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مجلة التربوي

مجلة علمية محكمة تصدر عن كلية التربية

جامعة المرقب

العدد الحادي والعشرون
يوليو 2022م

- المجلة ترحب بما يرد عليها من أبحاث وعلى استعداد لنشرها بعد التحكيم .
- المجلة تحترم كل الاحترام آراء المحكمين وتعمل بمقتضاها .
- كافة الآراء والأفكار المنشورة تعبر عن آراء أصحابها ولا تتحمل المجلة تبعاتها .
- يتحمل الباحث مسؤولية الأمانة العلمية وهو المسؤول عما ينشر له .
- البحوث المقدمة للنشر لا ترد لأصحابها نشرت أو لم تنشر .

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يشترط في البحوث العلمية المقدمة للنشر أن يراعى فيها ما يأتي :

- أصول البحث العلمي وقواعده .
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- يرفق بالبحث تزكية لغوية وفق أنموذج معد .
- تعدل البحوث المقبولة وتصحح وفق ما يراه المحكمون .
- التزام الباحث بالضوابط التي وضعتها المجلة من عدد الصفحات ، ونوع الخط ورقمه ، والفترات الزمنية الممنوحة للتعديل ، وما يستجد من ضوابط تضعها المجلة مستقبلا .

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- يخضع البحث في النشر لأولويات المجلة وسياستها .
- البحوث المنشورة تعبر عن وجهة نظر أصحابها ، ولا تعبر عن وجهة نظر المجلة .

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The Phytoconstituents Screening and Antibacterial Activities of Leaves, Seeds Bark and Essential Oil Extracted from Carya illinoinensis Plant

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Abstract

Pecans (*Carya illinoensis*) considered as 'Queen of Nuts' because of its value both as wild and as cultivated nut. Merely may there are no adequate studies related to the composition of the shell and to the presence of compounds with possible positive effects. Thus, the objective of the present work was to determine the nutritional composition. The yield of extract was calculated for the two parts extracts of *Carya illinoensis* and studied for qualitative and quantitatively analysis of phytochemical constituents. The plant extracts were positive for a wide range of bioactive compounds such as Tannins, Saponins, Flavonoids, Steroids, Terpenoids, Phenols, Carbohydrates, Amino Acids, Alkaloids and Glycosides, and further were studied the evaluations quantities for each of Alkaloids, Saponins and flavonoids contents, where the total Alkaloids in the leaves was 49% and for seeds bark was 75%, while the Saponins was 55% , 62% respectively and Flavonoids was 45% for leaves, 71% for seeds bark. In addition, An antibacterial activity was carried out for the crude extracts against four pathogenic bacteria, whereas The results obtained indicated a high antibacterial activity determined through different methodology. As well, the extraction of oil from the fresh seed of *Carya illinoensis* seed by using appropriate solvents (hexane and ethanol, separately) has been successfully taken place by Soxhlet Extractor and then the properties of the extracted oil were studied by physiochemical determination. Where the absolute yield of extracted seeds oil was 35%. While the values of the physiochemical properties of the oil were 182 for Saponification, 8.3 for acid value, 7 for peroxide and 1.4776 was for the refractive index. Therefore, the results of extracted oil from the seeds of *Carya illinoensis* in this study have showed that this oil could be utilized successfully as source of edible oil for human consumption.

Keywords: *Carya illinoensis*, Soxhlet Extraction, Mineral Elements, Phytochemicals, physiochemical, Residual Oil, Antibacterial Activities.

