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PHYTOCHEMICAL PROFILING AND *IN VITRO* ANTIOXIDANT ACTIVITY OF *DACRYODES EDULIS* SEED FLOUR METHANOL EXTRACT

Emmanuel Nnamdi Ifedi [a*], Olayombo Margaret Banwo [b],
Olakunle Alex Akinsanoye [a], Oluwadurotimi Olutosin Akintade [c]

[a] *Industrial unit, Department of Chemistry, University of Ibadan, Ibadan, Oyo State, 200005 Nigeria*
[b] *Department of Industrial Chemistry, Abiola Ajimobi Technical University, Ibadan,200255 Nigeria*
[c] *Department of Chemical Sciences, KolaDaisi University, Km 18 Ibadan-Oyo Express way, Ibadan, Nigeria*
[*] *e-mail: ifedi79@yahoo.com*

Abstract: The growing interest in naturally derived bioactive compounds with health-promoting properties has intensified the study on *Dacryodes edulis* seed flour methanol extract (DESME). DESME obtained by the cold extraction method using methanol was characterized by gas chromatography-mass spectrometry (GC-MS) and Fourier transform-infrared (FT-IR) spectroscopy. Antioxidant activity was assessed by 1,1-diphenyl-2-picrylhydrazyl radical and ferric reducing antioxidant power assays. Phytochemical analyses, conducted through established standard methods, identified a wide class of compounds, including saponins, alkaloids, flavonoids, tannins, phenolic compounds, coumarins, terpenoids, cardiac glycosides, carbohydrates, and free amino acids. Among the identified compounds by GC-MS, fatty acids and fatty acid esters were an abundant class, with 9-octadecenoic acid being the most dominant compound, comprising 13.66% of the total composition. FT-IR showed major absorption peaks at 1709 cm^{-1}, 1611 cm^{-1}, and 3276 cm^{-1}, confirming the presence of carbonyl, aromatic, hydroxyl, and nitrogen-containing functional groups, respectively. DESME demonstrated a total phenolic content of 320.68±0.33 GAE mg/g and exhibited strong radical inhibition (92.52%).

Keywords: phytochemical, *Dacryodes edulis,* 9-octadecenoic acid, *GC-MS, antioxidant activity.*

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Introduction

Medicinal plants have increasingly gained attention for their potential health benefits, particularly as natural antioxidants, which play a crucial role in combating oxidative stress. These plants, rich in bioactive compounds, not only support overall wellness but also offer promising therapeutic options for various health conditions related to oxidative damage, thereby contributing significantly to modern drug discovery and development. This growing attention is largely driven by the increasing prevalence of drugs resistance, hence the need for more efficient, safer, eco-friendly and cost-effective alternatives to synthetic drugs [1,2].

Dacryodes edulis, commonly known as African pear, belongs to the *Burseraceae* family. It is a tropical fruit-bearing plant distributed across West and Central Africa and is widely used traditionally, alone or in association with other plants, to cure wounds, fever, headaches, and malaria [3]. Parts of *D. edulis* have been known to possess several biological and pharmacological activities, such as antimicrobial, anti-inflammatory, antispasmodic, laxative, antihypertensive, and diuretic effects [2,4]. According to [5], the pulp of *D. edulis* fruit possesses bioactive compounds which confer medicinal importance on the fruit and contribute to protection against free radicals-related damages. Phytochemical investigations of the seed have identified the presence of alkaloids, tannins, saponins, flavonoids, cyanogenic glycosides, and phytates. Furthermore, research by [4] reported that oil extracted from the seeds using ethanol and petroleum ether demonstrates antibacterial activity.

Although several studies have investigated the phytochemical composition and antimicrobial properties of various parts of *Dacryodes edulis,* research on its seed flour remains scarce, despite the seeds constituting a significant portion of the fruit biomass and being largely discarded as agricultural waste.

Previous investigations have mainly focused on the pulp, leaves, bark, and seed oils [4-6], leaving the methanol extract of the seed flour largely unexplored.

