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Proximate, Anti-Nutritional and Phytochemical Composition of the Yellow Variety of the *Synsepalum Dulcificum* (Miracle Fruit) Berry

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Abstract The pulp of freshly harvested mature *Synsepalumdulcificum* (miracle fruit) berries were analyzed for proximate, pH, titratable acidity, anti-nutritional and phytochemical content. The results indicated a moisture content of 45.12%, protein content of 2.48% and a carbohydrate content of 48.84%.The anti-nutrients content include Tannin 2.90 ± 0.64mg/100g, phytate 5.21 ± 0.92 mg/100g, glycosidic cyanide 0.03 ± 0.00mg/100g, steroid 1.56±0.03 mg/100g and oxalate 11.04 ± 0.29%. The anti-nutritional levels were all within the recommended safety limits. Some phytochemicals like flavonoids, resins and steroids were also identified. It is hoped that the knowledge of miracle fruit's nutritional content/importance will enhance its utilization in our diet.

Keywords: *berry pulp, phytochemicals, proximate, anti-nutrients, Synsepalumdulcificum*

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1. Introduction

The miracle fruit, also known as 'miraculous berry' or 'miracle berry' is a fruit of a tropical plant, *Synsepalumdulcificum* and a member of the Sapotaceae family [1] which is native to West African (Plate 1). It is known as 'Agbayun' by the Yorubas', and called different names such as 'Uninaa', 'Uneonu', 'Unighini' and 'Uni' by the Ibos'jn Nigeria. The plant is commonly found growing in the wild, in fringes of virgin forests, though it also grows naturally on farms and around dwellings and in secondary bushes [2]. Its fruit has a relatively large seed which is encapsulated by a translucent pulp. This pulp is covered by a thin skin.

Plate 1. The *Synsepalumdulcificum* Tree

The plant has two varieties, the red and the yellow ripe berry varieites [1]. The red berry is not really sweet to taste by itself but miraculously gives a sweet taste when food, even a sour food is being eaten after taking or licking it, thus, it is aptly named 'miracle fruit' [1].

Although the miraculous unique sweet flavour-enhancing capacity of the fruit has been known since the 18th century [3], scientific investigations of the fruit were not initiated until 1964 [4], and even so, only some scanty work has been done on this berry. Noticeably, the few research reports available were focused on the red berry variety. There is paucity of information on the yellow berry variety which is more prevalent in Nigeria, especially the Eastern part of Nigeria. Although it is primarily used as a sweetener, for gari and palm-wine drinking, it is hoped that there are other uses it can be subjected to. However, the insufficient study and information on the fruit have aided the under- utilization of the fruit in modern diet. Consequently, the fruit is gradually but definitely going into extinction, making it quite rare to find in our environment. This work, therefore, aims to investigate the chemical (proximate) and anti-nutritional composition of this unique yellow berry as well as some of its phytochemicals as a means of observing its nutritional potential of meeting the macronutrients needs of its consumers.

2. Materials and methods

2.1. Materials Collection

Freshly harvested mature berries of *Synsepalumdulcificum* (miracle fruit) were obtained from Umuagwo in OhajiEgbema Local Government Area of Imo State, Nigeria. The samples were immediately transported to the laboratory. The pulp were extracted by scraping the fruits with clean stainless spatula.

2.2. Proximate Analysis

The analysis of proximate composition was done in triplicate trials using the procedure described by [5]. The moisture, ash, protein, fibre, fat and carbohydrate contents were all determined in triplicate trials.

2.3. Determination of Titratable Acidity

One gram of the sample was weighed out and macerated with 50ml of distilled water. The mixture was filtered with Whatman's filter paper, No 1. The filtrate was collected into a 50ml conical flask. One millilitre of phenolphthalein indicator was added to it. The solution was titrated with 0.1N Sodium Hydroxide until the colour turns pink. The reading on the burette was noted.

2.4. Determination of pH

Ten grams of the sample was mixed with 25ml of distilled water. It was stirred continuously to dissolve. The mixture was left to stand for 5 min. Zero point three millilitres was pipette out. The pH was read off a digital Hanner (pHS – 25) pH meter calibrated with pH 7 buffer.