Introduction

Many studies have shown an inverse relationship between the consumption of fruit, vegetables and cereals and the incidence of diseases such as cardiovascular diseases and cancer, among others. These diseases are associated with oxidation in biological systems due to the action of free radicals (FR) in the organism (Scalbert and Williamson, 2000). Among traditionally used foods, nuts have been recommended in the diet owing to their positive health effects. The *Carya illinoensis* (Pecan) is a fruit species belonging to the group of walnuts, a member of the family *Juglandaceae*, the same of the common walnut (Juglans regia) that asides being part of the culinary culture of Middle Eastern and European nations It has a high nutritional value. Pecan can be grown in regions owing an altitude of around 914-1829 m above mean sea level (Singh, 1967). Areas free from severe spring frost and too much heat in summer, which characterize mild temperate weather, are well convenient for its successful cultivation. In addition, pecan nut is the one of the most important temperate nuts grown in India, where it is mainly grown in Jammu and Kashmir, and Himachal Pradesh. Nutritional value of the nut is very high. It is a rich source of fat (71.43%) and protein (12.05%). The pecan nuts are usually utilised to add crispness, aroma, lovely colour and garnish for several dishes. However, almost, it is used in ice creams and baking dishes. Pecan shell is also considered as a by-product to manufacture tannin, charcoal and abrasives in the manufacturing of hand soaps. while the pecan tree is valuable as timber likewise, due to its hardiness and strength.There is a great demand for its veneer and lumber in decorative paneling, fine furniture, and flooring and in pallet manufacturing (Ravindran, 2006). The Pecan nut is reveal low levels of saturated fatty acid contents and high levels of monounsaturated and polyunsaturated fatty acids. Evidence also indicates the presence of bioactive molecules, such as sterols and a high content of total phenolic compounds, with possible natural antioxidant activity (Kornsteiner et al., 2006, Kris-Etherton et al., 1999). In this order of ideas, it is important to develop research projects for the preparation of foods with good functional properties that allow the projection of native legumes as nutritional alternatives at the regional and national levels. It is expected that when carrying out, the analyzes of the oils present in the seeds of the Pecan they possess fatty acids important for food or for bio-fuels. Hence, in this work, the extraction and characterization of Pecan oil was carried out by studying its components and measuring its physiochemical properties in order to propose other uses for the oil. Furthermore, there

are many investigations on the phytochemical study of secondary metabolites in plants. However, studies related to inorganic elements or nutritional elements of plant parts are very insufficient. Thus in the present research, the above mentioned plant parts are analyzed for its qualitative inorganic content also.

Materials and Methods

Collection and identification of the plant materials

The parts of *Carya illinoens* like seeds bark , leaves etc i.e. any part of the *Carya illinoens* may contain active components were collected December-January (2019) from surrounding of Al-Khums where Carya illinoensis is predominantly found. The samples were identified at the Department of Biology, Science College University of El-Mergeb Al-Khums Libya.

Preparation of Carya illinoens powdered sample

The samples were washed in running water and cut into small bits to facilitate drying. The pieces of plant material were dried for 12hrs in a hot air oven at 45°C . The dried plant materials was taken separately and ground using an electric blender to obtain a fine powder. The powder was further passed through a 2mm sieve to obtain finer particles. The powdered samples were stored in a clean glassware container until needed for analysis.

Preparation of ash

The dried samples materials were powered using electrical blender. Five grams of dry seeds bark, leaves powders were taken separately in pre-weighed crucibles and placed over a tripod stand and ignited slowly over Bunsen flame, till no fumes were evolved. The crucibles were then transferred to Muffle's furnace at a temperature of 550 – 600oC for 5 – 6 hours, till the black carbon particles turns into white color. Then the crucibles were transferred to a desiccator for cooling and weighed to calculate the percentage of total ash. The ash obtained was used for further analysis.

The water and organic content of the plant parts were calculated by subtracting the total of dry weight from the weight of fresh leaves and dry inorganic weight. For inorganic element analysis, the ash was dissolved in distilled water and used as aqueous ash.

Preparation of samples extract

From the powdered samples, 5 g of each part of *Carya illinoens* was extracted separately in ethanol and water for 48 hr under mechanical agitation The extracts were then filtered and evaporated to dryness under reduced pressure at 40°C using a rotary evaporator at 55°C. Each residue

was weighed and the yield percentage was calculated and then stored in tightly sealed glass vial ready for use. The yield of the extracts was calculated using the following equation:

R% = (Me / M v) * 100

R% = Production productivity of extracts %

Me = Mass of dry plant material extracted after solvent evaporation.

Mv = Dry plant material mass used for extraction.

The resulting extracts were reconstituted with mixture of ethanol and ater 1:1 to give the required concentrations used in the study.

