

# Ethnomedicinal use, phytochemical constituents and bioactivity of wild edible fruits commonly consumed in Burkina Faso

## ABSTRACT

The screening of bioactive phytochemical constituents in edible fruits and vegetable has been interested by researchers owing their benefit property on consumer's health. Fruits are used in ethnomedicinal cure to treat numerous diseases including metabolic and microbial diseases. They are also used in human or animal nutrition because of their high energy value and their mineral contents. The pharmacological proprieties of fruits phytochemical constituents include antioxidant, anticancer, anti-mutagenic, antimicrobial, anti-inflammatory and anti-neurodegenerative properties. These bioactive compounds are among others flavonoids, phenolic, anthocyanin, phenolic acids, stilbenes, tannins, as well as sugars, essential oils, carotenoids, vitamins, and minerals. This review points to summarize the ethnomedicinal use, the phytochemical constituents and the bioactivity of wild edible fruits commonly consumed in Burkina Faso.

*Keywords: Bioactivity; Ethnomedicinal; Phytochemical; Nutrition; Wild edible fruits*

## 1. INTRODUCTION

Fruits have been extensively consumed since the primers of human civilization, due to their unique and delicate flavor, being rich sources of minerals and having high amounts of water, protein, fiber, and carbohydrates. Lipids are present in low values, which make them excellent to be included in low-caloric diets. Wild edible fruits which have been identified to possess high nutritional value play an important role in the rural poor and tribal communities in the form of food fortification and nutrient supplement[1]. Beyond the nutritional characteristics, fruits have been also extensively studied for their medicinal properties, mainly due to their richness in bioactive compounds. Several epidemiological, experimental and clinical studies suggested that dietary intake of fruits rich in antioxidant compounds reduces the risk of the development of diseases associated to stress oxidative such as cancer, diabetes, neurodegenerative disorders or cardio -vascular diseases. These pharmacological properties of fruits have been attributed to common molecules present in fruits such as, vitamins, carotenoids, tannins, flavonoids and polysaccharides[2]. In Africa, researches on wild edible plants also endeavors to promote the preservation of these species, actually under threat by human daily activities and the strong anthropic pressure associated with ecosystem degradation caused by soil infertility and climatic changes. The importance of wild edible fruits in the rural population's nutrition is widely recognized in the tropics and subtropics areas. Wild edible fruits are safe to consume owing their dietary fiber, vitamins, mineral, sugar, proteins, fat and other dietary compounds such as anthocyanin, flavonoids and carotenoids [3]. In Burkina Faso, wild edible fruits are potential for the economic development toward their commercialization. These fruits are directly consumed freshly or cooked, or used to extract oils or drink juice [4]. Moreover, they are traditionally used to treat numerous diseases including metabolic and microbial diseases. Wild fruits are receiving increasing interest from researchers because of their medicinal properties, nutritional value, vitamin and mineral contents. Their pharmacological properties commonly studied are antioxidant, anti-cancer, anti-inflammatory and antimicrobial potent [5]. This review points to summarize the ethnomedicinal use, the phytochemical constituents and the bioactivity of wild edible fruits commonly and frequently consumed in Burkina Faso.

