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REVIEW ARTICLE

A REVIEW ON TRADITIONAL USES, PHYTOCHEMICAL AND PHARMACOLOGICAL PROFILES, SPIRITUAL AND ECONOMIC VALUES, AND TOXICITY OF *DACRYODES EDULIS* (G. DON) H.J. LAM.**¹TENE TCHEGHEBE Olivier, ¹Fouodjouo Moïse, ²SEUKEP Armel Jackson, ³NGOUAFONG TATONG Francis**¹Inorganic Chemistry Department, Faculty of Science, P.O. Box 812, University of Yaounde I²Biochemistry Department, University of Dschang, P.O Box 67 Dschang; West Region, Cameroon³Chemistry Department, University of Dschang, P.O Box 67 Dschang; West Region, Cameroon

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ABSTRACT

Since ancient times, medicinal plants have played a key role in the management of some health problems and in the discovery of new drugs. For many years, *Dacryodes edulis* (G. Don) is reported to be used by local populations of West and Central Africa for its nutritional values and by traditional medicine practitioners for the treatment of many diseases among which: leprosy, dysentery, anaemia, spitting blood, debility, stiffness, tonsillitis, skin diseases (such as scabies, ringworm, rash and wound), worms, ear infections, fever, headache, malaria, cephalgia, treatment of snakebite, jiggers, protection of the skin, oral hygiene and cicatrization of wounds. Many parts of this tree have been scientifically studied for their numerous therapeutic activities such as: antioxidant, antimicrobial and antibacterial, antimalarial, Haemopoietic, Cardiovascular and Anti-drepanocytary. Moreover, its spiritual and economic values are of great import for the local populations. No part of this plant has been mentioned to be toxic. This review study is an attempt to give a detailed survey of the literature on its traditional uses, phytoconstituents, pharmacological activities, spiritual and economic values, as well as its toxicity.

Keywords: *Dacryodes edulis*, traditional uses, phytochemical, pharmacological, spiritual and economic values, toxicity.**DOI:** <http://dx.doi.org/10.22270/jddt.v6i5.1276>**URI:** <http://jddtonline.info/index.php/jddt/article/view/1276>**INTRODUCTION**

Plants have been used, since ancient times by mankind either as food or as source of their medicines. *Dacryodes edulis* (G. Don) is one of those plants currently used by indigenous persons for its nutritional value and to manage health problems. The generic name *Dacryodes* is derived from the Greek word *Dakruon* meaning tear, referring to resin droplets on the bark surface of its members, while *edulis* means edible, emphasizing the importance of the nutritious fruit in the plant's cultivation¹. The plant belongs to the Burseraceae family whose members are characterized by an ovary of 2 to 5 cells, prominent as in ducts in the bark, wood and intrastaminal disk². The genus *Dacryodes* counts about 40 species³. The common names of *Dacryodes edulis* are in English: African pear, African pear tree, Bush butter, Bush butter tree, Bush fruit tree, Eben tree, Native pear; and in French: Safoutier or prunier⁴. It is cultivated in most rural communities by the peasant farmers, mostly for its edible fruits. But all parts of this tree, including leaves,

bark, roots, resin, seeds and fruit pulp are used for medicinal purposes.

Botanic description:


Dacryodes edulis is a medium-sized, evergreen tree attaining a height of 18-40 m in the forest but not exceeding 12 m in plantations⁵. The plant can be cultivated widely, since it adapts well to differences in the duration of day light, temperature, rainfall, soils and altitudes. It is generally low branching with a deep dense crown. The scars of bark exude a limpid gummy substance called resin which becomes opaque while solidification and spreads a strong odor⁶. The fruit is red, turning blue-black when ripe with unpleasant turpentine smell. The fruit is oval in shape and matures within the months of May and June. The fruit consists of large seeds, surrounded by thin mesocarp. The bowl is 50-170 cm in diameter, short, shallow fluted and more or less sinuous. The bark is yellowish-grey to pale-grey, often rough with lenticels and horizontal folds exuding white aromatic resin. Leaves are compound, imparipinnate, with 5-8 pairs of leaflets. They are

