THE POTENTIALS OF *ELAEIS GUINEENSIS* JACQ VAR: *VIRESCENS* OIL AS NUTRITIONAL AND MEDICINAL AGENT.

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ABSTRACT

Palm oils were obtained from the ripe fruits of *Elaeis guineensis Var: Nigerescens* and *Elaeis guineensis var: virescens.* The work reports the chemical evaluation, nutritional and medicinal properties of *Elaeis guineensis var: virescens* oil. The quality (chemical) characteristics were determined, using standard methods. The result showed acid value (0.75%), Saponification value (233), Iodine value (51) and Specific gravity (0.89) and Melting Point (28^{o}C). The mineral content of the oil was determined using Atomic Absorption Spectrophotometer (AAS). The oil is rich in Iron, Potassium, Sodium, Phosphorus, Calcium, Zinc, Selenuim and Manganese. The phytochemical was done by simple chemical analysis and revealed presence of Saponins, Flavonoids, Carotenoids, Steroids, Triglycerides and Phenolic Compounds. The TLC analysis using n-hexane: diethylether: acetic acid glacial (4:1:0.5) solvent system showed three spots. The present study provides evidence that the solvent extract of *Virescens* oil contains some important bioactive substances that appears to be responsible for the folkloric reputation and medicinal values. These bioactive substances and essential minerals probably justifies the use of the oil (ojukwu) as traditional medicine to cure poison, bacterial infections and treatment of certain diseases and illness.

Key words: Characterization, Phytochemicals, Thin Layer Chromatography, *Virescens* oil, *Elaeis guineensis*.

Introduction

Elaeis guineensis jacq (African oil palm) is one of the important oil bearing plantation crop grown in the region of equatorial tropics: Africa, South East Asia, and United State (Ataga, 2007). *Elaeis* is derived from the Greek word *elaion,* meaning oil, while the specific name *guineensis* indicates its origin to Guinea Coast (Hartley, 1967). Johnson (1999) recognized that the two different types of oil palm fruits exist: Dura and Tenera and distinguished by the thickness of their shells (Agu, 2009). Also two different types of oil palm variety exists: the *Nigrescens* which is very common and the *virescens* which is green fruited. The *virescens* is popularly known as "akwu ojukwu" in igbo speaking area of Nigeria. The fruits of *nigrescens* maintain dark colour at the developing stage and on maturity or ripening turns black-reddish orange colour, the exterior fruits retaining their brownish-black cap (Poku, 2002). But the fruit of *virescens* is usually greenish at the developing stage and on ripening or maturity turns to light reddish-orange or wholly golden yellow and do not retain the cap; only a small ring of the fruit apex (Godwin, 1971).

The oil of *virescens* variety foams excessively on heating and this makes it distasteful for consumers, hence lowering its market value (Ihuerie et al, 2004). Palm oil contains a mixture of poly unsaturated, monounsaturated and saturated fatty acids. The relative concentrations are 38.7% Oleic acid, 10.5% linoleic acid 44.3% palmitic acid and 4.6% stearic acid (Anon., 2009). The greater acceptance of palm oil over other vegetables oils results from its super values being a healthy component of human and animal diets (Onwudinjo., 2010). Fats and oils provide the most food energy per gram of all the food groups. The human body needs unsaturated fatty acids for building cells especially the cells of the brain and nervous system. It also needs omega-3-fatty acids for protection of the heart from heart disease. *Virescens* oil is widely regarded as a good source of these fat nutrients. *Virescens* oil contains 50% saturated fatty acids (Gunstone 2011). It behaves nutritionally like unsaturated oil and contains appreciably phytochemicals (FAQ, 2009).

Phytochemicals are naturally occurring non-nutritive chemicals produced by plants for their protection (Ogbuanu et al., 2020). Phytochemicals help the body perform numerous functions such as building strong bones, transmitting nerve impulse, making hormone, maintaining regular heart beat. They also possess antitumor, antimicrobial and antiviral effects and help in reducing the risk of heart disease, stroke and blindness (Rayman., 2009). Many researchers have worked extensively on the physic-chemical properties and mineral contents of *nigrescens* (ordinary) palm oil of *eleais guineensis.* Little or nothing has been done to find the scientific basis for the folkloric reputation and various applications of *virescens* oil of *elaeis guineensis.* The aim of this study is to investigate the chemical, nutritional composition and medicinal properties of *virescens* oil so as to ascertain why the oil is traditionally used for the treatment of poison, bacterial infections and other diseases.

Materials and Methods

Sample collection and preparation

The fruits of *virescens* var of *elaies guineensis* were purchased from "Nkwo-agu" market in Amokwe, Udi L.G.A of Enugu State on 4th August 2019. The palm fruits were collected following leads supplied by local traditional medicine men or healers in Amokwe communities where the oil are used in traditional treatment of certain illness or disease.

The sample or fruits were sorted out, removing every other thing that is not the fruit, regarded as foreign materials.