**43 2. ETHNOMEDICINAL USES OF WILD EDIBLE FRUITS**

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46 Medicinal plants have been used in various ways for the treatment of diversified diseases. For many  
47 years, researchers have grown interest among the use of different medicinal plant from folklore  
48 system of medicine for the treatment of numerous ailments The folklore system of medicine consists  
49 of several plants with a variety of medicinal, pharmacological and therapeutic importance and  
50 therefore represents a priceless reservoir of novel and potential bioactive ingredients[6,7]. In African  
51 folklore system of medicine, wild edible fruits are used to treat a large variety of diseases (table 1).  
52 The administration mode is diversified such as dietary intake, pomade or purgative. The diseases  
53 treated include microbial diseases, nutritional diseases and metabolic diseases. So, fruits of *A.*  
54 *adigitata*, *B. aethiopum*, *D. microcarpum*, *D. mespiliformis* and *F.sycomorus* trees are used to treat  
55 dermatitis, dysentery, leucoderma, malaria, tuberculosis and meningitis [8,9,10,11]. Fruits of *G.*  
56 *erubescens*, *V. doniana*, *S. birrea*, and *Z. mauritiana* are used to treat metabolic diseases such as  
57 cancer, obesity, diabetes and hypertension [2, 12]. Wild edible fruits such as fruits of *A. senegalensis*,  
58 *T. indica* and *D. microcarpum* are used in avitaminosis or in diet deficiency to remedy some nutritional  
59 diseases such as scorbutic, goiter, kwashiorkor and marasmus [7]. Fruits of *A. digitata*, *D. guineense*,  
60 *F. sycomorus* and *X. americana* are used in human reproduction to improve lactation, to treat  
61 inflammation of uterus and ovaries and to treat sterility and infertility[13,14]. Fruits of *A. senegalensis*  
62 are used as antidote against venomous bite [6]. These multiple uses of fruits in folklore system of  
63 medicines are due to their bioactive phytochemical constituents like, vitamins, polysaccharide,  
64 triterpenes, anthocyanin, coumarins, flavonoids and alkaloids. So, these phytochemical constituents  
65 are now recognized in the literature to have pharmacological properties such as anti-inflammatory,  
66 anti-microbial, enzymes inhibitory and anti-cancer properties [2].

67 **Table 1: Ethnomedicinal use of wild edible fruits**

<b>Plant names</b>	<b>Country</b>		<b>References</b>
<i>Adansonia digitata</i> L. (Bombacaceae)	Malawi, Burkina Faso, Nigeria	Bronchial asthma, dermatitis, microbial disease, dysentery, diarrhea, galactagogue, diabetes	[11,15,16,10]
<i>Annona senegalensis</i> Pers. (Annonaceae)	West African countries	Venomous bites, Kwashiorkor and marasmus	[6,7]
<i>Balanites aegyptiaca</i> (L.) Del. (Balanitaceae)	Senegal, Mali	Sore throat, constipation, eye irritation, leucoderma, whooping cough, antidiabetic, purgative	[17,18, 19]
<i>Borassus aethiopum</i> Mart. (Arecaceae)	Nigeria, Burkina Faso	Diarrhea, minor injuries, mouthwash, antimalarial	[20,21 ]
<i>Detarium microcarpum</i> Guill. et Perr. (Caesalpiniaceae)	Niger, Togo, Burkina Faso	Skin infection, tuberculosis, meningitis, itching, diarrhea	[22, 9]
<i>Dialium guineense</i> Willd (Caesalpiniaceae)	Nigeria	Diarrhea, palpitation, fever, to improve lactation, to check genital infection	[13]
<i>Diospyros mespiliformis</i> Hochst.(Ebenaceae)	Burkina Faso, Namibia	Malaria, diarrhea, toothaches, hemorrhoid, to increase nutritional value of infant porridge	[8,23]
<i>Ficus sycomorus</i> L.(Moraceae)	Boswana	Fungal infection,jaundice, dysentery, cough, diarrhea, skin infection, epilepsy, tuberculosis, sterility, infertility, chronic joint pains	[24, 14 ]
<i>Gardenia erubescens</i> Stapf. et Hutch.(Rubiaceae)	Burkina Faso	Obesity	[12]
<i>Vitex doniana</i> SWEET (Verbenaceae)	Benin, Guinea	Rheumatism, cancer, diarrhea, constipation, hypertension	[25, 2]
<i>Lannea microcarpa</i> Engl. et K. Krause.(Anacardiaceae)	Burkina Faso, Mali	Scurvy, rickets, cough, wound	[26, 27, 28]
<i>Parkia biglobosa</i> (Jacq.) R. Br. (Anacardiaceae)	Burkina Faso	Stomach ache, jaundice	[29, 8]
<i>Saba senegalensis</i> (A.Dc) Pichon var.(Apocynaceae)	Mali	Wound, to stop inflammation	[28]
<i>Sclerocarya birrea</i> (A. Rich.) Hochst. (Anacardiaceae)	West African countries	Hypertension, goiter	[30]
<i>Tamarindus indica</i> L. (Caesalpiniaceae)	Nigeria	Swelling, sore throat, rheumatism, blood tonic, fever, bile disorder, antiscorbutic	[31, 32]
<i>Vitellaria paradoxa</i> C.F. Gaertn. (Sapotaceae)	Burkina Faso, Ghana	Diarrhea, skin revitalizer	[8, 33]
<i>Ximenia americana</i> L. (Olacaceae)	Nigeria	Antiulcer, anti-inflammation of uterus and ovaries, anemia, cancer	[34]
<i>Ziziphus mauritiana</i> Lam. (Rhamnaceae)	India	Digestive disorder, weakness, obesity, diabetes, bronchitis, anemia	[35]