glossy and pubescent, the pubescence disappearing with age. They are oblong-lanceolate or ovate-lanceolate, up to 20 (-30) x 6 (-8) cm, broadly cuneate to rounded and asymmetric at base. They are acuminate at apex and margin is entire and glabrescent. Flowers are unisexual, subtended, 3 lobed and conspicuous with caducous low bract^{3, 7}. However, bisexual state for the flower had been reported, emphasizing that the flowers gather in panicles which to fruit bunches. Flowers are fragrant, about 5 mm across and are trimerous except for the ovary⁸. They are arranged in dense, ferruginous, stellate-tomentose inflorescence. Sepals and petals are 3, the former showing brown color and the latter, cream color. Stamens are 6 and are slightly shorter than petals. Disc is also 6 but lobed, surrounding the two-celled, glabrous ovary. Styles are very short and stigma is 2-4 lobed. Inflorescence axis is 10-42 cm long or may be longer and deeply grooved. Fruits are ellipsoid drupe and vary in size, 4-12x3-6 cm, resembling olives. The exocarp is thin and pink ripening to form blue-green, purple or brilliant black. The fruits are one-seeded, with pulpy pericarp, about 5 mm thick and thin, cartilaginous endocarp. Seeds are oblong-ellipsoid, up to 5.5 cm long. The cotyledons are very much thickened and deeply folded or conduplicate, appearing palmately lobed^{7,9}.

GEOGRAPHICAL DISTRIBUTION:

Dacryodes edulis is an indigenous fruit tree found in West and Central Africa, as well as in the Gulf of Guinea^{5, 10}, but is native to southern Nigeria and perhaps to Cameroon¹¹. The natural range extends from Angola in the South, Nigeria in the North, Sierra Leone in the West and Uganda in the East. It is also cultivated in Malaysia¹².

SCIENTIFIC CLASSIFICATION

Kingdom: Plantae	
Genus: <i>Dacryodes</i>	
Order: Sapindales	
Specie: <i>Edulis</i>	
Scientific name: <i>Dacryodes edulis</i> (G. Don) H.J. Lam	
Family: Burseraceae	Plant and fruits image

TRADITIONAL USES

Dacryodes edulis is a versatile plant in African traditional medicine, as its various parts are employed for the treatment of several diseases. Its bark has long been used in Nigeria to cicatrize wound (in this case, the bark is pulped and then applied directly to the wound)¹³, and for the treatment of leprosy, dysentery, anaemia, spitting blood, debility, stiffness, tonsillitis and skin diseases^{14, 15}. The leaves are often crushed and the juice released to treat generalized skin diseases such as scabies, ringworm, rash and wound, while the stem or stem twigs are employed as chewing sticks for oral

hygiene^{16, 17}. When chewed with kola nut, its leaves serve as an antiemetic, while its leaf sap could be used for treating ear infections, fever, headache, malaria and cephalgia¹⁸. In Democratic Republic of Congo, the plant is employed for the treatment of various ailments: the decoction of the bark is taken orally to treat leprosy. It is also used as gargle and mouth-wash to treat tonsillitis¹⁹. The bark is comminuted with melegueta pepper to cure dysentery, anaemia, spitting blood and as an emmenagogue; when mixed with palm oil, it is applied topically to relieve pains, debility, stiffness and skin diseases¹⁹. In Congo Brazzaville, the leaves are boiled with those of *Lanata camara*, *Cymbopogon citratus* and *Persea americana* in water to form a decoction for treating malaria. A steam bath can also be taken from the decoction to treat the same ailment²⁰. Boiling the leaves with those of *Persea americana* alone can be used to treat headache and cephalgia, and can serve as antalgic²⁰. Recently, Jiofack *et al* reported that the leaves are made into plaster to treat snakebite in Southwest Cameroon²¹. The bark resin is used in Nigeria to treat parasitic skin diseases and jiggers^{14, 15}. When applied in lotions and creams, the resin smoothens and protects the skin⁶. The aroma of the resin when liberated through burning is believed to ward off evil spirit in Nigeria²². In western Cameroon, leaves and bark of *Dacryodes edulis* are associated to those of *Citrus limonum* and *Cymbopogon citratus*, and then boiled. The resulting liquid is drunk in order to cure malaria. Its leaves are also known in this part of the country to be effective against digestive disorders, toothache and earache. Its barks extract is equally used to cure dysentery and anemia (Personal investigation), while it fruit pulp when getting ripe is eaten raw or, boiled or roasted and eaten with cooked cassava or with braised corn. The pulp may also be boiled or roasted to form a kind of butter, since cooked flesh of the fruit has a texture similar to butter⁷. Oil from the fruit is rich in amino acids and triglycerides can augment common household oils^{6, 14}.