Extraction of Oil

The fruits having been previously washed was weighed. About 500gram was used and local extraction method was used to ensure originality of the sample for subsequent tests. The crude extract was then separated using a rotary evaporator.

Reagents

All the chemicals used for characterization and other tests were of Analar grade made by British Drug House (BDH) Poole, England.

Method of Analysis

The physical parameters such as colour and taste of the oil at room temperature was noted by visual and tongue inspection. The specific gravity and viscosity was determined as described by Oguuegbeule and Omodara (2014). The percent age yield (Kayode, 2015); refractive index using Abbe refractometer (Eddy et al, 2011); melting point (Association of Official Analytical Chemist, 1995) and colour using Lovibond tintometer apparatus (Agu, 2009). The percentage yield was determined as described by Kayode (2005). The chemical characterization such as saponification value, iodine value, peroxide value and acid value was determined using method described by Association of Official Analytical Chemist (AOAC, 1995) with slight modifications.

Screening for Phytochemicals

The extracts were subjected to phytochemical screening using the following tests: the Wagner's test for alkaloids; Dragendorff method (Sofowora, 1993). Benedicts tests for carbohydrate (Priyanga et al., 2014), gelatin test for tannins (Evans, 1997), lead acetate test (Ogbuanu, et al., 2014) for flavonoids; the Liberman-Burchard test for phytosterols (Olaniyan, 2016); the Rosenthaler test for Saponins (Sofowora, 1993); the absolute alcohol test for gums and mucilages (sai et al; 2011).

Thin Layer Chromatographic (TLC) Analysis

Thin layer chromatographic analysis was used in evaluating the medicinal plant (World Health Organisation, 1989). The ascending order technique was employed in the TLC analysis. A clean dry chromatographic tank with 50ml of the running solvent (mobile phase) made up of n-hexane: diethylether: acetic acid (4:10:5) was used to develop the chromatogram. The spots on the TLC plate after development were visualized in iodine tank and the position of the spots were marked. The retention factor (Rf - values) for each spot was calculated using the method of Nicholas Lisa (2021).

Mineral Content (Elemental) Analysis

The sample extract was digested with perchloric acid and nitric acids using Johnson and Ulrich (1999) method. The digest was used for mineral content determination using Atomic Absorption Spectrophotometer (PYE UNICAMS.9, AA-7000), after development of colour with ammonium molybdate and result expressed on a dry weight basis (Okwu, 2006).

Results

Table I showed the physic-chemical properties of *virescens* oil. It shows the quality characteristics of the extracted oil.

Parameters	*Virescens* oil

Yield (%)	48.20	
Colour		14.20
Taste		Bland
Sp. Gravity		0.895
Viscosity	53.50	
Refractive index		1.35
Melting point		28.10
State at room temp.		Liquid
Chemical Parameter		
Acid value		6.57
Saponification value		236
Iodine value		51
Volatile matter (%)		2.14

Values are means of three determinations

Table 2 showed the mineral contents of the plant. The sample has high content of such minerals as Iron (48.5%), Potassium (22.6%) and Soduim (15.20%). Other elements such as Zinc, Soduim, Phosphorus and Magnesuim were also determined.

Table 2: Result of Mineral content of *virescens* oil

Element	**Virescens Oil (ppm)**
Iron	48.5
Selenium	0.98
Calcium	7.05
Potassium	22.6
Zinc	1.90
Sodium	15.20
Phosphorus	7.55
Chromium	1.43
Manganese	0.06

Values are means of three determinations

Table 3 showed Rf values of TLC analysis of *virescens* oil extract. A total of three spots was isolated using n-hexane: diethylether: acetic acid (4:10:5) solvent system.

TABLE 3: Number of spots and Rf values for *virescens* oil

No of Spots	Distance	Rf-Values
1	5:15	44.78
2	4.25	36.90
3	2.30	20.00

Solvent Front in Virescens Oil = 11.5

The phytochemical screening of *virescens* extract is shown in table 4. Result revealed the presence of Saponins, Flavonoids, Steroids, Phenolic compounds, triglycerides, carbohydrate with little or no trace of tannins.

Table 4: Result of Phytochemical screening of *virescens* oil extract

Constituents	*Virescens* oil extract
Flavonoids	++
Saponins	+++
Steroids	+
Tannins	-
Phenolic compounds	++
Triglycerides	+
Carbohydrate	+
Gum and mucilages	-
Alkaloids	-
Wagner Test	-
Draggendoff test	++

Key: +++ = strongly present; ++ = present; + = trace; - = not detected

The qualitative analysis showed strongly present, present, trace and not detected position of different constituents or phytochemicals in the oil extract.

Discussion

The result in table I showed the physic-chemical characteristics of *virescens* oil. A yield of 48.2% showed that the extraction (local method) process was seemingly successful and efficient given that the standard percent yield of a good palm oil extraction lies between 45-55%.