68 **3. NUTRITIONAL VALUES OF WILD EDIBLE FRUITS**

69

70 Fruits from natural forest trees constitute a good food supply for many people during food shortage. In  
71 several African countries, natural tree products constitute an important part of human diets and are  
72 also a potential source of vitamins, minerals, water, carbohydrates, fats, proteins, dietary fibers (table  
73 2). Mainly crudely consumed, they improve the daily food ration as an energy source and their content  
74 in micronutrients [36]. The common minerals found in wild edible fruits are calcium, potassium,  
75 copper, magnesium, manganese, iron; selenium, sodium, zinc, phosphorus. These minerals play a  
76 crucial role in human health. Potassium is a systemic electrolyte and is essential for coregulating ATP  
77 with sodium. Potassium is a major intracellular cation that maintains intracellular osmotic pressure.  
78 The depolarization and contraction of heart require potassium[37]. Phosphorus is a component of  
79 bones and teeth. As phosphate ion, it is required for formation of teeth and bones, production of high  
80 energy compounds such as ATP, creatine phosphate. It is also required for synthesis of coenzymes  
81 such as NAD<sup>+</sup> and NADP<sup>+</sup>, DNA and RNA synthesis and activation enzymes by phosphorylation[38].  
82 Magnesium is an activator of enzymes requiring ATP alkaline phosphatase, hexokinase, and  
83 phosphofructokinase. Iron is a component of many proteins or enzymes, notably cytochrome P450  
84 and hemoglobin. Deficiency of iron could lead to iron deficiency anemia which is more common in  
85 menstruating females and pregnant women[30]. Calcium is a very important mineral. It is a structural  
86 component of bones and teeth. It contributes to physical strength of bones and teeth. Calcium is also  
87 required in muscle contraction, blood coagulation, nerve impulse transmission[37]. Zinc is a  
88 component of metalloenzymes like carbonic anhydrase; alkaline phosphatase. Zinc is also a  
89 component of Zn – Cu superoxide dismutase which destroys superoxides and free radicals.  
90 Deficiency of zinc has been associated with poor wound healing, poor growth, impairment of sexual  
91 development and decreased acuity[30]. Sodium is an electrolyte present in extracellular fluid and is  
92 essential for coregulating ATP with potassium. Sodium (sodium bicarbonate) is also important in the  
93 regulation of acid-base balance[38]. Iodine is required for synthesis of thyroid hormones, thyroxine  
94 and triiodothyronine, needed to prevent goiter. Iodine deficiency has been associated with mental  
95 retardation and stunted growth in children[38]. Wild edible fruits contain a high level of primary  
96 metabolites such as carbohydrate, fats, proteins, dietary fiber and vitamins. They improve the daily  
97 food ration as an energy source. The medicinal properties of fibers are well known. Liberal  
98 consumption of dietary fiber from a variety of foods help protect against colon cancers and help  
99 normalize blood lipids and thereby reduce the risk of cardiovascular disease. Certain types of fibers  
100 slow down glucose absorption and reduce insulin secretion, this is of great importance to diabetics  
101 and non-diabetics. Dietary fibers help to prevent constipation and diverticular disease[37].  
102 Carbohydrates, fats and proteins are energetic compounds and their presence in high level in wild  
103 edible fruits justify the high nutritional value of these fruits. Among the consumed wild edible fruits in  
104 Burkina Faso, fruits which contain a most level of calories are *A. digitata*, *D. microcarpum*, *B.*  
105 *aegyptiaca*, *B. aethiopicum*, *P. biglobosa*, *S. senegalensis*, *T. indica*, *V. paradoxa* and *Z. mauritiana*  
106 with calorie values range from (212,25 to 379,32 Kcal/100g of fruits. Moreover essential amino acids  
107 and non-essential amino acids were found in the wild edible fruit. So, fruit pulp *B. aegyptiaca* contains  
108 essential amino acids such as Leucine, Valine, Lysine, Isoleucine, Threonine, Histidine, Methionine  
109 as well as non-essential amino acids such as Glutamic acid, Aspartic acid, Alanine, Tyrosine,  
110 Arginine, Serine, Serine and cysteine [17]. Concerning vitamins, they are solicited by the living  
111 organisms in low level for the normal metabolism. Vitamins commonly found in wild edible fruits are  
112 vitamins C, E, B1, K. The pharmacological role of vitamins is well known such as antioxidant,  
113 neuroprotective, anti-cancer [3]. Wild edible fruits are a potent source of vitamins justifying their  
114 ethnomedicinal use in avitaminosis. Variations observed between different reported data pertaining to  
115 the observed phytochemical,