PH measurement of the extracts

In a 100 mL flask, placed 2g of the dry extracts and diluted with 50ml of distilled water. By using pH meter (HANNA Instruments) at 25 °C. Results as shown in table

Phytochemical Profiling of Bioactive compounds from Carya illinoens

A systematic and complete study of plant should include a thorough investigation of both primary and secondary metabolites derived as a result of plant metabolism. Different qualitative chemical tests and quantification of total Alkaloids, saponins and flavonoids contents were performed for establishing the profile of a given extract for its nature of chemical composition

Phytochemical Screening

Preliminary screening for the presence of phytoconstituents (Primary and Secondary metabolites) of all the extracts was carried out using standard conventional procedures (Adeniyi, 2009) (Obadoni, 2002) (Boham, 1994).

Qualitative phytochemical analysis of the extracts

Phytochemical examinations were carried out for all the extracts as per the standard methods. The qualitative detection of phytochemical constituents in water and alcohol extracts of the studied plant's extracts included tannins, flavonoids, saponins, alkaloids, reduced sugars, Alkaloids glycosides and steroids as per standard procedure. (Harborne, 1973) (Trease, 1989)

Detection of alkaloids

Dragendroff’s reagent: 3-4 drops of the Dragendroff’s reagent was added to 10 ml of extract (water, ethanolic, separately) an orange colour will observe indicate the presence of alkaloids.

Detection of tannins and phenols

1 to 2 drops of diluted $FeCl_3$ solution to 1% was added to 10 ml of extract, the appearance of dark green or bluish green indicates the presence of tannins

Detection of flavonoids

10 ml of extract was mixed with 18 ml of sodium hydroxide solution (0.1 molars), Appearance of yellow colour turns to colour less after adding 2 ml of diluted hydrochloric acid.

Detection of terpenes

5 ml of chloroform was added to 10 ml of the extract then 3-4 drops of concentrated sulfuric acid. The appearance of a brownish reddish colour evidence of the presence of terpenes (Salkowski's test).

Detection of saponins

1. Frothing test (Emulsion):10 ml of plant extract placed in a test tube mixed with a 1-2 drop of olive oil added and the tube was well shaken from 4 to 5 minutes. The appearance of the emulsion indicates the presence of the saponins.

2. Foam test: 1ml of distilled water mixed with 2 ml of extract placed in a test tube and then well shaken from 3 to 4 minutes. The appearance of foam will indicate positive detection.

3. Mercuric Chloride Test: Addition of 5 mL of mercuric chloride solution to 10 ml extract. The appearance of white precipitation will indicate positive detection.

Detection of steroids

2 ml of the extract placed in a test tube then mixed with 2 ml of chloroform and an equal amount of sulfuric acid was added cautiously on the tube wall, the appearance of a reddish colour formed at the interphase indicates the presence of a steroid ring

Detection of anthraquinones

2 ml of extract was mixed with 5 ml of chloroform and shook well. Then 10% of the ammonia solution was added. The appearance of pink or red in the ammonia layer indicates the presence of the anthraquinones in the extract.

Detection of Glycosides

2 ml of the extract was mixed with 2 ml of acetic acid and then added 1 - 2 drops of ferric chloride solution; after that 1 ml of concentrated sulfuric acid was added. The appearance of brown ring indicates the presence of reduced sugar.

Detection of Coumarins

To the test solution add a drop of sodium sulphate developing yellow colour. Indicates the presence of coumarins.

Detection of Carbohydrates (Benedicts Test): Add 1 ml of Benedict's reagent to test tube and heat the mixture to boiling in a water bath for 2 minutes. The formation of an orange red precipitate due to the formation

of a copper (I) oxide indicates the presence of reducing sugars.

Physiochemical Screening

Description. It included evaluation of ash by colour, odour, taste, size, shape, andspecial feature, like touch and texture.

Total Ash Value. About 2-3 g of ground plant material was incinerated in a tarred silica crucible at a temperature not exceeding 450°C until free from carbon. Then it was cooled and weighed. The percentage of ash with reference to the air dried plant material was calculated

Qualitative analysis of the inorganic elements

Iron: 5 ml of the test sample and a few drops KSCN reagent was taken. Formation of red colour indicates the presence of Iron.

Calcium: 5 ml of the test sample and a few drops of Conc.H_2SO_4 was taken. White ppt. was formed. It was an indication of the presence of calcium.