The novelty of this study lies in the comprehensive evaluation of the phytochemical constituents and *in vitro* antioxidant potential of methanol-extracted *D. edulis* seed flour obtained from a specific geographical region. Environmental and geographical factors are known to influence the biosynthesis and accumulation of secondary metabolites in medicinal plants, potentially leading to variations in biological activities. Therefore, generating region-specific phytochemical and antioxidant data is essential for establishing the therapeutic value of the plant. Furthermore, this research contributes to the growing field of agricultural waste valorisation by exploring the possibility of converting discarded *D. edulis* seeds into a valuable source of natural antioxidants. The study provides baseline scientific evidence for the development of functional foods, nutraceuticals, and phytopharmaceutical products derived from an underutilized plant resource. By linking phytochemical composition with antioxidant activity, the work offers new insights into the potential health-promoting properties of *D. edulis* seed flour and supports its sustainable utilization in food and pharmaceutical industries Furthermore, this research contributes to the growing field of agricultural waste valorisation by exploring the possibility of converting discarded *D. edulis* seeds into a valuable source of natural antioxidants.

Experimental

Materials and methods

Sample collection

Dacryodes edulis seeds employed in this study were obtained from Umunnofor village of Etti-Nanka community in Orumba North local government of Anambra State (6° 2' 56.4936" N and 7° 3' 57.4452" E), Nigeria, between December 4th and 23rd, 2025. *Dacryodes edulis* seeds were identified and authenticated at the Herbarium Unit of the Botany Department, University of Ibadan. The edible parts (fleshy) were removed, and the seeds obtained were air-dried at room temperature for 7 days, after which they were milled using a laboratory blender, pulverised into powder and kept in a tight container for further analysis.

Preparation of methanol extract

Two hundred grams (200 g) of the pulverised powder obtained from the air-dried seed were extracted with 500 mL of 99% methanol (1:2.5 w/v) in a 1 L airtight Pyrex bottle using the cold extraction technique. Extraction was performed at room temperature for 72 h, with manual shaking every 12 h to facilitate solvent-sample interaction. The resulting filtrate was filtered using Whatman No. 1 filter paper and concentrated with rotary evaporator under reduced pressure to obtain the *D. edulis* seed flour methanol extract (DESME) which was stored at 4ºC until further analysis. The percentage yield of the extract was calculated using Eq.(1).

$$\%\, yield = \frac{W}{w} \quad (1)$$

where, W - the weight of dried extract (g);
w - the weight of plant material (g).

Qualitative and quantitative Analysis

The screening of various phytochemicals, such as saponin, flavonoids, phenolics, terpenoids, cardiac glycoside, tannins, alkaloids, coumarins, diterpenes and steroids was carried out using established methods described by [7,8]. The quantitative analysis of DESME was performed according to the method described by [9].

Fourier transform - infrared spectroscopy

Functional groups and the nature of chemical bonds in the phytochemicals were identified using Fourier Transform-Infrared (FT-IR) spectroscopy. The absorption of light at specific wavelengths is a key characteristic of chemical bonds and can be observed in the resulting spectrum [10]. Thus, the infrared absorption spectrum enables the identification of different chemical bonds within the compounds. DESME was analysed using an Agilent Cary 630 FT-IR spectrometer fitted with an attenuated total reflectance (ATR) sampling unit and operated with Micro-lab PC software. The analysis was conducted at a resolution of 8 cm^{-1} over a scanning range of 4000-400 cm^{-1}.

Gas chromatography-mass spectrometry

DESME was examined using a PerkinElmer GC-MS Clarus 500 system fitted with an AOC-20i auto-sampler, integrating a gas chromatograph with a mass spectrometer. Separation was achieved on a Restek Rtx-5 capillary column (30 m × 0.25 mm; 5% diphenyl/95% dimethyl polysiloxane), with the instrument operating under electron impact ionization at 70 eV. Helium (99.999% purity) was used as the carrier gas at a constant flow rate of 1 mL/min. A 1.0 µL sample was injected with a split ratio of 10:1, and the injector temperature was set at 280°C. The oven program began at 40°C, held for 5 minutes, followed by a gradual increase of 6°C per minute until reaching

280°C, where it was maintained for 15 minutes. Mass spectra data were collected at 70 eV with a scanning interval of 0.5 s over a mass range of 40-550 Da, and the total analysis time was 60 minutes [9]. Identification of the detected compounds was accomplished by comparing their mass spectra with reference data from the National Institute of Standards and Technology (NIST) library, thereby enabling the matching of unknown peaks with known standards [11].