2.5. Determination of the Anti-nutritional Content

The determination of tannin, glycosidic cyanide, steroid, saponin and alkaloid contents of the berry was done using the procedure as described by (6) and modified by [7] while the phytate and oxalate contents were determined following the procedure of (8) using a spectrum 21D spectrophotometer. Trypsin inhibitor content was determined using the spectrophotometric method described by [9] while the procedure of [10] was implemented for hemagglutinin.

2.5.1. Determination of Tannin Content

One gram of the sample was macerated with 50ml methanol. It was filtered with Whatman's No 1 filter paper. Five milliliters (5ml) of the filtrate was pipette out and 0.3ml of 0.1N ferric chloride in 0.1N hydrochloric acid (HCl) was added to it. Zero point three millilitre (0.3ml) of 0.0008M potassium ferricyanide was also added. The absorbance of the resulting solution was read at 720nm. Concentration of tannin was thus calculated:

$$Concentration = \frac{Absorbance\ of\ sample}{Gradient\ Factor} xDF \quad (2.5.1)$$

Where DF= Dilution Factor
Gradient Factor = Slope of the standard curve (Figure 1).

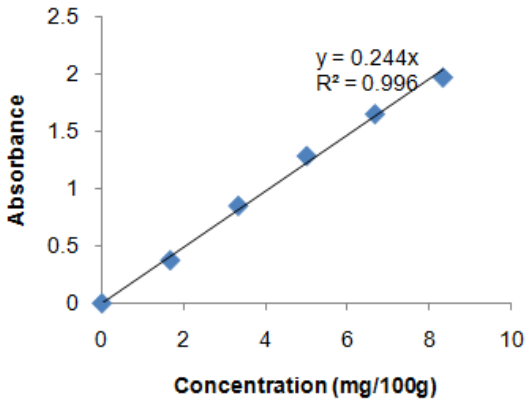

Figure 1. Standard Curve of Tannin Concentrations

2.5.2. Determination of Glycosidic Cyanide Content

One gram of the sample was macerated with 50ml of water. It was filtered with Whatman's No 1 filter paper. One milliliter (1ml) of the filtrate was pipette into a test tube and 4ml of alkaline picrate solution added to it. The solution was boiled for 5 min. It was then cooled in a water bath. The absorbance of the solution was read at 490nm.

$$Cyanide\ (mg/100g) = \frac{Absorbance\ of\ samplex\ Gradient\ Factor\ x\ DF}{Sample\ weight} \quad (2.5.2)$$

Where DF= Dilution Factor
Gradient Factor = Slope of the standardcurve (Figure 2).

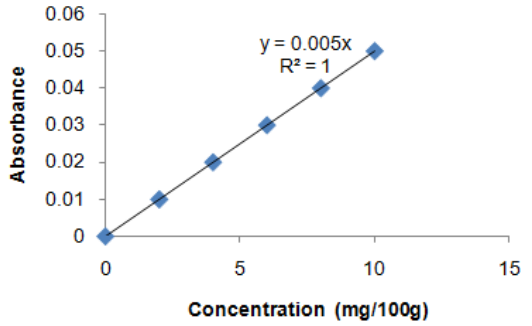

Figure 2. Standard Curve of Glycosidic Cyanide Concentration

2.5.3. Determination of Steroid Content

One gram of the sample was macerated with 20ml of ethanol. The solution was filtered with Whatman's No 1 filter paper. Two milliliters (2ml) of the filtrate was pipetted out and 2ml of cholesterol color reagent was added. The solution was left to stand for 35 min after which the absorbance of the solution was taken at 550nm.

$$\text{Concentration} = \frac{Absorbance\ of\ sample}{GradientFactor} xDF \quad (2.5.3)$$

Where DF= Dilution Factor
Gradient Factor = Slope of the standard curve (Figure 3).