Phosphorus: 5 ml of test solution was taken and a few drops of Ammonium Moly date reagent was added. Formations of yellow colour indicate the presence of Phosphorus.

Potassium: 5 ml of test solution was taken and a few drops of 15% $HClO_4$ soln. Formation of $KClO_4$ crystals indicates the presence of K.

Manganese: 5 ml of test solution was taken and was added 10 ml of 1% KOH solution, then a few drops of Benzedrine reagent. Formation of blue colour showed the presence of Mn.

Sulphur: 5 ml of test solution was taken and a few drops of $BaCl_2$ was added. Formations of white ppt. of $BaSO_4$ indicate the presence of Sulphur.

Potassium: 5 ml of test solution was taken and a few drops of 15% $HClO_4$ soln. Formation of $KClO_4$ crystals indicates the presence of K.

Oil extraction

***Sample of oil collection and preparation*:**

First, Carya illinoensis seed was collected from surrounding of Al-Khums where Carya illinoensis is predominantly found. Then, the seeds was removed from the pods, and stored in box, transported to laboratory, seeds was cleaned manually to remove all foreign matter such as dust, dirt, stones and chaff as well as immature and broken seeds and oven dried and stored until needed. The dry nuts were grinded using mortar and pestle. Finally, the crushed seed powder was kept for extraction.

Procedure of Oil Extraction

In order to extract oil from the crushed nuts, a soxhlet apparatus using analytical grade of mixture of hexane (n- hexane) and ethanol 1:1 was applied for 5 hours at 60 ^{0}C. The extraction was executed for 3 hours.

Then, the solvent was separated from oil by using rotary evaporator at a temperature of 50^{O}C for one hour, stored in the bottle for further analysis. The physical and chemical parameters including refractive index, specific gravity, peroxide value, saponification value and acid value were determined according to the standard methods.

Determination of moisture content of seeds

Carya illinoensis seeds were weight primarily, and it was dried in an oven at 109^{o}c for 7 hours and the final weight was taken. The procedure was repeated in triplicate and recorded. The percentage moisture in the seed was calculated using the following equation. (Adejumo,2012)

Moisture content= $[(w_1-w_2)/w_2]$ X 100

Where, W_1=original weight of sample (before drying)

W_2=Weight of sample after drying

Description. It included evaluation by colour, odour, taste, and special feature, like texture. To determine the color, the samples were correlated using color charts.

Determination of the seed oil content

Solvent was freed from the oil obtained after extraction was placed over a water bath at 70^{o}C for 30mins and the weight of oil of each replicated extracted was determined and mean value was recorded and the percentage of oil extracted was determined using below equation. (Farooq, 2006)

Seed oil content = (W_0/W_S) X 100

Where, W_0 = weight of oil extracted

Ws= Weight of sample

Determination of the Physiochemical Parameters

Determination of Acid Value

0.5 g of the oil sample was weighed into a conical flask using a plastic dropper.20mL of Absolute ethanol was added. 3 drops of phenolphthalein was added and the solution was titrated using 0.1 M sodium hydroxide until pink colour persists (Okeneand Evbuomwan, 2014)

$$\text{Free Fatty Acid} = \frac{\text{titre value x M x 5.61}}{\text{weight of oil sample used}}$$

Where M = Normality of the K OH.

Acid Value = 2 x Free Fatty Acid Value

Determination of Saponification Value

0.5g of the sample was weighed into a conical flask. 50mL of 0.5N

alcoholic solution of potassium hydroxide was added and the solution was re-fluxed for 30 minutes to ensure perfect dissolution. The solution was allowed to cool and 3 drops of phenolphthalein was added. The solution was titrated with 0.5N HCl, Titter value recorded as V1. It was observed that the pink solution turns colourless. Blank titration was carried out (V2) as well starting from 50mL of 0.5N alcoholic solution but without adding the oil sample.

$$\text{Saponification value} = \frac{56.1 \times 0.5 \times (v2 - v1)}{\text{weight of the sample used}}$$