116 mineral and nutritional content could be attributed to the biotic and abiotic factors such as diversity in  
117 genetic material, the nature of soil and the type of climate. According to the dietary recommendation  
118 for mineral elements [51], the daily dietary intake of 100 g of pulp of some wild edible fruit such as *B.*  
119 *aegyptia*, *B. aethiopum*, *D. microcarpum*, *P. biglobosa* and *D. guineense* may satisfy the need of daily  
120 mineral ration notably sodium, calcium, magnesium, phosphorus and potassium of children, adult and  
121 pregnant women. These findings suggest that some wild edible fruits could be exploited as food  
122 supplements to fight against mineral deficiency.

123

## 4. Table 2: Nutritional values of fruits

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Plants	Mineral content (mg/Kg of fruits)	Proximate composition (g/100g of fruits) and Vitamin content (mg/100g of fruits)	Energy value (Kcal/100g of fruits)
<i>A. digitata</i>	Ca:14,34-6580; Mg:4,14-2550; P:2,31-3054; Na:23; Mn:21-95,44; Fe:100-401,98; Zn:12,22-25,7; Cu:5,36-15 [15,36,39]	Moisture:13,5-91,31; Ash:5,27-7,8; Protein:2-6,3; fat:0,27-2,1; Carbohydrate:72,3-75; Fiber:27,89-52; Vitamin C:138-280 [15,36,39,16]	311,15 [36]
<i>A. senegalensis</i>	Not available	Moisture:68,21; Protein:8,88; fat:10; Carbohydrate:593 [40]	
<i>B. aegyptiaca</i>	Ca:1410-1640; Mg:440-730; K:11100-22200; P:480-510; Na:480; Mn:3,3; Fe:49,4-138; Zn:6,5-17,7; Cu:3,9-4,3 [17,41]	Moisture:17,7; Ash:4-16,31; Protein:4,2-9,51; fat:0,41-0,6; Carbohydrate:42,7-68,6; Fiber:5,3; Vitamin C:1,86-6,87 [17,19,41]	212,25 [17]
<i>B. aethiopicum</i>	Ca:418,1-6200; Mg:677,7-2029; K:1424-4574; Na:178-14060; Mn:65; Fe:31,5-218; Zn:8,2-322; Cu:13-541 [20,42]	Moisture: 6,88-65; Ash:3,3-6,53; Protein:3,94-6,33; Fat:1,19-7,73; Carbohydrate: 7,87-43,5; Fiber: 4,5-32,56; Vitamin C: 89,9 [20,42,43]	367 [42]
<i>D. microcarpum</i>	Ca:430-709,7; Mg:840-1135; K:9801-10170; P:0,63-2045; Na:150,9-1120; Mn:39,65-59,5; Fe:61,5-787,1; Zn:3,2-317; Cu:1,8-5,9; S:445,4; Nitrate:150,9-1120; Ammonium:1998,9 [36,38,37]	Moisture:11,06-95,07; Ash:3,1-4,47; Protein:2,86-4,68; Fat:0,7-2,23; Carbohydrate:65,38-81,21; Fiber:12,19; Vitamin K1:32,23; vitamin E :12.44; vitamin B2: 4.20, and folic acid 0.17 [36,38,37]	335,5 36
<i>D. guineense</i>	Ca:1990-5671; Mg:874,2-910,1; K:6190; Cl:205,4; I:0,28; Na:46,53-332,95; Mn:23,43 [44,45]	Moisture:10,6; Ash:2,82; Protein:3,12; Fat:0,4; Carbohydrate: 90,02; Fiber:3,64 44,45]	41,9 [36]
<i>D. mespiliformis</i>	Not available	Not available	
<i>F. sycomorus</i>	Not available	Not available	
<i>G. erubescens</i>	Ca:9775; Mg:4055; K:4755; Na:1165; Mn:123,7; Fe:472,6; Zn:277,8; Cu:3,69-113,7 [46,45]	Moisture:19,13-23,7; Ash:2,54-2,94; Protein:1,1-5,68; Fat:1,19-1,54; Carbohydrate:6,7-70,69; Fiber:14,57 [46,36]	
<i>V. doniana</i>	Ca:75-302,7; Mg:53-201; K:157-1272; P:165; Na:14-104; Fe:7,8-52; Zn:0,43; Cu:27 [47,48]	Moisture:16,66-30; Ash:3,33-11,5; Protein:3,24-8,24; Fat:2,67-34,62; Carbohydrate:28,4-58,56; Fiber:0,58-4,4; Vitamin A:0,27; Vitamin B6:20,45; Vitamin B1:18,33; Vitamin B2: 4,8; Vitamin C:35,58 [43,47]	
<i>L. microcarpa</i>	Ca:3,56; Mg:2,38; K:11,73; K:0,3; Mn:9,07; Fe:91,61; Zn:10,57; Cu:2,93 [36]	Not available	
<i>P. biglobosa</i>	Ca:11650; Mg:7000; K:3945; Na:1795; Mn:661,96; Fe:1814,5; Zn:437,52; Cu:447,48 [46]	Moisture:4-90,06; Ash:2,4-4,98; Protein:3,78-6,64; Fat:0,13-18; Carbohydrate:68,75-79,73; Fiber:8,75-12 [46,36]	351,25 [36]
<i>S. senegalensis</i>	Ca:810; Mg:47,5; P:357,5 [49]	Ash:2,8; Protein:0,53; Fat:8,92; Carbohydrate:74,23, Vitamin C:16,41; Malic acid:47,7; Fiber:13,52 [49]	379,32 [49]