REPORTED PHYTOCONSTITUENTS

Many scientific researchers have been carried out in order to determine the chemical composition of *Dacryodes edulis*. Almost all parts of the plant are concerned by these researches, but leaves, stem bark and fruit seeds are the most studied. The results showed the presence of lipids, volatile components and bioactive components in *Dacryodes edulis*.

Lipids and volatile components:

The fruit pulp of the plant is rich in lipid^{23, 24}. In a study conducted by Koudou *et al* aimed to evaluate volatile components, antioxidant and antimicrobial properties of the essential oil of *Dacryodes edulis* from Gabon, the hydrodistillation of the resins from this tree gave a mobil oil in 6.78% yield (w/w). A total of 29 compounds were identified (98.52%). They noted that the oil contains exclusively monoterpenoids with hydrocarbons (72.25%) being dominant. The oxygenated compounds accounted for (25.11%) of the constituents of the oil. Among the hydrocarbons, 5monoterpenoids were

dominant: Sabinene (21.76%), terpinene-4-ol (19.79%), α -pinene (17.47%) and p-cymene (11.29)²⁵. They also noted that the essential oil is bactericidal for certain strains tested and its antibacterial spectrum is middle, and that the oil possesses a good antioxidant activity.

Qualitative and quantitative analysis of bioactive components:

To ascertain the phytochemical components responsible for the ethno-medicinal properties, a qualitative and quantitative screening of the bark of the tree source from Benin City and South-South Nigeria was conducted by Ogboru RO et al²⁶. The results showed that alkaloids(18.13 mg/kg), Phenolic compounds (22.01mg/kg), Flavenoids (60.91mg/kg), Tannins (18.16 mg/kg), Saponins (3.16 mg/kg), Anthraquinones (12.16 mg/kg), Cardiac glycosides (0.81 mg/kg) and steroids (0.91 mg/kg) were significantly present in the sample. Another study destined to evaluate the phytochemical contents and medicinal values of *Dacryodes edulis* and *Raphia hookeri* exudates was conducted by Okwu and Nnamdi in 2008²⁷. Their phytochemical screening of *Dacryodes edulis* also showed bioactive compounds comprising saponins (2.08–3.98mg 100g⁻¹), alkaloids (0.28–0.49 mg 100g⁻¹), tannins (0.47–0.72 mg 100g⁻¹), flavonoids (0.26–0.39 mg 100g⁻¹), and phenolic compounds (0.01–0.05 mg 100g⁻¹). The carbohydrates, lipids and protein content were 77.42–78.90%, 2.02–4.185% and 16.63–18.38% respectively. They also showed that exudates are a good source of water soluble vitamins; ascorbic acid (7.04–26.40 mg 100g⁻¹), niacin (3.12–4.00 mg 100g⁻¹), riboflavin (0.14–0.54 mg 100g⁻¹) and thiamine (0.15–0.22 mg 100g⁻¹), respectively. Also, the plants exudates are good sources of minerals such as Ca, Mg, P, Fe, Zn, Cu and Mn while Cr and Co were trace. More recently, the phytochemical, vitamins and proximate composition of *Dacryodes edulis* at different stages of maturation were investigated by Duru Majesty et al²⁸. Fully matured but not darkened, half darkened, and fully darkened *D. edulis* samples were used. The results obtained for phytochemical composition showed that flavonoids (0.67 \pm 0.27 – 2.42 \pm 0.32 mg/100g), alkaloids (0.42 \pm 0.13 – 1.50 \pm 0.25 mg/100g), saponins (0.21 \pm 0.04 – 1.29 \pm 0.41 mg/100g), tannins (3.10 \pm 0.11 – 5.78 \pm 0.67 mg/100g), cyanogenic glycosides (0.03 \pm 0.02 – 0.05 \pm 0.00 mg/100g) and oxalate (1.34 \pm 0.91 – 4.97 \pm 0.24 mg/100mg). Those for vitamins revealed that thiamine (0.95 \pm 0.53 – 0.26 \pm 0.06mg/100g), riboflavin (0.23 \pm 0.11 – 1.69 \pm 0.21 mg/100g), niacin (0.17 \pm 0.02 – 0.93 \pm 0.19mg/100g), ascorbic (0.07 \pm 0.81–0.02 \pm 0.00mg/100g), and tocopherol (0.29 \pm 0.16–0.90 \pm 0.46 mg/100g) while proximate content showed the presence of moisture (26.12 \pm 0.16 – 32.10 \pm 2.10 %), crudeprotein (5.13 \pm 2.39 – 8.25 \pm 1.12 %), lipid (31.52 \pm 10.75 – 37. 31 \pm 1.07 %), ash (2.89 \pm 0.13 – 4.16 \pm 2. 11 %), crude fiber (2. 10 \pm 1.34 – 11.21 \pm 0.19 %), carbohydrate (16.07 \pm 1.15 – 23 – 14 \pm 6.97 %) and energy value (400.68 \pm 0.21 – 450.59 \pm 12.01 kcal/100g).