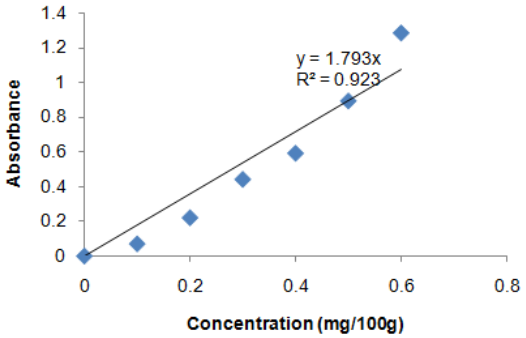

Figure 3. Standard Curve of Steroid Concentrations

2.5.4. Determination of Saponin Content

One gram of the sample was macerated with 10ml of petroleum ether. It was decanted into a beaker. Another 10ml of petroleum ether was added to the same sample and again, it was decanted into a beaker. The filtrates from the two decantation were combined and evaporated to dryness. The residue was dissolved with 6ml of ethanol. Two milliliters (2ml) of the resulting solution (mixture) was transferred (or pipette) into a test tube. A color reagent (chromogen) was added. The solution was allowed to stand for 30 min. The absorbance of the solution was read at 550nm.

$$\text{Concentration} = \frac{Absorbance\ of\ sample}{GradientFactor} xDF \quad (2.5.4)$$

Where DF= Dilution Factor
Gradient factor = Slope of the standard curve (Figure 4).

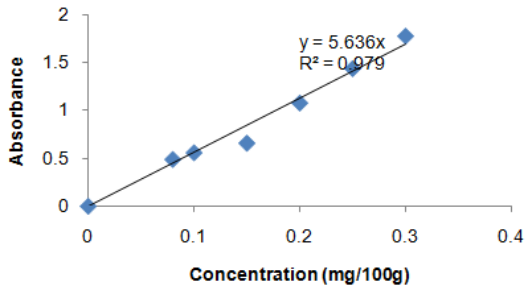

Figure 4. Standard Curve of Saponin Concentrations

2.5.5. Determination of Alkaloid Content

One gram of the sample was macerated with 20ml of ethanol. A twenty percent (20%) solution of sulphuric acid was added to the mixture in the ratio of 1:1. It was allowed to stay for 5 min. The mixture was filtered with a Whatman's No 1 filter paper. One milliliter (1ml) of the filtrate was pipette out and 5ml of 60% H_2SO_4 added. They were mixed together and allowed to stand for 3 hours. The absorbance of the resulting solution was taken at 565nm.

$$\text{Concentration} = \frac{Absorbance\ of\ sample}{GradientFactor} xDF \quad (2.5.5)$$

Where DF= Dilution Factor
Gradient Factor = Slope of the standard curve (Figure 5)

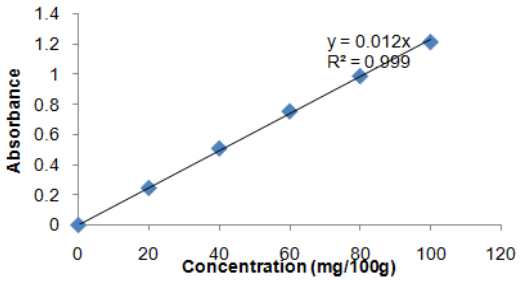

Figure 5. Standard Curve of Alkaloid Concentrations

2.5.6. Determination of Hemagglutinin Content

One gram of the sample was dispersed in a 10ml normal saline solution buffered at pH 6.4 with a 0.01M phosphate buffer solution. The solution was allowed to stand at room temperature for 30 min. It was then centrifuged and filtered to obtain an extract. Zero point one milliliter (0.1ml) of the extract diluent was pipette into a test tube and 1ml of trypsinzed albino rat blood was added. A blank containing only the blood cells was prepared in a test tube. This was used as the control. Both test tubes were allowed to stand at room temperature for 4 hours. One milliliter (1ml) of normal saline was added to both test tubes and allowed to stand for 10min. The absorbance of the two, sample and control were read at 620nm. The result was expressed as hemagglutinin units per milligram of the sample.

$$Hemagglutinin\ unit / mg = (b - a) xf \quad (2.5.6)$$

Where b= absorbance of test sample solution
a = absorbance of the blank control

$$f = experimental\ factor\ given\ by\ 1/w\ x\ V_f / V_a \quad (2.5.6.1)$$

Where w = weight of sample
V_f = total volume of extract
V_a = volume of extract used in the assay.

