediol, 2-methyl-		[18]
	9-Octadecenamide, (Z)-		[18]
Mature flowers	Kaempferol		[19]
	Quercetin		[19]
Whole pod	O-[2'-hydroxy-3'-(2'-heptenyloxy)]-propylundecanoate		[13]

	O-ethyl-4-[(α -1 rhamnosyloxy)-benzyl]carbamate		[14]
	methyl-p-hydroxybenzoate and β -sitosterol		[15]
Mature seeds	Methionine		[12]
	Cysteine		[12]
	4-(α -L-rhamnopyranosyloxy)-benzylglucosinolate		[14]
	Benzylglucosinolate		[14]

	Moringyne	 The structure shows a six-membered ring with an oxygen atom at the top. It has hydroxyl groups (-OH) at the 2, 3, and 6 positions. A methyl group is attached to the 4-position. A 3,4-dimethylbenzoyloxy group is attached to the 5-position.	[15]
	Pterygospermin	 The structure is a complex bicyclic system with two nitrogen atoms and two sulfur atoms. It features a central ring system with various substituents, including a benzyl group and a phenyl ring.	[20]
	B-sitosterol-3-O-β-D-glucopyranoside	 The structure shows a steroid nucleus with a hydroxyl group at the 3-position. The 3-OH is linked to a glucose molecule via a β-glycosidic bond. The glucose is in its pyranose form. The steroid has several methyl groups and a long side chain at the 17-position.	[21]
	4-(α-L-rhamnosyloxy)benzyl isothiocyanate	 The structure shows a rhamnose molecule in its pyranose form. It has a hydroxyl group at the 1-position and an acetate group at the 2-position. A benzyl isothiocyanate group is attached to the 4-position of the rhamnose ring.	[22]

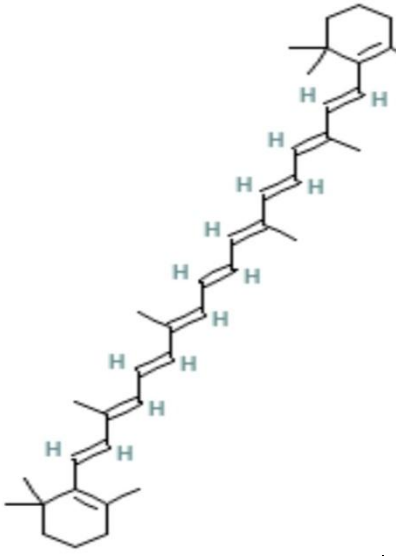
Seed oil	beta carotene	 <p>[23]</p>
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Table 2
Medicinal uses of *Moringa oleifera*

Parts and its form	Pharmacological activities
Crude ethanolic extract of dried seeds, Hot water infusions of flowers, leaves, roots, seeds and bark, Crude methanolic extract of the roots	Anti-inflammatory[24]
Oil from dried seeds, Methanol and ethanol extract of free dried leaves	Antioxidant[25]
Defatted and shell free seeds, Fresh leaves juice, Roots and bark	Antimicrobial[26]
Aqueous extract of stem bark, ethanolic extract of leaves, ethanolic and aqueous extracts of whole pod and their parts, namely, coat, pulp and seeds	Cardiovascular[27]
Leaves and fruits	Antihyperlipidemic[28]
Methanolic extract of roots	CNS depressant[29]
Aqueous or ethanolic extract of bark and roots	Antifertility[30]
Paste of leaves, Ethanolic extract of roots	Anticancer[31],[32]
Aqueous or ethanolic extract of roots and flower, Ethanolic extract of leaves	Antihepatotoxic[33]
Methanolic extract of leaves and flower buds	Antiulcer[34]
Ethyl acetate extract fraction of Leaves	Antidiabetic [35]
Leaves and pods	Antihypertensive [36][37]
Leaves	Antibacterial[38]
Leaves	Antifungal[39]
Flower	Anti-inflammatory[40]

Leaves	Anti-asthematic[41]
Roots	Antioxidant[42]

Conclusion

Moringa oleifera Lam (Moringaceae) is a highly sought-after plant that grows in a wide range of tropical and subtropical climates. This plant's leaves, roots, seed, bark, and flower have anticancer, antipyretic, antiepileptic, anti-inflammatory, antiulcer, and antibacterial qualities, and are used in traditional medicine, particularly in developing countries, to treat a variety of ailments. The purpose of this study is to provide comprehensive information on the phytochemical components and pharmacological actions of the medicinal plant *Moringa oleifera*. Future research targeted at generating a breakthrough therapeutic medication will benefit from the insights offered in this study.

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