<i>S. birrea</i>	Ca:350; Mg:190; K:3250; P:310; Fe:34; Zn:3,1; Cu:1,6 [41]	Moisture:86,3; Protein:0,7; Fat:0,5; Vitamin C:167 [41]	
<i>T. indica</i>	Ca:215,7-4547,4; Mg:250-1605,4; K:389,3-2300; P:163,4-1877,3; Na:273-1127,6; Mn:1,3-2; Fe:10,5-273,6; Zn:8-296; Cu:14,5-30 [50,51,52]	Moisture:11,19-42,7; Ash:1,69-6,9 ; Protein:2,4-9,15; Fat:0,14-7,4; Carbohydrate:51,5-69,9 ; Fiber:4,5-18,83 ; Vitamin C: 11,3-44,26 ; Caretonoid:0,025 [50,51,52,53]	216,86-502,84 [52,31]
<i>V. paradoxa</i>	Ca:2,33; Mg:0,94; K:11,73; P:0,16; Mn:3,68; Fe:88,9; Zn:5,75; Cu:2,93 [36]	Moisture:9,5-15,54; Ash:6,2-6,9 ; Protein:5,7-8,29; Fat:1,4-19,01; Carbohydrate:42,7-58,22; Fiber:17,4-44,5[54,55]	198,5 [55]
<i>X. americana</i>	Not available	Not available	
<i>Z. mauritiana</i>	Ca:238; Mg:92; K:2133; P:145; Na:198; Mn:1,6; Fe:2,1; Zn:0,6; Cu:0,9 [56]	Moisture:24,1; Ash:3,6 ; Protein:8; Fat:1,5; Carbohydrate:79,5 ; Fiber:5,3; Vitamin C:28,6 [56]	362,91 [56]

125 Ca: Calcium; Mg: Magnesium; K: Potassium; P: Phosphorus; Na: Sodium; Fe: Iron; Cu: Copper; Mn: Manganese; Zn: Zinc; Cl: Chloride; S:  
126 Sulphur.