Alkaloids possess a lot of pharmaceutical activities which includes antihypertensive, antiarrhythmic,

antimalarial and anti-cancer functions²⁹. Anthraquinones and steroids constituents promote the plant in the treatment and therapeutic applications as arrow poisons or cardiac drugs as laxatives³⁰. The presence of anthraquinones was reported to have anti-oxidant, antimicrobial, anti-viral, anti-malaria and anti-tumor activities³¹. The presence of alkaloids also indicates that the bark of *Dacryodes edulis* can be useful as a muscle relaxant in clinics as reported by Doughari³². The presence of flavonoids in a plant indicates its anti-allergic, anti-inflammatory³³, anti-cancer^{34, 35}, anti-oxidant³⁶ and hypo-lipidemic effects. Tannin rich medicinal plants are used to heal a lot of illnesses; such as leucorrhoea, rhinorrhea and diarrhea. More recently, tannins have gained medical interest, because of the high prevalence of deadly ailments such as AIDS and numerous cancers³⁷. In the dyestuff industry, tannins are useful as caustics for dye and ink production. Also, in the food industry, tannins have proved usefulness in the purification of wine, beer and fruit juices and also as coagulants in rubber production³⁸. Saponins are responsible for antimicrobial, antifungal, anti-inflammatory, anti-yeast and antidote activates. The function of saponins in plants generally serves as anti-feedant and to protect the plant against microbes and fungi³⁹.

From these different studies, we can understand that various parts of the plant can serve as food for indigenous people and its exudates can be potential sources of feedstock for the pharmaceutical industry. This gives credence to the medicinal benefits that this plant has been used for in the past years.

Effect of boiling on the phytochemical constituents and antioxidant properties of *Dacryodes edulis* seeds *in vitro*:

A study aimed to investigate the effect of boiling on the antioxidant properties of *Dacryodes edulis* seed extract using *in vitro* parameters such as free radical scavenging ability against 2, 2-diphenyl -1-picrylhydrazyl (DPPH) radical, iron (III) reducing and iron (II) chelating ability was carried out by Ogunmoyole et al⁴⁰. Furthermore, the ability of both extracts (boiled and unboiled) to offer protective benefit against lipid peroxidation in cerebral and hepatic tissues of rat was assessed. Moreover, the effect of boiling on the phytochemical constituents (total phenolics, flavonoids and vitamin C) of the seed extracts was measured. Results indicate that boiling significantly ($P < 0.05$) potentiates the total phenolic [(Boiled 60.1 \pm 0.88 mg/g (GAE), Unboiled 30.2 \pm 0.68 mg/g (GAE)] and flavonoid [(Boiled: 50.02 \pm 0.12 mg/g (QE), Unboiled: 35.8 \pm 0.15 mg/g (QE)] content but mildly depleted the vitamin C content [Boiled: (36.9 \pm 0.44mg/g; Unboiled: 40.1 \pm 0.21 mg/g]. Similarly, boiling markedly increased the antioxidant properties (free radical scavenging, iron (II) chelating, iron (III) reducing and inhibitory effect against pro-oxidant-induced lipid peroxidation) of the seed extract. From the foregoing, the wide usage of African pear as remedy for ailment in folk medicine may be due to its phytochemical constituents which are potentiated by boiling. Hence,

information from this study would create public awareness especially to traditional medical practitioners who are involved in the act of boiling the fruit to get the extract used for medicinal purposes.

PHARMACOLOGICAL ACTIVITIES

Antioxidant activity:

In a study conducted in Cameroon by Agbor *et al*, the extracts of 42 medicinal plants used for anaemia, diabetes, AIDS, malaria and obesity were investigated for phytochemical substances and antioxidant properties. The leaves of *Dacryodes edulis* elicited very high antioxidant effect when analyzed against three assay methods: Folin (Folin Ciocalteu Reagent), FRAP (Ferric Reducing Antioxidant Power) and DPPH (1, 1-diphenyl-2-picrylhydrazyl), ranking second behind *Alchornea cordifolia*⁴¹. This antioxidant property was attributed to the presence of flavonoid in the plant. The essential oil of the plant resin also demonstrated good antioxidant activity. In a DPPH test system, the IC₅₀ value of *D. edulis* oil was reported to be 68.5±2.29 µg mL⁻¹, while oxidation of linoleic acid was effectively inhibited by the plant (70%) in the β-carotene-linoleic acid test⁴². However, this antioxidant capacity was ascribed to the mono and sesquiterpenes present in the plant essential oil. Employing similar antioxidant assay methods, Koudou *et al* reported significant antioxidant effect of the resin oil, including DPPH radical scavenging activities and inhibition of lipid peroxidation and suggesting that *Daryodes edulis* may help prevent oxidative damage in the human body such as lipid peroxidation associated with cancer, premature aging, atherosclerosis and diabetes²⁵. Nguefack *et al* confirmed the significant antioxidant and free radical scavenging activities in the aqueous and ethanol extracts of *D. edulis*⁴³. More recently, ethanol extract of *Dacryodes edulis* was shown to possess antioxidant phytochemicals that exhibit significant effects on the MDA levels, GSH and CAT activities in blood and liver tissues of rats⁴⁴. The study showed that *Dacryodes edulis* is effective in bringing about restorative activity against CCl₄ induced oxidative stress and tissues (blood and liver) damages in rats. They explained this by the fact that ethanol extract of the plant may act through antioxidants enzymes such as GSH and CAT as well as reduced lipid peroxidation and suggested that the oxidative stress suppressive effect may justify the plants inclusion in folk preparation of the popular antimalarial potion- "Agbo" in the West and central African regions, particularly in Nigeria and Cameroun.

Antibacterial and antimicrobial activities:

Omogbai and Eneh conducted an *in vitro* study aimed to evaluate the antibacterial effect of aqueous and ethanol seed extracts of *Dacryodes edulis* against food-borne bacterial isolates of *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella aerogenes*, *Pseudomonas aeruginosa*, *Salmonella typhi* and *Proteus mirabilis*; using agar diffusion technique⁴⁵. The highest zone of inhibition was obtained from ethanol extract at 2000 µg/mL against *Escherichia coli* with a diameter of 28 mm. The minimum inhibitory

concentration (MIC) and minimum bactericidal concentration (MBC) of the water extract ranged between 62.5-500 µg/mL and 125-1000 µg/mL respectively, while those of ethanol extract ranged between 31.25-250 µg/mL and 62.5-500 µg/mL respectively. They concluded that the extracts of *Dacryodes edulis* possess potential antibacterial activity against all the tested micro-organisms and that this plant extracts can be used as food preservative and for pharmaceutical preparation. In screening some Nigerian plants for antibacterial activity, the leaf extract demonstrated the best activity for which ethylgallate and quercitrin were identified as responsible⁴⁶. In another study designed to evaluate the antimicrobial effects of the chloroform and ethanol extracts of *Dacryodes edulis* *Garcinia kola* and *Chrysophyllum albidum* on some tested isolates, Idu *et al* demonstrated that *Dacryodes edulis* and *Garcinia kola* have the best MIC values (3.125-50 mg/mL in chloroform and 6.25-100 mg/mL in ethanol)⁴⁷. They also showed that the antimicrobial activity of the leaf extract of these two plants was even greater than that of the standard antibiotics like Pefloxacin, Amoxicillin, Ampicillin, Ceporex, Strptomocin, Zinnacef, Nalidixic acid, Ofloxacin, Augmentin and Nystatin (100mg/mL). They suggested that the results of their study could be of commercial interest to both pharmaceutical companies and research institutes in the production of new drugs. In Cameroon, anti-*Staphylococcus aureus* activity of methanol extracts of 12 plants used in folk medicine was studied by Fonkeng *et al*⁴⁸. *Dacryodes edulis* and *Occimum gratissimum* with MIC values ranging from 64–256 µg/ml were found to have the best inhibitory activity on almost all the tested microorganisms. Elsewhere, the essential oils of the plant resin were investigated by Obame *et al* for antimicrobial and antioxidant activities. The essential oil showed more potent antibacterial effect against bacteria such as *Staphylococcus aureus*, *Bacillus cereus*, *Escherichia coli*, *Salmonella enteric* and *Proteus mirabilis* than antifungal effect against *Candida albicans* and this effect was found to be due to the presence and high content of terpinen-4-ol (19.8%) and α-pinene (17.4)⁴². In all the antibacterial cases, the Minimum Inhibitory Concentration (MIC) of 1-16 mm was equivalent to the Minimum Bactericidal Concentration (MBC). In another study, the antibacterial effect of the essential oil of the plant resin was confirmed to be due to the presence and high content of the same foregoing terpenes, but antifungal effect of the oil was reported to be lacking²⁵. Since compounds such as alkaloids and saponins are known to be antimicrobial⁴⁹, their presence has been suggested to account for the antimicrobial activity of the plant²⁷. Like many other plants, the leaves of *Dacryodes edulis* showed better activity than the stem and root. This lends credence to the wider application of leaves in Cameroon and Nigerian traditional medicine than the other plant parts^{6, 17, 50}.

Antimalarial activity:

In order to assess their acclaimed potentials, eleven extracts were prepared from seven selected plants commonly used in Western Cameroon, and tested both

for their antiplasmodial activity and cytotoxicity by Zofou *et al*⁵¹. The *Dacryodes edulis* leaves showed the highest activity (IC₅₀ of 6.45 g/mL on 3D7 and 8.2 g/mL on DD2). Zofou *et al* conducted another study in order to identify the compounds responsible for the antimalarial activity of *Dacryodes edulis*⁵. They isolated 5 compounds from ethyl acetate and hexane extracts of this plant's stem bark. The most active compound identified was methyl 3,4,5-trihydroxybenzoate (C₈H₈O₅), with the IC₅₀ values of 0.37 and 0.55 µg/mL, against 3D7 (chloroquine-susceptible) and DD2 (multidrug-resistant) strains of *Plasmodium falciparum* respectively. None of the tested compounds was cytotoxic against LLC-MK2 cells, suggesting their selective activities on malaria parasites.