Determination of Peroxide Value

0.5g of the sample was weighed into a conical flask. 25mL of solvent mixture was added, that is, 2 volume of glacial acetic acid and 1 volume of chloroform. 1mL of 10% potassium iodide was added and shaken vigorously. The solution was covered with a stopper and kept in the dark for 30 minutes. 35mL of starch indicator was added, and titrated (V1) with 0.02 M sodium thiosulphate until solution turned colourless. The blank was done starting with 25mL of solvent mixture.

$$\text{Peroxide Value} = \frac{1000\ (V1 - V2) \times M}{\text{weight of sample.}}$$

M = molarity of sodium thiosulphate

Screening of antibacterial activity

Antibacterial agents from different classes of antibiotics were used which included penicillin(P), Streptomycin (S), augumentin(AMC), Cefotaxime (CTX), Ceftriaxone (CRO), Doxycline (DC) and Amoxicillin (AMX). The antibacterial activity of the plant extracts was investigated using agar well diffusion method.

Microbial strains

Four types of pathogenic bacteria (two Grame positive *Streptococcus, Staphylococcus Aureus* and *t*wo Grame negative strains *Klebsiella* and *Pseudomonas*) were used against crude plant extracts.

Disc diffusion method

1. Firstly prepared the extract disc by using Whatman No-1 filter paper with the help of punching machine and then autoclaved.
2. Soaked the discs in already prepared different concentrations of extracts and left overnight.
3. Prepared the petri-plates with suitable agar media (already prepared

and autoclaved).
4. Spread the bacterial strains on their respective agar media.
5. Test extract loaded disc were placed on respective bacterial and fungal lawn and then incubated at
suitable temperature i.e. 37˚C for bacteria
6. After incubation period, the zone of inhibition was measured and recorded.
7. Similarly standard antibiotic disc of Amoxicillin was used instead of test extract for comparative study of test extracts.

RESULTS AND DISCUSSION

Phytochemical screening of successive extracts of *Carya illinoinensis*

Quantitative phytochemical analysis of the extracts

Quantitative assessments of the different phytochemicals detected during the investigation were graded.

Table 1: Results of pH values and per cent yields of chemical constituent:

Name s' plant	Name of part	Percentage Yield (%)	Alkaloids (%)	Saponins (%)	Flavonoids (%)	pH Value
Carya illinoinensis	leaves	65%	49%	55%	45%	5.67
	seeds bark	40%	75%	62%	71%	7.25

The percentage yield for the various parts of *Carya illinoinensis* extracts as shown in Table 1 were results relieved that the leaves have the highest percentage yield 65% when compared to the seeds bark extracts 40%, a high amount of Flavonoids and Alkaloids was also found in the seeds bark of *Carya illinoinensis.* The biological functions of flavonoids apart from their antioxidant properties include protection against allergies, inflammation, free radicals, platelet aggregation, microbes, ulcers, hepatotoxins, viruses and tumors (Barakat, 1993). However, PH of seeds barks as 7.25 which approximately agrees with the traditional use of seeds bark of *Carya illinoinensis*.

Table 2: The phytochemical screening of crude plants extracts

Chemical Component	Tests	*Carya illinoensis*	
		leaves	seeds bark
Alkaloids	Dragendorff's	+++	+++
	Picric acid	+++	+++
Phenols	Ferric chloride test	+++	++
Tannins	Ferric chloride test	+++	++
	Lead acetate test	++	++
Flavonoids	Sodium Hydroxide test	++	+
Terpenes	Salkowski's test	++	++
Saponins	Frothing test (Emulsion)	++	++
	Foam's test	++	+++
	Mercuric Chloride Test	++	+++
steroids		+++	+++
Glycosides	Reducing sugar test	+++	+++
Coumarins	sodium sulfate	+	+
carbohydrates	α-naphthol	+	++
Amino acids	ninhydrin	+	++

As shown in table 2 the qualitative phytochemical of the whole plant of *Carya illinoinensis* revealed presences of different phytochemicals prepared in two same solvent extracts of steroids, terpenoids, glycosides, saponins, flavonoids, tannins, alkaloids, Coumarins, amino acids, phenols and carbohydrates, Leaves have the highest contents of Phenols, flavonoids and tannins, than the seeds bark Nonetheless, High amount of saponins, carbohydrates and amino acids were also found in the seeds bark of *Carya illinoinensis*. Leaves possess alkaloids, steroids and glycosides in abundance which approximately agrees with seeds bark.