2.5.7. Phytate Content Determination

One gram (1g) of the test sample was weighed out into a 500ml flat bottom flask. The flask with the sample was placed in a shaker and extraction was done with 100ml of 24% Hydrochloric acid (HCl) for one hour at room temperature. The solution was decanted and filtered. Five milliliters (5ml) of the filtrate was pipetted out and diluted to 25ml with distilled water. Fifteen milliliters (15ml) of sodium chloride was added to 10ml of the diluted sample. The absorbance reading of the solution was taken at 520nm.

$$Concentration = \frac{Absorbance\ of\ sample}{Gradient\ Factor} xDF \quad (2.5.7)$$

Where DF= Dilution Factor
Gradient Factor = Slope of the standard curve (Figure 6)

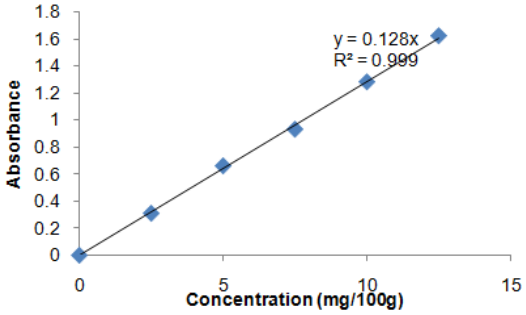

Figure 6. Standard Curve of Phytate Concentrations

2.5.8. Oxalate Content Determination

Two grams (2g) of the sample was weighed into a 300ml flask. Twenty milliliters (20ml) of 30% hydrochloric acid (HCl) was added to the sample and allowed to stand for twenty min. Forty grams of ammonium sulphate was also added and allowed to stand for another thirty minutes. The solution was filtered (with Whatman's No 1 filter paper) into a 250ml volumetric flask and made up to the mark with 30% HCl. Ten milliliters (10ml) of the filtrate was transferred into 100ml centrifuge tube. Thirty milliliters (30ml) of diethyl ether was added to it. The pH was adjusted to pH 7 with ammonium hydroxide. The solution was centrifuged at 10,000g for fifteen minutes. It was decanted into a 250ml conical flask and then titrated with 0.1M potassium tetraoxomanganate (IV) ($KMnO_4$). The volume used (titre) was noted.

The percentage oxalate was calculated thus:

$$\%\ oxalate = \frac{titrexmol\ KMnO_4\ x\ DF\,(12.5)\,x\,100}{Weight\ of\ sample} \quad (2.5.8)$$

Where DF is the dilution factor.

2.5.9. Trypsin Inhibitor Content Determination

One gram (1g) of the sample was weighed out and dispersed in 50ml of 0.5M sodium chloride (NaCl) solution. The mixture was stirred for 30 min at room temperature and centrifuged. The supernatants were filtered through Whatman No 41 filter paper. The filtrate was used for the assay. Standard trypsin was prepared using N-α- Bensoyl-DL-arginine-P-nitroanilide (BAPA) and used to treat the substrate solution. Into a test tube containing 10ml of the substrate and 2ml of the filtrate (extract), 2ml of the standard trypsin solution was added. A blank containing 2ml of the standard trypsin solution and 10ml of the substrate without the pulp sample was prepared and put in a test tube. The contents of the two test tubes were allowed to stand for 30min. Their absorbance were then measured spectrophotometrically at 410nm. The extent of inhibition of trypsin hydrolysis of the filtrate is used as a standard to measure the trypsin inhibition activites of the test sample. One trypsin unit inhibited (TUI) is equal to an increase of 0.01 in absorbance unit at 410nm. The trypsin inhibitor activity was expressed as the number of trypsin units inhibited (TUI) per unit weight (g) of the sample analyzed.

$$TUI/g = \frac{Absorbance\ of\ sample}{Absorbance\ of\ standard} x0.01F \quad (2.5.9)$$

Where b= absorbance of test sample solution

a = absorbance of the standard (uninhibited) sample or blank (control)

F = experimental factor, given by

$$F = 1/W\ x\ V_f\ /V_a \quad (2.5.9.1)$$

W = weight of the sample

V_f = total volume of the extract (filtrate)

V_a = volume of filtrate used in the analysis (assay).

2.6. Phytochemical Analysis

The tests were carried out based on procedures outlined by [6] and modified by [7].

2.6.1. Qualitative Phytochemical Analysis: They Include

Tests for carbohydrate, proteins, alkaloids, saponins and tannins were all carried out. Others include:

2.6.1.1. Test for Reducing Sugar

Five millilitres of a mixture of equal parts of Fehling's solution A and B were added to 5ml of aqueous of sample, and then heated in a water bath for 5min. Brick red precipitate showed the presence of reducing sugar.