127 **5. BIOACTIVITY OF WILD EDIBLE FRUITS AND HEALTH BENEFIT**

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129 Wild edible fruits are receiving increasing interest from researchers because of their medicinal  
130 properties, nutritional value, vitamin and mineral contents. Numerous fruits have been screened for  
131 their bioactive compounds. Common bioactive compounds found in wild fruits are flavonoids,  
132 carotenoid, coumarins, tannins, anthocyanin and vitamins. These phytochemical constituents have a  
133 crucial pharmacological properties including antioxidant, anti-cancer, anti-microbial, enzymes  
134 inhibition, gene expression modulator and anti-inflammatory (table 3). The presence of various  
135 antioxidant compounds in fruits is very promising according to their health benefits. Flavonoids in wild  
136 edible fruits such as *A. digitata* fruit are free radical scavengers and anticancer on stomach cancer cell  
137 line SGC7901 [57,58]. Anthocyanins from *L. microcarpa* reduce oxidative rout mediated by aflatoxin  
138 B1 on cellular protein, lipid and DNA [59]. The flavonoids rutin and isorhamnetin isolated from the fruit  
139 of *B. aegyptiaca* are antidiabetic[60]. Moreover, a pregnant glucoside 26-(O-β-D-glucopyranosyl)-22-  
140 O-methylfurost-5-ene-3β,26-diol-3-O-β-D-glucopyranosyl-(1,4)-[α-L-rham-nopyranosyl-(1,2)]-β-D-  
141 glucopyranoside isolated from this fruit has antidiabetic property by α-glucosidase and aldose  
142 reductase inhibition [61]. Phenolic compounds of *S. birrea* have a hypocholesterolemic action in  
143 healthy volunteer [62]. Maslinic acid isolated from fruit of *Z. mauritiana* prevent oxidative stress  
144 induced by CCl<sub>4</sub> in liver slice culture cell[35]. The pulp powder of fruit of *A. digitata* reduces the levels  
145 of total cholesterol in hyperlipidic patients probably due to the presence of procyanidines [63].  
146 Saponin, steroid, and flavonol glycoside from the fruit of *A. senegalensis* are anti-sickling [64].  
147 Diterpenes clerodane [3,4-epoxyclerodan-13E-en-15-oic acid ; 5R,8R-(2-oxokolavenic acid) ; 3,4-  
148 dihydroxyclerodan-13E-en-15-oic acid; 3,4-dihydroxyclerodan-13Z-en-15-oic acid] and, 2-  
149 oxokolavenic acid and copalic acid isolated from the fruit of *D. microcarpum* are anti-  
150 acetylcholinesterase and antifungal (*Cladosporium cucumerinum*) potent compounds [65]. An anti-  
151 inflammatory activity on carrageenan induced oedema in chicks was observed when a phenolic rich  
152 extract of fruit from *B. aethiopicum* was applied [66]. A group of odour-active compounds were  
153 quantified in *D. guineense* fruit such as linalool, limonene, 4-hydroxy-2,5-dimethyl-3(2H)-furanone,  
154 nonanal, (Z)-3-hexenal, cis-linalool oxide (furanoid), geranyl acetone, and cinnamyl acetate[67].  
155 Phenolic compounds of *S. birrea* fruits have anti-atherogenic effects in healthy humans[62]. The  
156 various biological properties of bioactive compounds of fruits are due to their capacity to reduce free  
157 radical or to stop lipid peroxidation by one electron or hydrogen atom transfer and to modulate enzyme  
158 activity or gene expression. Other bioactivities of tropical wild edible fruits are antimicrobial,  
159 insecticidal and molluscicidal [68,69].

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161 **Table 3: Bioactive compounds and bioactivities of fruits**