Table 3: The Results of physical characteristics of ash:

Plant's Name	Name of parts	Colour	Odour	Ignition	Taste and texture
Carya illinoinensis	leaves	Light gray	Characteristic	Black smoke	Bitter taste, coarse texture
	seeds bark	Dark gray	Characteristic	Black smoke	Normal taste, soft texture

Organoleptic Characters of *Carya illinoinensis 's* ash

The macroscopic study is the morphological description of the plant parts which are seen by the naked eye or magnifying lens. Organoleptic evaluation can be done by means of sense organs, which provide the simplest as well as quickest means to establish the identity and purity to ensure the quality of a particular drug (Sharma and Pracheta, 2013). Results of organoleptic characters such as colour, odour, taste and fracture of leaves and seeds bark, are evaluated Table 3.

Table 4: Results of pH and the solubility tests in different solvents:

Plant's Name	Name of parts	PH Values	Solubility test			
			Aqueous	EtOH	$CHCl_3$	H_2SO_4
Carya illinoinensis	leaves	10.09	S	W	W	W
	seeds bark	10.26	S	S	W	W

S = soluble, W= slightly soluble (weak)

Table 5: Results of ash content, Conductivity, Total Dissolves substances (TDS) and salinity

Plant's Name	Name of parts	**Ash Content (%)**	**Conductivity µS**	**TDS Mg/L**	**Salinity**
Carya illinoinensis	leaves	84%	1428	850	5.9
	seeds bark	45%	1412	847	5.29

Identification and evaluation of plant material using various analysis techniques is one of the simplest and cheapest methods to establish the correct identity of the source materials. (Paliwal, 2015). The parameters which are studied are Ash Content, PH Values, Conductivity, Total Dissolves substances, etc., were as shown in Table 4 and 5 the proximate analysis revealed that Ash Content percentage of leaves was 84% and seeds bark was 45%. The pH values were slight basic, 10.09 were observed in leaves and 10.26 in seeds bark.

Table 6: The results of analysis of minerals content in plant samples:

Plant's Name	Name of part	Minerals content					
		Calcium	Cobalt	Iron	potassium	Phosphorus	Sulphur
Carya illinoinensis	leaves	++	-	++	+	++	-
	seeds bark	++	-	++	++	++	-

Table 7: Results of Heavy Metals Determinations

Names of part of *Carya illinoinensis*	**Metals**	
	Mercury	**Nickel**
leaves	-	-
seeds bark	-	-

The results of the elemental analysis of inorganic elements in the selected plant parts were recorded in tables 6 and 7 Analysis of inorganic elements showed the absence of Nickel, Cobalt, Sulphur and mercury in all the

plant parts analyzed, whereas Iron, Phosphorus, calcium and potassium were reported in all the plant parts selected. Calcium, magnesium and potassium are essential for making good of worn out cells, building of red blood cells and maintaining body mechanisms. (WHO, 1996) Sodium and potassium take part in ionic balance of human body and help in the formation of gastric juice in stomach (Brody, 1998).

Table 11 Physical and chemical Characteristics of the extracted Oil

Physical property	Value	**Chemical property**	Value
Color	Pale yellow	Seed oil content	%35
Odor	odorless	Acidic value	8.3
Refractive index	1.4776	Saponification value	182
		Peroxide value	7

The physical properties of *Carya illinoensis* seeds such as size, shape and bulk and chemical composition of seeds are needed for the design of equipment to handle, transport, process and store for asserting product quality. Moreover, unit operation for preparation of seeds for oil extraction very slightly depending up on the physical properties and oil contents of the seed. The kernel has brown color and oval shape and its thickness decrease from the center towards either end along the length of seed. The extracted oils were liquid at room temperature. The oil extraction with lab-scale Soxhlet extractor had the highest yield, due to the increased ability of the polar solvent to overcome forces that bind lipids within the sample. Next, the data from the analyses of *Carya illinoensis* oil seeds and extracted oils have been summarized in table 11 the extracted oil was liquid at room temperature. The oil extraction with Soxhlet extractor had the highest yield due to the increased ability of the polar solvent to overcome forces that bind lipids within the sample. The high oil yield allows the possibility of economical exploitation which results in lower operation costs compared to some other oil seeds. Where as shown in Table 11 the oil from *Carya illinoensis* seed using Soxhlet apparatus and hexane and ethanol as a solvent were liquid at room temperature, pale yellow, odorless. Average acid value; in this study is 8.3 mg KOH/g. The acceptable acid value limit for edible oil is less than 10 (Sampson, 2005). From this the oil from *Carya illinoensis* seed used for edible oil. Saponification value of *Carya illinoensis* seed oil in this study is 182 (mg koH/g). This indicates the presence of high percentage of fatty acid in *Carya illinoensis* oil and there for implies the possible tendency to soap formation. Generally, this result have some variation, this may be due to the difference in variety of plant, cultivation climate, ripening stage, harvesting time of the seed, extraction method used.