2.6.1.2. Test for Glycosides

Five millilitres of dilute sulphuric acid was added to 1g of the sample in a test tube and boiled for 15min in a water bath. It was cooled and neutralised with 20% potassium hydroxide solution. Ten millilitres (10ml) of a mixture of equal parts of Fehling's solution A and B were added and boiled for 5min. A more dense brick red precipitate indicated the presence of glycoside.

2.6.1.3. Test for Flavonoid

Fifty millilitres of ethyl acetate was added to 1g of the extract and heated on a water bath for 3min. The mixture was cooled and filtered. Four millilitres of the filtrate was shaken with 1ml of dilute ammonium solution. The layers were allowed to separate. A yellow colour in the ammonium layer indicated the presence of flavonoids.

2.6.1.4. Test for Fats and Oil

One hundred milligrams of the extract was passed in between filter papers and the paper was observed. A control was prepared by placing 2 drops of olive oil on filter paper. Translucency of the filter paper indicated the presence of fats and oil.

2.6.1.5. Test for Steroids and Terpenoids

Nine millilitres of ethanol was added to 1g of the extract and refluxed for a few min. it was then filtered. The filtrate was concentrated to 2.5ml in a boiling water bath. Five millilitre of hot distilled water was added to the concentrated solution. The mixture was allowed to stand for one hour and the waxy matter was filtered off. The filtrate was extracted with 2.5ml of chloroform using separating funnel. One millilitre of concentrated sulphuric acid was carefully added to 0.5ml of the chloroform extracted in a test tube to form a lower layer. A reddish brown interface showed the presence of steroids. Another 0.5ml of the chloroform extract was evaporated to dryness

in a waterbath. A grey colour indicated the presence of terpenoids.

2.6.1.6. Test for Acidic Compounds

One gram of the extract was placed in a clear dry test tube and sufficient water was added. The solution was warmed in a hot water bath and then cooled. A piece of water-wetted litmus paper was dipped in the solution and observed. Acidic compounds turned blue litmus paper red.

2.6.1.7. Test for Resins

One gram of the sample extract with chloroform and the extract solution was concentrated to dryness. The residue was re-dissolved in 3ml of acetone and 3ml of concentrated hydrochloric acid added. This mixture was heated in a hot water bath for 30min. a pink colour which changes to magenta red indicated the presence of resins.

2.6.2. Quatitative Phytochemical Analysis

For the quantitative analysis, the parameters measured include *Cyanogenic glycosides*, tannins, soluble carbohydrates and steroids. Others are:

2.6.2.1. Flavonoid Determination

One gram of the sample was weighed out and macerated with 20ml of ethyl acetate for 5min. it was filtered with Whatman No 1 filter paper. Five millilitre of the filtrate was pipette into a test tube and 5ml of dilute ammonia was added. The solution was shaken vigorously for 5min and then it was allowed to settle. The supernatant was collated and the absorbance measured using a spectrophotometer at 490nm.

2.6.2.2. Reducing Sugar Determination

One gram of the sample was macerated with 20ml of distilled water. It was then filtered with a filter paper. One millilitre of the filtrate was pipettedinto a testtube and 1ml of alkaline copper reagent was added. The solution was boiled in a fume cupboard for 5 min, and then cooled in a water bath. One millilitre of phosphomolybdic acid reagent and 7ml of water were added to the cooled solution. The absorbance was read at 420nm.

2.6.2.3. Glycosides

One gram of the sample was macerated with 20ml of water. Some quantity (2.5ml) of 15% lead acetate was added to the filtration and the solution was shaken vigorously. It was allowed to settle and the lower layer (infranatant) was collected and evaporated to dryness. The residue was dissolved with 3ml of glacid acetic acid. About 0.1ml of 5% ferric chloride was added. Some 0.25ml of conc H_2SO_4 was also added. The solution was vigorously shaken and put in a dark container for 2h. The absorbance was read at 530nm.

3. Results and Discussion

From Table 1, the moisture content of the berry sample (45.12%) was observed to be less than other berries such as blackberry (88.15%), cranberry (86.5%) and strawberry (89.9%) [11,12]. This suggests that its dehydration will require less energy and time with reduced nutrient loss. The moisture content of any food indicates its level of water activity and may thus, be used to measure its stability and susceptibility to microbial contamination [13]. The ash content (0.87%) was higher than the contents of blackberry (0.5%), blueberry (0.2%), strawberry (0.5%), raspberry (0.5%) and cranberry (0.2%) [14].