Haemopoietic property:

Ufelle *et al* investigated the haemopoietic effects of crude methanolic extract of *Dacryodes edulis* seeds in Wistar rats⁵². The results revealed significantly decreased mean Hemoglobin, Haematocrit, and significantly increased mean total (TWBC) and platelets compared to control group, after oral administration of graded-doses of *Dacryodes edulis* seeds extract in Wistar rats.

Cardiovascular activity:

Leudeu *et al* reported *Dacryodes edulis* oil to decrease the HDL cholesterol level in serum of rats⁵³. Thus, potential health related functions of dietary plants such as *Dacryodes edulis* was reported to include immunostimulation and nervous system action⁵⁴.

Antidrepanocytary activity:

Mpiana *et al* conducted a study intended to evaluate the antidrepanocytary activity of 13 Congolese plants⁵⁵. The aqueous and ethanol extracts of *Dacryodes edulis* leaves were discovered to normalize the SS blood erythrocytes, following the deoxygenation of haemoglobin in anaerobic condition, thus validating their use in traditional medicine.

Toxicity:

All parts of *Dacryodes edulis* can be taken without any risk of toxicity. This plant was not among the plants implicated for eventual toxicity evaluation, during the survey of toxic plants of Akwa Ibom State of Nigeria⁵⁶.⁵⁷, supported this position when they reported lack of toxic principles in the seed of the plant. Unlike to their reports, the findings of Hanson⁵⁸ showed that the seed contains antinutrient factors such as oxalate, tannins, phytate and trypsin inhibitory activity. It is therefore recommended that the seed should be thoroughly processed before use.

Spiritual Value:

The Igbos of Nigeria consider the plant "good", "pure" or "clean"⁵⁹, because they believe it has no harmful component and it has not been reported to cause death of persons or livestock after its consumption^{56, 57}. Numerous communities use the whole plant or part of *Dacryodes edulis* for spiritual purity²², and in some

cases exorcism of bad luck. Planting the tree close to shrines or placing leaves in a shrine or its vicinity confers spiritual purity or cleanliness. The Igbos believe the plant cannot harbor evil spirits or its part been used for evil activities, and more importantly, it is believed to ward off evil spirits. The sweet-smelling smoke from burning the leaves or stem exudates is also said to ward off evil spirits⁶⁰. Handling the plant's part is believed to confer spiritual protection on the holder⁵⁹. As the maize season approaches in Likenanzizi village, the leaves and fruit of *Dacryodes edulis* are offered as a peace and fertility offering to the gods of the land for a bountiful harvest⁵⁹.

Economic Value:

The fruits are sold in local markets and, to some level, have attracted international trade⁶¹. The wood of *Dacryodes edulis* has general use for carpentry, tool handles, and occasionally for construction. The stem exudates serve as glue, cosmetic components, or for lighting. Oil from the fruit is rich in amino acids and triglycerides and can augment common household oils^{8, 62}. At international markets, African pear fruits imported into Europe are generally intended for nationals of the exporting countries, with the volume increasing since 1982⁶³. This is a source of incomes for exporting countries. The principal importing countries of *Dacryodes edulis* fruits are Belgium, France and United Kingdom from African countries such as Cameroon, Nigeria, Congo Brazzaville, Democratic Republic of Congo and Central Africa Republic.

CONCLUSION:

Dacryodes edulis is a tree cultivated in most rural communities by the peasant farmers, mostly for its edible fruits. But all parts of this tree, including leaves, bark, roots, resin, seeds and fruit pulp are used for medicinal purposes. The fruit confers huge economic values on the plant through local and international trade.

Some biological tests carried out on the plant for antioxidant, antibacterial and antimicrobial, antimalarial, haemopoietic, Cardiovascular and antidrepanocytary activities revealed positive results without adverse side effects.

Bioactive constituents such as alkaloids, phenolic compounds, flavonoids, saponins, anthraquinones, tannins, cardiac glycosides and steroids, significantly present in the *Dacryodes edulis* extract, account for its multiple activities and uses in medicine.

We sincerely hope that the information provided in this review on *Dacryodes edulis* will serve as a data base for proper evaluation of this plant and for pharmaceutical applications of its bioactive components.

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