Antioxidant activity

The 1,1-diphenyl-2-picrylhydrazyl radical (DPPH) assay

The antioxidant potential of DESME was assessed based on its capacity to neutralise DPPH free radicals. A series of concentrations, ranging from 31.25 to 1000 µg/mL, were prepared from the DESME. Methanol served as the negative control, while *L*-ascorbic acid, prepared under similar conditions, was used as the positive control. The absorbance of each sample was recorded at 517 nm using a UV-Visible spectrophotometer (Microprocessor double beam model: AVI-2704, Avi Scientific, India) [11,12]. The percentage of free radical scavenging activity (RSA) of both DESME and the standard was calculated according to Eq.(2). A calibration curve was constructed by plotting percentage RSA against the corresponding concentrations of DESME and *L*-ascorbic acid [10,12].

$$\% \text{ RSA} = \frac{\text{Abs.of DPPH sol.} - \text{Abs.of the test sample}}{\text{Abs.of DPPH sol.}} x\ 100 \quad (2)$$

where, % RSA is radical scavenging activity

Ferric reducing antioxidant power (FRAP) assay

The ferric reducing antioxidant power (FRAP) of DESME was assessed using a previously described procedure with slight modifications [12]. Serial dilutions of the test samples were prepared in a suitable solvent to obtain concentrations ranging from 31.25 to 1000 µg/mL. Each concentration was mixed with 2.5 mL of 20 mM phosphate buffer and 2.5 mL of 1% (w/v) potassium ferricyanide solution, then incubated at 50°C for 30 minutes. After incubation, 2.5 mL of 10% (w/v) trichloroacetic acid and 0.5 mL of 0.1% (w/v) ferric chloride were added, and the mixtures were left to stand for an additional 10 minutes. Ascorbic acid served as the reference standard. Absorbance was measured at 700 nm using a spectrophotometer. All assays were performed in triplicate, and mean values were recorded. The reducing capacity of DESME was determined by comparing its activity with that of ascorbic acid [12].

Statistical analysis

All experimental data were recorded, and results obtained in triplicate were analysed and expressed as mean values ± standard deviation. Data analysis was performed using one-way analysis of variance (ANOVA) with IBM SPSS statistical software version 20.0. Duncan T test was applied to determine significant differences among group means, and results were considered statistically significant at $p< 0.05$.

Results and discussion

Qualitative phytochemical screening

Phytochemicals are naturally occurring compounds produced through plant metabolic processes. They occur in varying concentrations and contribute significantly to the therapeutic properties of plants. Qualitative phytochemical analysis of DESME, as presented in Table 1, showed the presence of several bioactive constituents, including saponins, alkaloids, flavonoids, tannins, phenolic compounds, coumarins, terpenoids, cardiac glycosides, carbohydrates, and free amino acids, while diterpenes were not detected.

The diversity of these compounds suggests that the extract is a rich source of substances known for their antioxidant, antimicrobial, and other health-related activities. The presence of these phytochemicals indicates considerable pharmacological potential and supports the medicinal significance of DESME.

Table 1

Phytochemical screening of *Dacryodes edulis* seed flour methanol extract (DESME).