Determination of Antibacterial Activity

The results of the Antibacterial Activity tests revealed that the various extracts of *Carya illinoinensis* showed different degrees of growth inhibition, depending upon the bacterial strains and antibiotic used against in the test as shown in Tables 8, 9 and 10. Aqueous / ethanolic of the leaves extract of *Carya illinoinensis* were showed notable antibacterial activity against Gram−positive bacteria than Gram−negative bacteria. Also, This study showed that aqueous/ ethanolic extract of seeds bark of *Carya illinoinensis* was more effective against Streptococcus (+) bacteria *in vitro*.

Table 8: Results of antibacterial activity against of Leaves of Carya illinoinensis extracts

Aqus / EtOH. Extr. of Leaves		Antibiotic						
		Streptomycin (S)	Amoxicillin (AMX)	Penicillin (P)	Cefotaxime (CTX)	Amoxicillin (AMC)	Ceftriaxone (CRO)	Doxycline (DC)
Bacteria Species	*Pseudomonas(-)*	S+++	S++	S+	S++++	S+++	S+	R
Aqus / EtOH. Extr. of Leaves		Antibiotic						
		Streptomycin (S)	Amoxicillin (AMX)	Penicillin (P)	Cefotaxime (CTX)	Augumentin(AMC)	Ceftriaxone (CRO)	Doxycline (DC)
Bacteria Species	Streptoccus (+)	S++++	S++++	S++	S++++	S++	S+++	R

Table 9: Results of antibacterial activity against of seeds bark of Carya illinoinensis extracts

Aqus / EtOH. Extr. of seeds bark		Antibiotic						
		Streptomycin (S)	Amoxicillin (AMX)	Penicillin (P)	Cefotaxime (CTX)	Augumentin(AMC)	Ceftriaxone (CRO)	Doxycline (DC)
Bacteria Species	Staphylococcus Aureus (+)	S+++	S++	S++++	R	S+++	S+	S+
Aqus / EtOH. Extr. of seeds bark		Antibiotic						
		Streptomycin (S)	Amoxicillin (AMX)	Penicillin (P)	Cefotaxime (CTX)	Augmantin (AMC)	Ceftriaxone (CRO)	Doxycline (DC)
Bacteria Species	Streptoccus (+)	S+++	S+++	S++++	S+	S++++	S++	R

Table 10: Results of antibacterial activity against of the extracted Oil of Carya illinoinensis seeds

Oil extract of Carya Illinoinensis seeds		Antibiotic					
		Streptomycin (S)	Amoxicillin (AMX)	Penicillin (P)	Cefotaxime (CTX)	Doxycline (DC)	Ceftriaxone (CRO)
Bacteria Species	Klebsila	S++++	S+++	S++++	S+	R	S++

Conclusions

The presence of these chemical constituents in this plant is an indication that the plant, if properly screened, could yield drugs of pharmaceutical significance. This is better supported by the fact that members of the family of this plant have been known to be involved in ethnomedicine in the management of various ailments. *Carya illinoensis* have high nutritional value, medicinal value, fast growth, and many of its potential uses have great impact on economic and social values so need better attention of researchers. So pharmacological investigations regarding various activities of this plant can be done so that the medicinal activities of this plant could be exploited. In addition to its promising result the physicochemical characteristics of *Carya illinoensis* oil samples fells within limits of other edible vegetable oils making it a good raw material for food, cosmetics and other industrial applications.

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