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Plants	Bioactives compounds	Bioactivities	References
<i>A. digitata</i>	Total phenolic contents: 50,1 ± 5,5 mgGAE/mL	DPPH: 1132,3 ± 251,6 µmol/L; FRAP: 1539,2 ± 733,3 µmol/L; ABTS: 1766,2 ± 234,03 µmol/L	[57]
	Aqueous and Methanol extracts	Anti-apoptosis role by restoring P <sub>53</sub> and Bcl-2 gene expression in Ehrlich ascites carcinoma	[58]
	Aqueous extract	Hepatoprotection against CCl <sub>4</sub> toxicity in rats	[70]
	Pulp powder	Reduction of the levels of total cholesterol in hyperlipidic patients	[63]
	Procyanidines B2: 533 ± 22,6 mg/100g; Vitamin C: 466 ± 2,5 mg/100g; Gallic acid: 68,5 ± 12,4 mg/100g; (-)-epicatechin: 43 ± 3 mg/100g	FRAP: 2810 ± 92,8 mgTEAC/100g; ABTS: 1520 ± 17,1 mgTEAC/100g; DPPH: 50,9 ± 0,49 %	[71]
<i>A. senegalensis</i>	Saponin; steroid, Flavonol glycoside	Anti-sickling	[64]
	Sabinene, α-humulene; Germacrene D; 1,8 cineole; E-β-caryophyllene; β-selinene; linalol; Terpinel-4-ol; α-terpineol; β-hydroxy-16-kaurene; Germacrene A; β-eudesmol; car-3-ene; δ-cardinene-γ-eudesmol	Antimicrobial	[6]
<i>B. aegyptiaca</i>	Balanitin-1; Balanitin-2 ; Balanitin-3	Molluscidal	[69]
	Rutin; Isorhamnetin	Antidiabetic	[60]
	Pregnan-5-ene-3β,16β,20(R)-triol-3O-(2,6-di-O-α-L-rhamnopyranosyl) -β-D-glucopyranoside		[72]
	Trigonelline	Hypoglycemic	[73]
	Saponin [26-(O-β-D-glucopyranosyl-3β,22,26-trihydroxyfurost-5-ene O-β-D-glucopyranosyl-(1,4)-[α-rham-nopyranosyl-(1,2)]-β-D-glucopyranoside	Larvicidal activity against <i>A. aegypti</i>	[68]
	26-(O-β-D-glucopyranosyl)-22-O-methylfurost-5-ene-3β,26-diol-3-O-β-D-glucopyranosyl-(1,4)-[α-L-rham-nopyranosyl-(1,2)]-β-D-glucopyranoside	Antidiabetic activity by α-glucosidase and aldose reductase inhibition	[61]
	Total phenolic content: 212 ± 2,6 mgGAE/g; Total flavonoid: 11,5 ± 1,3 mgAE/g; Vitamin C: 0,98 ± 0,44%	Antimicrobial, Antiradicalaire: DPPH (88,2%); Anticancer on stomach cancer cell line SGC7901	[19,74]
Ethanol 80 % extract	Hypocholesterolemic action in albinos rats	[75]	
<i>B. aethiopicum</i>	Total phenolic contents: 73,65 mg ETA/g	Total antioxidant activity: 329,4mgEAA/g; anti-inflammatory activity on carrageenan induced oedema in chicks	[66]
	Ethanol extract	Antioxidant activity: 39,81 ± 18,06 %	[43]
	Aqueous extract	Anti-radical activity DPPH: IC50 = 0,98 ± 0,05 mg/mL	[20]