Phytochemical compounds	*Standard methods*	*DESME*
Saponins	Froth's test	++
Alkaloids	Harger's test	++
Flavonoids	Lead acetate test	++
Tannins	Braymer's test	++
Phenols	Ferric Chloride test	++
Coumarins	Reaction with 10% NaOH	++
Terpenoids	Salkowski's test	++
Steroids	Salkowski's test	++
Diterpenes	Copper acetate test	−−
Cardiac glycosides	Keller-Killani test	++
Carbohydrates	Molish's test	++
Free amino acids	Million's reagent	++

+ = Presence, − =absence

However, in contrast to the present findings, a previous study on the methanol extract of *Dacryodes edulis* seeds by [6] reported the absence of alkaloids and saponins. This may establish the distinction between the geographical locations of our *Dacryodes edulis* samples and the one used by Ikpa, C.C.B. and Maduka, T.O.D. [6].

***Quantitative phytochemicals and percentage yield of Dacryodes edulis* seed**

The methanolic extraction of *Dacryodes edulis* seed flour yielded 14.08% (w/w) crude extract. The yield obtained suggests that *D. edulis* seed flour contains a substantial amount of methanol-soluble bioactive phytochemicals.

The quantitative phytochemical profile of DESME presented in Table 2, revealed a marked predominance of phenolic constituents, with total phenols (320.68±0.33 GAE mg/g) occurring at substantially higher concentrations than all other measured compounds. This high phenolic content strongly suggests that DESME possesses considerable antioxidant capacity, as phenolic compounds are well known for their redox properties and ability to scavenge free radicals, chelate metal ions, and inhibit oxidative stress (induced cellular damage) [13]. Tannins (28.31±0.33 GAE mg/g) and flavonoids (22.67±0.19 QE mg/g) were also present in lower amounts. These classes of polyphenolic compounds are widely associated with diverse biological activities, including antimicrobial, anti-inflammatory, and anticancer effects. Their relatively high levels further reinforce the likelihood that the observed bioactivity of DESME is largely driven by its polyphenolic composition. The presence of tannins, in particular, may contribute to protein precipitation and microbial growth inhibition, while flavonoids are known to modulate key cellular pathways involved in growth, inflammation, and antioxidant defense [14]. Alkaloids were detected at a moderate concentration (13.59±0.13%), indicating a significant contribution to DESME pharmacological profile. Alkaloids are recognised for their potent physiological activities, including analgesic, antimicrobial, and neuroactive effects, and their presence suggests that DESME may exhibit notable bioactivity beyond antioxidant mechanisms [15]. Saponins were found in relatively lower amounts (4.85±0.8%), yet their presence remains important, as they are known to exhibit membrane-permeabilising, antifungal, and cholesterol-lowering properties [16]. Even at lower concentrations, saponins can act synergistically with other phytochemicals to enhance overall biological efficacy.

Overall, the quantitative data indicate that DESME is particularly rich in phenolic compounds, supported by moderate levels of flavonoids, tannins, and alkaloids. This phytochemical composition underscores the strong potential of DESME as a source of natural antioxidants and bioactive agents. These findings equally provide a solid basis for further investigation into pharmacological properties and potential therapeutic applications of DESME.

Table 2

Quantitative phytochemical analysis of *Dacryodes edulis* seed flour methanol extract (DESME).

Phytochemical compounds	*DESME*
Saponins (%)	4.85±0.8
Alkaloids (%)	13.59±0.13
Flavonoids (QE/mg/g)	22.67±0.19
Tannins (GAE/mg/g)	28.31±0.33
Phenols (GAE/mg/g)	320.68±0.33

Values are mean ± standard deviation of triplicate determinations.