The result of the physical parameters such as: Specific gravity, melting point, colour, taste and volatile matter indicated the oil extract was not contaminated or adulterated. The results obtained fell within the acceptable standards for crude palm oil (CPO) as recommended by Standards Organization of Nigeria (SON). An average melting point of 28.3^{0}C suggests that the oil contain low molecular weight fatty acid. A red unit colour of 14. 2 red indicated high presence of beta-carotene. Moisture and volatile of 2.46 showed high quality grade of the oil against hydrolytic rancidity and storage stability. The acceptable standard as recommended by Standards Organisation of Nigeria (SON) is 1-3%. Higher values signify high degree of susceptibility to deterioration by hydrolytic rancidity.

On the chemical analysis, an acid value of 6.57 showed that the oil is fresh and has not gone rancid or have offensive odour. No wonder the physical tongue taste showed bland, typical of fresh palm oil taste. Hence the oil is suitable for both human consumption and industrial applications. The saponification value of the oil stood at 236. This result showed that the oil has high fatty acid content. Also an iodine value of 51 for *virescens* oil showed low degree of unsaturation and of course low susceptibility to oxidative rancidity.

The mineral content result of the oil was shown in table 2. *Virescens* oil appears to be very rich in the elements considered except for sodium. It has high content of iron (48.5%); potassium (22.6%), Phosphorus (7.55%) and Calcuim (7.50%). These minerals are essential in the composition of the body fluid balance, impulse conduction, normal development and maintenance of normal acid-base balance of the blood (Okwu, 2001). The oil is also rich in Zinc (1.9%). Zinc is vital for the production of insulin a hormone and carbonic anhydrase, an enzyme in the body (Okwu, 2005). The zinc content could mean the oil can play a valuable role in the management of diabetes. Iron on its own part is a component of haemoglobin. It helps in oxygen transport; together with haemoglobin and ferrodixin, play important role in human metabolism. However but most importantly is the presence of trace element, Selenuim in this oil. Selenium is a trace element that is involved in hormone metabolism and immune function (Shomon, 2009). Particularly, it is an essential nutrient and co-factor for endogenous antioxidant (Okwu, 2001). Also, it helps to stimulate the production of antibodies, improve male fertility and is considered an anti-viral agent and has great potential to reduce the progression of HIV to AIDS (Shomon, 2009). The presence of these essential minerals in *virescens* oil appears to confirm the medicinal value of this oil and probably justify its native use as an antidote to poison and in the treatment of bacterial infections and certain diseases.

The result of the TLC analysis carried out on the crude oil extract is shown in table 3. Only three spots were isolated. The Rf values of the compounds were compared to literature values and remarks were made. According to Kztemuller (1975), the Rf values showed that the oil contains more of triglycerides and terpenoids than cholesterol esters. Phytochemical screening of the sample extract revealed the presence of saponins, flavonoids, steroids, phenolic compounds and alkaloids. The presence of these bioactive substances in *virescens* accounts for its usefulness as a medicinal plant and in traditional medicine. This is because it is a known fact that different phytochemicals have broad range of pharmacological activities. For instance the presence of phenols and phenolic compounds indicate that the oil might possess anti-microbial agents. Phenols and phenolic compounds have been extensively used in disinfections and remain the standard with which other bactericides are compared (Okwu, 2001). Saponins on its part is used as an anti inflammatory agent and in treatment of tuberculosis. Saponins are equally responsible for detoxification and cleansing effect. The significant presence of this bioactive substance

in *virescens* oil is very important and probably account for its usefulness in traditional medicine. The detoxification appears to confirm the traditional use of *virescens* oil as anti poison. Saponin also lowers blood cholesterol and boost immune system. The diuretic activity of this oil may be attributed to the presence of saponins. Moreover, flavonoids are well documented to have important effects on various biological systems (NG, 2013). Flavonoids have been referred to as "nature's biological response modifiers" because of strong experimental evidence of their inherent ability to modify the body's reaction to allergies, viruses and carcinogens. They show anti-inflammatory, anti-microbial and anti - cancer activities (Cushine and Lamb, 2005). According to Hartwell and Williams (2010), the oil from *virescens* is used as liniment for indolent tumour. It is also reported to be amodyne (analgesic effect), antidotal, aphrodisiac, diuretic and vulnary. It is a folk remedy for cancer, headaches and rheumatism (Duke and Wame, 1981) and has numerous traditional uses in Africa.

Conclusion

The outcome of this investigation has greatly elucidated the nutritive composition of *virescens* oil variety of E.guineensis. The medicinal uses of this oil are predicated on it's rich content in essential minerals and phytochemical constituents including flavonoid, saponins, alkaloids, steroids, carbohydrates and phenolic compounds which could be responsible for the biological activities. The present study provides evidence that *virescens* oil contains some important bioactive substances probably justifies its native use as traditional medicine to cure poison, bacterial infection and treatment of certain diseases and illness.

RECOMMENDATION

This study supports further research to isolate, purify and characterize the active components or constituents from *virescens* oil and the oil palm leaves as a valuable source of new leads for during development as well as development of new anti bacterial agent.

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