Table 1. The proximate composition, pH and titratable acidity of the pulp of *Synsepalumdulcificum* BERRY

COMPONENT	CONTENT
MOISTURE (%)	45.12
ASH (%)	0.87
FIBRE (%)	0.57
FATS (%)	2.1
PROTEIN (%)	2.48
CARBOHYDRATE (%)	48.85
pH	3.2
TITRATABLE ACIDITY (g/100g)	0.02

This gave an idea of the inorganic content of the sample, since the inherent minerals are contained in the ash. Miracle berry's relative higher protein value (2.48%) compared to most berries (blueberry-0.74%, cranberry-0.4%, strawberry-0.8%) and tropical fruits (banana-1% - 1.3%, orange-0.9%, apple-0.3%-0.4%, pawpaw-0.47-1.17%, guava-1% and avocardo pear-2%) [15,16] seem to suggest that a glycoprotein may be involved in its action of imparting sweetness in non-sweet food. The crude fiber content (0.57%) was lower than the content instrawberries (1.6%), blackberries (3.2%) and raspberries (4.7%)(14). As such, the sample may be desirable for incorporation in weaning diets. Emphasis has been placed on the importance of keeping fibre intakes low in the nutrition of infants and pre-school children (17). The fat content of the sample (2.10%) was higher than the values reported for most fruits(pineapple-0.1%, guava-0.4%, sweet orange-0.1% and banana-0.4%)excluding avocardo pear (17-20%) [15,18]. The pH of the pulp was found to be 3.2 which compares well with other berries such as blackberry (3.4), strawberries (3.3-3.4) and raspberry (3.4) [14]. However, the sample was more acidic than acai berry (5.21). Its titratable acidity was 0.0196g/100g (as citric acid). This value was lower than that of some fruits such as orange (0.139g/100g), banana (0.453g/100g), pawpaw (0.072g/100g) and mango (0.369g/100g) reported by [19].

Table 2. The phytochemical test result

PHYTOCHEMICAL	QUALITAITVE	QUANTITATIVE
Protein	+	
Carbohydrate	++	3.279mg/100g
Saponin	+	
Reducing sugar	++++	397.101mg/100g
Flavonoid	++	6.5842mg/100g
Steroid	+	
Tannin	++	
Alkaloid	++	
Glycoside	+	
Fats/oil	-ve	
Acidic compound	-ve	
Resin	-ve	

Qualitative analysis were carried out to ascertain the presence of the different phytochemicals in the berry pulp before quantitative analysis were carried out. Table 2 presents the quality and quantity of phytochemicals observed in the berry pulp.It has been observed that phytochemicals have positive health effects in human and animal bodies, especially in areas of coronary heart disease, ulcers, diabetes, high blood pressure, mascular degeneration, inflammation, infection and psychotic diseases [20]. The various phytochemicals observed are known to have beneficial importance in medical sciences.Reducing sugars were more abundant than other phytochemicals whereas fats and oil, acidic compounds and resins were not observed at all. Flavonoids, tannin and alkaloid were equally present. Flavonoid and tannins are classified as phenolic metabolites [21] which are known to give defense against infection. This is in agreement with the observation of [22] that berries may provide additional health benefits because they also contain high levels of a diverse range of phytochemicals/phytonutrients consisting predominantly of phenolic type molecules. Berry phenolics also have a wide range of biological properties which includes cell regulatory effects [22,23]. It is interesting to note that glycosides were present in the pulp, though in less quality than flavonoids because [23] observed that human bioavailability of flavonoids differs significantly depending on the type of glycosides that these molecules possess. Flavonoids not only have anticancer properties but have also been shown to have anti-allergic, cardiovascular protection properties, anti-inflammatory properties and antiviral properties [24,25]. Tannins and alkaloids are known to be antimicrobial, anthelmintic and antidiarrhoeal [26]. Tannins also possess astringent properties, hastening healing of wounds [28,29]. Pure isolated plant alkaloids and their synthetic derivatives, on the other hand, are used as basic medicinal agents for analgesic antispasmodic and bactericidal effects [27]. These properties indicate that the berry pulp may be an antioxidant source.