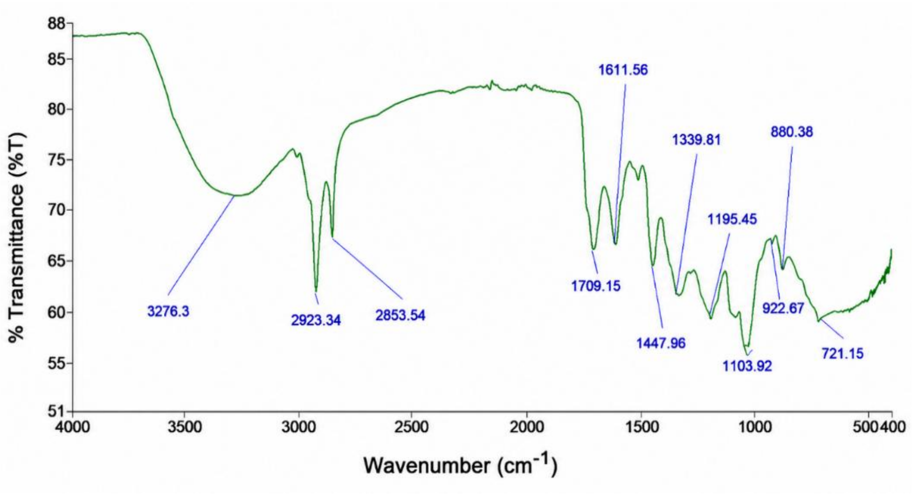

Figure 1. FT-IR diagram of *Dacryodes edulis* seed flour methanol extract.

Fourier transform-infrared spectroscopy (FT-IR) of DESME

FT-IR analysis of DESME revealed the presence of diverse functional groups, as presented in Figure 1. A broad absorption band observed at 3276 cm^{-1} was attributed to N-H and O-H stretching vibrations, indicating the presence of hydroxyl-containing compounds such as phenols, saponins, and carboxylic acids.

Absorption peaks at 1709 cm^{-1} and 1611 cm^{-1} correspond to carbonyl (C=O) and C=C stretching vibrations respectively, suggesting the occurrence of carboxylic acids and unsaturated compounds, including saponins, tannins, phenolics and other C=C containing metabolites. The band at 1709 cm^{-1} has been specifically associated with fatty acids and their glyceride derivatives [17]. The peak at 1339 cm^{-1} was assigned to C-H bending vibrations, while those at 1195 cm^{-1} and 1043 cm^{-1} were attributed to C-O stretching. These features further indicate the presence of oxygenated functional groups such as carboxylic acids, phenols, anhydrides, and alcohols [10]. Overall, the functional groups identified (C-H, N-H, O-H, C=O, C=C, and C-O) are indicative of various bioactive constituents, including phenols, saponins, aldehydes, amides, and esters [10,17,18]. The FT-IR findings for DESME are consistent with previous studies that reported similar spectral characteristics in plant-derived extracts [17-19]. Furthermore, earlier investigations on *Dacryodes edulis* seed extracts have identified O-H, N-H, and C=O as predominant functional groups, associated with carboxylic acids, saturated carbonyl compounds, and nitriles [6]. These results suggest the probable presence of alkenes, amines, carboxylic acids, amides, esters, alcohols, phenols, ketones, and aromatic compounds.

GC-MS analysis of DEMSE

The GC-MS analysis of DESME identified fifteen bioactive constituents, as illustrated in Figure 2. The chromatographic peaks correspond to distinct chemical entities, several of which have previously been reported in other medicinal plant systems. Detailed information on the identified compounds including their retention times (RT), molecular formulas, molecular weights and relative abundances (expressed as peak area percentages), is summarised in Table 3. The 15 identified compounds comprise of a diverse group of chemical constituents, including fatty acids, fatty acids esters, and terpenes, among others. Some of these constituents are consistent with earlier findings reported for *D. edulis*, using similar analytical methods [6].

Among the compounds identified in DESME, four major compounds found were 9-octadecenoic acid (13.66%); pentadecanoic acid, 14-methyl-, methyl ester (12.82%); 9-octadecenoic acid (*Z*)-, methyl ester (12.36%); and *n*-hexadecanoic acid (12.07%). Eicosane; *E*,*E*,*Z*-1,3,12-nonadecatriene-5,14-diol, phenol, 3,5-bis(1,1-dimethyl ethyl)-; (*R*)-(–)-14-methyl-8-hexadecyl-1-ol; 7,9-di-tert-butyl-1-oxaspiro(4,5)deca-6,9-diene were among the predominant compounds found in the methanol extract of *Dacryodes edulis* as reported in [6] but were not identified in DESME. This might be majorly attributed to the variations in geographical location, which can influence the phytochemical composition of plant materials.