	Methanol extract	Antidiabetic in alloxan induced diabetic rats	[76]
<i>D. microcarpum</i>	Diterpenes clerodane [3,4-epoxyclerodan-13E-en-15-oic acid; 5R,8R-(2-oxokolavenic acid); 3,4-dihydroxyclerodan-13E-en-15-oic acid; 3,4-dihydroxyclerodan-13Z-en-15-oic acid] and 2-oxokolavenic acid; copalic acid	Anti-radical DPPH, Anti-acetylcholinesterase and antifungal ( <i>Cladosporium cucumerinum</i> ) activities	[65]
	Total phenolic contents: 5978,33 ± 87,5 mgGAE/100g; Total flavonoids contents: 155,9 ± 1,89 mgQE/100g Powder	DPPH: 10729,41 mgAEAC/100g; FRAP: 48,85 mmol AEAC/100g; ABTS: 528 µmol AEAC/100g	[77]
		Increase red blood cells and white blood cells and hemoglobin concentration in rat	[78]
<i>D. guineense</i>	Total phenolic content: 1,16 ± 0,049 mgGAE/g	DPPH: IL=14,99 mg± 0,11 of fresh fruit; ABTS: 23,27 ± 1%	[79]
	Phenolic extract	Enhances reactive oxygen species detoxification in aflatoxin B <sub>1</sub> hepatocarcinogenesis	[80]
	Saponins, Flavonoids, Tannins	Antimicrobial on <i>Candida albicans</i>	[13]
	Triterpenoid Glycoside : 3-O-[α-D-xylopyranosyl]oleanolic acid	Molluscicidal	[81]
<i>D. mespiliformis</i>	Methanol/water soluble phytochemicals	Potent antioxidant on DPPH, Superoxide anion radicals	[82]
<i>F. sycomorus</i>	Total flavonoids: 0.527 ± 0.15mgQE/100g; Total phenolic .75±0.23mgGAE/100g	Antimicrobial activity on <i>E. coli</i> , <i>Proteus SPP</i> , <i>S. aureus</i> and <i>H. influenza</i>	[24]
<i>G. erubescens</i>	Anthraquinones, Tanins, Stérois et Triterpènes	Not available	[83]
<i>V. doniana</i>	Methanol extract Alkaloid, Saponin, terpenoid and flavonoid	Stall protein oxidation, lipid peroxidation and DNA fragmentation in acetaminophen-induced hepatotoxicity, Antioxidant 18,25 ± 8,18 %	[84] [43]
<i>L. microcarpa</i>	Antocyanin extract	Stall Aflatoxin B1-mediated oxidative rout on cellular protein, lipid and DNA	[59]
	Total phenolic content: 5,53 ± 0,12 mGAE/100g; Total flavonoid: 2,46 ± 0,02 mgQE/100g	Antioxidant DPPH: IC <sub>50</sub> =46,67 ± 2,05 µg/mL; <i>S. aureus</i> MIC= 0,63 mg/mL	[26]
<i>P. biglobosa</i>	Total phenolic contents: 104,66 ± 2mg/100g; Total flavonoid: 73,06 ± 0,02 mg/100g	B-carotene/linoleic acid inhibition: 79,4 ± 0,2%	[85]
<i>D. mespiliformis</i>	Methanol/water soluble phytochemicals	Potent antioxidant on DPPH, Superoxide anion radicals	[82]
	Phenolic extract	Stall Aflatoxin B1-mediated oxidative rout in the liver of male rats	[29]
<i>S. senegalensis</i>	b-carotene: 1559 µg/100 g of fruits		[83]
<i>S. birrea</i>	Aqueous/methanol extract	Potent antioxidant on DPPH, Superoxide anion radicals and lipid peroxidation inhibition	[86]
	Juice: total phenolic contents:56 mg of pyrogallol equivalent dl <sup>-1</sup>	Potent antioxidant:382 mg of vitamin C equivalent.dl <sup>-1</sup> ;	[62]

<i>T. indica</i>	Aqueous extract	Hypocholesterolemic action in healthy volunteer Increase crustacean larvae lethality with LC <sub>50</sub> =27 μL/mL	[53]
<i>V. paradoxa</i>	Tanin: 1.2 ± 0.01 mg/g, Phenol : 55.6 ± 0.03 mg/g ; Saponin: 7 ± 0.05 mg/g; Flavonoid: 64.8 ± 0.01 mg/g	Inhibition of lipid peroxidation <i>in vitro</i>	[87]
<i>X. americana</i>	Yellow flavonoids content: 22,07mg/100g; Anthocyanin content:1,92mg/100g; Polyphenol content: 3051,62 mg/100g	DPPH:481,4 g fruit/g DPPH	[88]
<i>Z. mauritiana</i>	Maslinic acid	Prevent oxidative stress induced by CCl <sub>4</sub> in liver slice culture cell	[35]
	Methanol extract	Antibacterial potent and anticancer on HeLa cell	[89]

163 **5. CONCLUSION**

164

165 This review demonstrates that tropical wild edible fruits are a source of variety of bioactive  
166 compounds including therapeutic and dietary compounds. The presence of these bioactive  
167 compounds in fruits justify their ethnomedicinal uses in all parts of African regions. The health benefit  
168 of fruits are mainly ascribed to phenolic compounds and vitamins, which result mostly from  
169 antioxidant, anticancer, anti-mutagenic, antimicrobial, anti-inflammatory, and neuroprotective  
170 properties. Bio guiding fractionation of fruit might promote the development of alternative therapeutic  
171 compounds for the prevention and treatment of various diseases and disorders.

172

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