In Table 3, more quantitative phytochemical and anti-nutritional content of the sample was shown. The value of tannin in the test sample (2.90mg/100g) was higher than the tannin content of 0.029mg/100g in Africa star apple [13] but lower than the values of 7.5mg/g and 25.30mg/100g observed in the fruits analyzed by [30] and [31] respectively. The value is also lower than the lethal dose level of 30mg/kg (3mg/100g) observed by [32]. From medicinal point of view, polyphenols (to which tannin belongs) have been reported to act as antioxidants by preventing oxidative stress that causes diseases such as coronary heart disease, some types of cancer and inflammation [33]. The phytate value (5.21mg/100g) is lower than that in guava (0.8 mg/g), mango (0.86 mg/g) and pineapple (0.90 mg/g) [34]. Thus, the value of phytate in *Synsepalumdulcificum* berry might not pose any health hazard when related to a phytate diet of 10 – 60 mg/g consumed over a long period of time, which has been reported to decrease bioavailability of minerals in monogastric animals [35]. The berry's saponin content was low when compared to 17.80mg/100g observed by [36] in the African locust bean fruit pulp. Though high level of saponin has been associated with gastroenteritis manifested by diarrhoea and dysentery [37], acute poisoning is relatively rare [38]. It was however, reported that saponin reduces body cholesterol by preventing its re-absorption and suppressing rumen protozoan by reacting with cholesterol in the protozoan cell membrane (40). The value of trypsin inhibitor in the studied *sample* was 1.75 TUI/mg. However this is low when compared to a range of 6700 to 23300 TIU/g for cowpea [41] indicating that the test sample might not pose risk to health, especially considering the lethal dose of 2.50g/kg reported by [32]. The test sample glycosidic cyanide value was also lower than the 17.30mg/100g hydocyanic acid content of African locust bean fruit pulp and cyanogenic glycoside content of 0.730mg/100g for African star apple (*Chrysophyllumafricanum*) [13]. These values are below the accepted level of human consumption of 50-60mg/kg body weight/day. The Hemagglutinin value (5.10 HU/mg) was lower than the 200HU/mg and 100HU/mg recorded for groundnut oil and palm oil respectively by [32]. The value in the test sample was a lot lower than the lethal dose of 50mg/kg they observed. With an alkaloid content of 14.17mg/100g $\pm$ 0.68, this is higher than the content of alkaloid in groundnut oil (0.2%) and palm oil (0.16%) [32]. Consumption of some alkaloid-containing foods in excess of 20mg/100g sample may trigger off toxicological manifestations [32,42]. The pulp of *Synsepalumdulcificum* had a steroid value of 1.56mg/g $\pm$ 0.03. This was high compared to the 0.27g/100g and 0.07g/100g contents in Bitter leaf (Onugbo) and scent leaf (nchanwu) respectively [43]. Eating plant foods high in sterol is known to help lower the cholesterol level in the blood [44]. Hence, consumption of miracle berry could help to check the level of cholesterol in the blood.

Table 3. Other qunatitative phytochemicals and antinutrients in *Synsepalumdulcificum* berry pulp

ANTINUTRIENT	VALUE
TANNIN (mg/100g)	2.90
PHYTATE (mg/100g)	5.21
OXALATE (%)	11.04
SAPONIN (mg/100g)	0.65
TRYPSIN INHIBITOR (TUI/mg)	1.75
GLYCOSIDIC CYANIDE (mg/100g)	0.03
HEMAGLUTININ (Hemaglutinin Unit/mg)	5.10
ALKALOID (mg/100g)	14.17
STEROID (mg/100g)	1.56
SOLUBLE CARBOHYDRATE (mg/100g)	3.279
FLAVONOID (mg/100g)	6.5842
REDUCING SUGAR (mg/100g)	397.101

Values are means of triplicate determinations.

4. Conclusion

Proximate evaluation of the *Synsepalumdulcificum* berry pulp showed a substantial amount of carbohydrate, lipid and protein. The moisture content was also lower than the content in other berries. Interesting phytochemicals were observed with flavonoid, tannin and alkaloid having comparative quality presence. The anti-nutrients observed were all below their respective lethal doses. Thus, the berry pulp can be safely utilized as food and ingredient in food processing.

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