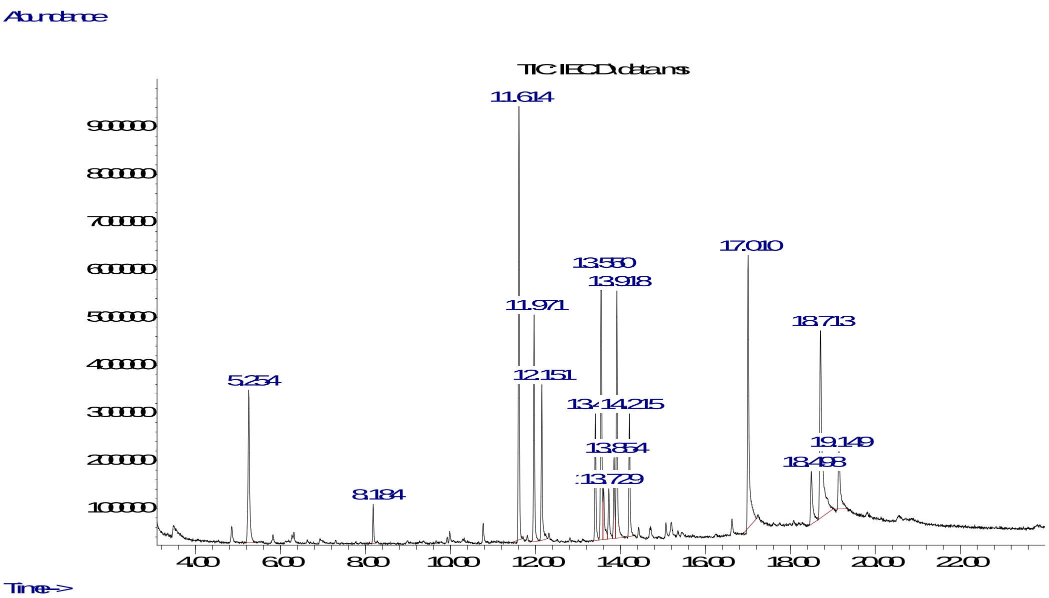

Figure 2. GC-MS chromatogram of *D. edulis* seed flour methanol extracts.

Table 3

GC-MS analysis showing the chemical constituents of *D. edulis* seed flour methanol extract (DESME).

S/N	*RT (min)*	*% Area*	*Name of the compounds*	*Molecular weight*	*Chemical formula*
1	5.256	6.84	*γ*-Terpinene	136.23	$C_{10}H_{16}$
2	8.182	1.12	Dimethyl sulfone	94.13	$C_2H_6O_2S$
3	11.612	12.82	Pentadecanoic acid, 14-methyl-, methyl ester	270.45	$C_{17}H_{34}O_2$
4	11.970	7.26	Hexadecanoic acid, ethyl ester	284.50	$C_{18}H_{36}O_2$
5	12.152	5.11	*N*-methoxymethanamine	61.08	C_2H_7NO
6	13.412	4.25	Methyl stearate	298.50	$C_{19}H_{38}O_2$
7	13.547	12.36	9-Octadecenoic acid (*Z*)-, methyl ester	296.49	$C_{19}H_{36}O_2$
8	13.729	2.02	Octadecanoic acid, ethyl ester	312.53	$C_{20}H_{40}O_2$
9	13.853	2.77	*E*-11-Hexadecenoic acid, ethyl ester	282.46	$C_{18}H_{34}O_2$
10	13.916	8.73	9,12-Octadecadienoic acid (*Z,Z*)-, methyl ester	294.47	$C_{19}H_{34}O_2$
11	14.217	4.20	9,12-Octadecadienoic acid, ethyl ester	308.50	$C_{20}H_{36}O_2$
12	17.008	12.07	*n*-Hexadecanoic acid	256.42	$C_{16}H_{32}O_2$
13	18.497	3.10	Undecanoic acid	186.29	$C_{11}H_{22}O_2$
14	18.715	13.66	9-Octadecenoic acid	282.46	$C_{18}H_{34}O_2$
15	19.151	3.69	9,12-Octadecadienoic acid (*Z,Z*)-	280.45	$C_{18}H_{32}O_2$

The biological and pharmacological activities of many of the compounds identified in DEMSE have been documented. For instance, *n*-hexadecanoic acid (a derivative of palmitic acid) has been associated with inhibitory activity against phospholipase A_2, suggesting potential anti-inflammatory and antioxidant effects [21]. It has been reported to possess antioxidant, anti-androgenic, hypocholesterolemic and antitumor activities [22]. Ethyl (*E*)-9-octadecenoate has been linked to applications in perfumery and to the local management of rheumatic conditions [23]. The presence of *γ*-terpinene, a monoterpene, is particularly noteworthy due to its broad spectrum of reported pharmacological activities, including antibacterial, antiprotozoal, antioxidant, cytotoxic, antitumor, antiplatelet, anti-inflammatory, antihyperalgesic, and neuroactive effects [24,25]. These phytochemical constituents corroborate the findings of [6] regarding the medicinal potential of *Dacryodes edulis* methanol seed extract. Overall, the identified compounds provide additional scientific support for the potential therapeutic value of *Dacryodes edulis* seed flour methanol extract.

Antioxidant activities of D. edulis seed flour methanol extract (DESME)

Antioxidant activities of DESME was assessed by the determination of the ferric ion reducing antioxidants power assay (FRAP) and 1,1-diphenyl-2-picryl hydrazyl (DPPH) free radical-scavenging activity.

DPPH radical scavenging activity of DESME

The DPPH radical scavenging activity (RSA) operates *via* a single electron transfer mechanism and reflects the capacity of antioxidants to reduce free radicals. The antioxidant potential of DESME was evaluated across a concentration range of 31.25-1000 µg/mL and compared with ascorbic acid used as a standard reference. The results for both samples, as illustrated in Table 4, demonstrated a concentration dependent increase in antioxidant activity, highlighting their ability to donate electrons or hydrogen atoms for free radical neutralization [10,25]. At 1000 µg/mL, DESME exhibited strong inhibition (92.52%), which was comparable to that of ascorbic acid (97.46%), indicating significant antioxidant capacity at higher concentrations. However, at 500 and 250 µg/mL, ascorbic acid showed greater activity (96.40% and 79.86%, respectively) than to the extract (79.84% and 76.54%), suggesting a higher efficacy of the standard at intermediate concentrations. Both DESME and ascorbic acid exhibited higher RSA at elevated concentrations and reduced activity at lower concentrations, as presented in Table 4. Consequently, DPPH radical scavenging activity increased at higher sample concentration, consistent with previous reports [10]. Radical scavenging capacity serves as an important indicator of antioxidant potential and is commonly associated with the presence of bioactive compounds such as flavonoids, tannins, and phenolic constituents in plant extracts [12].

Table 4

Percentage inhibition concentration of *D. edulis* seed flour methanol extract (DESME) and ascorbic acid.

Sample concentration (µg/mL)	*Percentage inhibition concentration (%)*	
	DESME	*Ascorbic acid*
1000	92.52±0.03[ab]	97.46±0.01[ab]
500	79.84±0.07[b]	96.40±0.02[a]
250	76.54±0.11[a]	79.86±0.08[a]
125	73.33±0.07[a]	65.26±0.04[b]
62.5	60.23±0.11[a]	46.10±0.02[b]
31.25	43.43±0.08[a]	24.38±0.03[b]

Values are mean±standard deviation of triplicate determinations. Values on the same row having the same letter as superscripts are not significantly different (P> 0.05).

Ferric reducing antioxidant power (FRAP) of DESME

The ferric reducing antioxidant power (FRAP) assay is widely used to assess the electron-donating ability of compounds by measuring their capacity to reduce ferric (Fe^{3+}) to ferrous (Fe^{2+}) ions [10]. In this study, the reducing potential of *Dacryodes edulis* seed flour methanol extract (DESME) was evaluated at concentrations of 250, 500, and 1000 µg/mL, with ascorbic acid serving as the reference standard. Both DESME and ascorbic acid as presented in Figure 3, exhibited a progressive increase in reducing power with increasing concentration, indicating a dose-dependent response. At 1000 µg/mL, ascorbic acid demonstrated the highest ferric reducing capacity, slightly exceeding that of the extract, suggesting strong electron-donating potential at elevated concentrations. A similar pattern was observed at 500 and 250 µg/mL, where ascorbic acid consistently showed higher reducing activity compared to the extract but closely related. The enhanced FRAP values observed for the extract may be attributed to the presence of bioactive phytochemicals, particularly phenolic compounds and flavonoids, which are known to contribute to antioxidant activity through redox mechanisms. The gradual decrease in reducing power with declining concentration further confirms the dependence of antioxidant activity on DESME concentration. This equally confirmed that DESME has the capacity of reducing Fe^{3+} to Fe^{2+} through electron transfer reaction mechanism. This result is comparable to those reported by [12]. The outcome of this study indicated that *D. edulis* seed flour methanol extract possesses considerable ferric reducing antioxidant capacity which suggests its potential applicability as a natural antioxidant source for mitigating oxidative stress through electron transfer mechanisms.

Conclusions

Analysis of the *Dacryodes edulis* seed flour methanol extract (DESME) using GC-MS and FT-IR techniques confirmed the presence of a wide range of bioactive compounds. FT-IR characterisation identified key functional groups including hydroxyl (OH), carbonyl (C=O), amine (N-H), alkene (C=C), and ether (C-O). GC-MS profiling further revealed a total of fifteen distinct compounds in DESME. Phytochemical screening indicated the presence of phenols, tannins, flavonoids, coumarins, alkaloids, and cardiac glycosides. DESME demonstrated considerable antioxidant capacity, as evidenced by DPPH radical scavenging activity and ferric reducing power. Overall, these findings suggest that *Dacryodes edulis* seed flour could serve as a valuable natural source of antioxidant agents.

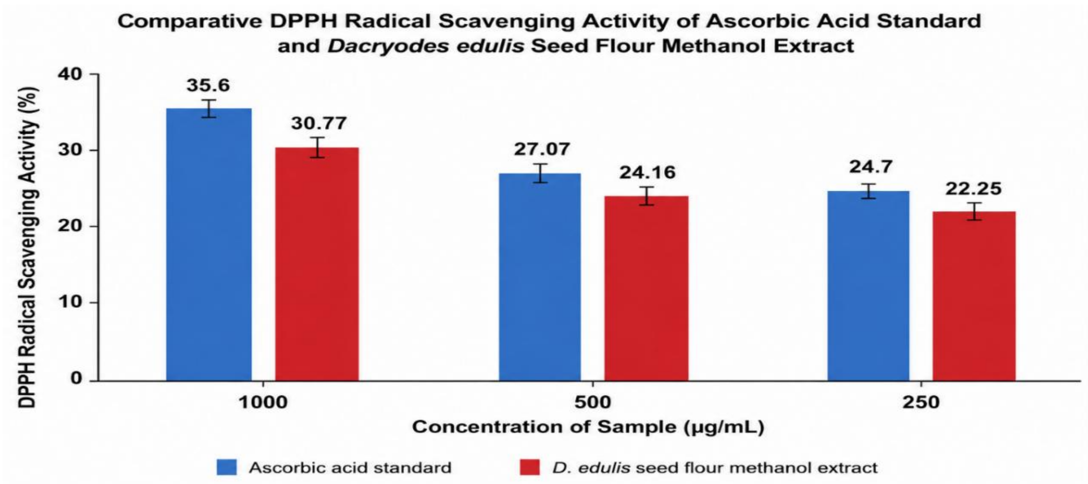

Figure 3. FRAP analysis of DESME *Dacryodes edulis* seed flour methanol extract.

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