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Research Article

EXTRACTION OF COFFEE OIL FROM *Coffea arabica* (GREEN COFFEE BEAN)

G. Prem Kumar* and Prabhavathi Prem Kumar

Crescent Biologicals Pvt. Ltd., Gandhipet, Tirupattur, Tamil Nadu, India

Abstract

The seed of Coffea plant is a coffee bean, the source for coffee, and the coffee fruit is also a so-called stone fruit. *Coffee arabica* belongs to the family Rubiaceae commonly known as Coffee bean. Coffee beans also contain coffee oil, which is mainly present in the endosperm of green beans. The part used is seed. The economically two most important varieties of coffee plant are the *Arabica* and the *Robusta*; ~60 % of the coffee produced worldwide is *Arabica* and ~40 % is *Robusta*. *Arabica* beans consist of 0.8 –1.4 % caffeine and *Robusta* beans consist of 1.7 – 4.0 % caffeine. *Coffea arabica* and *Coffea canephora* var. *robusta*, contain between 7 and 17 % fat. The lipid content of green *Arabica* coffee beans averages some 15 %, whilst *Robusta* coffees contain much less, around 10 %. In our project the main aim is to produce coffee oil from green coffee bean. Coffee oil is chemically known as "caffeol." Coffee seed oil for skin has shown an increase in anti-aging properties. It makes the skin look radiant and youthful has an herbaceous aroma and deeply moisturizes the skin with quick absorption. Green coffee beans are extracted with ethyl alcohol. Then the miscella is filtered and concentrated. The clear oil layer is separated and stored in containers.

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Key words: *Coffee arabica*, Coffee Robusta, Ethyl alcohol and Coffee seed oil.

1. Introduction

Coffee is the most widely consumed beverage for over 1000 years around the world. Coffee beverage quality is a result of a balance between a series of factors, actions and decisions, starting in the field during cultivation and continuing to bean storage, processing and roasting. Both non-genetic and genetic sources of variation have been shown to increase beverage quality. According to the International Coffee Organization, more than 9 million tons of these compounds were consumed worldwide. Two species are of significant economic importance:

Coffea arabica (Arabica) providing 75% of the world production and *Coffea canephora* (Robusta), both provides 25 % of the world production. So far, many studies have shown the properties of coffee beverages, such as the anti-oxidant, anti-bacterial, anti-inflammatory and anti-obesity properties, and effects on type 2 diabetes mellitus, amongst several others, but little known is the impact on human and environmental health from its disposal in the environment. One third of the total coffee bean protein is thought to bind to arabinogalactans in the cell wall, but there is no detailed information regarding the nature of these proteins. It is probable that most are enzymes, such as polyphenol oxidase and peroxidases, while the largest fraction of

**Corresponding author*: Dr. G. Prem Kumar

proteins remains in the cytoplasm. Coffee is the most important agricultural commodity in the world and is second only to petroleum in global trade activity and value (Njoroge *et al*., 2005). About 120 million bags of coffee are produced annually worldwide, corresponding to over 7 million tons of coffee beans per year (ICO, 2009). Of the several species in the genus Coffea (Rubiaceae), only *Coffea arabica* and *Coffea canephora* var. *robusta* are cultivated for commercial production. They are commonly referred to as *Arabica* and *Robusta*, with the former accounting for 70 – 75 % of the total production (Wintgens, 2009). The lipid content of green *Arabica* coffee beans averages some 15 %, whilst *Robusta* coffees contain much less, namely around 10 %. Most of the lipids, the coffee oil, are located in the endosperm of green coffee beans only a small amount and the coffee wax, is located on the outer layer of the bean. This lipid functions as an energy reserve during germination of the seed. Coffee oil accounts for 4 - 11.4 % of green beans and for 8.6 - 15.4 % of roasted beans.

Coffee oil is composed mainly of triacylglycerols with fatty acids, sterols and tocopherols in proportions similar to those found in common edible vegetable oils. The relatively large unsaponifiable fraction is rich in diterpenes of the kaurane family, mainly cafestol, kahweol and 16-O-methylcafestol, which have been receiving more and more attention in recent years due to their different physiological effects. Organic residues from brewed coffee the so-called spent coffee grounds have an oil content of approximately 10 to 15 percent by weight (wt%), depending on the coffee variety. Some of the benefits of Coffee bean oils are prevents age-related muscle loss, increases mental alertness and enhances cognitive function, supports weight loss, improves strength and stamina during workouts and exercise, enhances heart health, helps reduce the risk of developing metabolic syndrome and improve digestion with protein coffee.

3.Biological effects of Green Coffee Bean Oil

Hepatoprotective activity

Many studies have demonstrated that the diterpenescafestol and kahweol present in green coffee oil have anti-carcinogenic, antioxidant and hepatoprotective effects. It exhibited antioxidant effects on $FeCl_2$ ascorbate- induced lipid peroxidation in mouse liver homogenate, and on superoxide radical scavenging activity (Lee *et al*., 2007). These results suggest that the protective effects of kahweol and cafestol against the CCl4-induced hepatotoxicity possibly involve mechanisms related to their ability to block the CYP2E1- mediated CCl4 bioactivation and free radical scavenging effects. It is also reported that kahweol and cafestol can protect hepatocytes from oxidative stress (Oh *et al*., 2009).

Anti-cancer activity

Anti-carcinogenic effects have been demonstrated in Cafestol and kahweol. Kahweol inhibited growth of human lung adenocarcinoma A549 cells and induced apoptosis *via* down-regulation of STAT3 signalling pathway (Cardenas *et al.,* 2011). Based on their studies using U937 human promonocytic cells. It is also inferred that kahweol could modulate multiple components in apoptotic response of human leukemia cells, raising the possibility of a novel therapeutic strategy in haematological malignancies (Cardenas *et al.*,2015). Kahweol also behaves as an anti-inflammatory and antiangiogenic compound with potential use in

antitumoral therapies (Beveridge *et al*., 1999; Lee *et al*., 2012). Cafestol and kahweol-promoted induction of apoptosis through regulation of specificity protein 1 expression has also been reported in human malignant pleural mesothelioma (Grollier and Plessis, 1988).

Cosmetic properties

Green coffee bean oil is unsuitable for edible uses. On account of the emollient property provided by the constituent fatty acids and the diterpenes it is widely utilized in the cosmetics industry. Additionally, it also blocks sun rays harmful to human skin. Green coffee oil is used in the cosmetics industry for its ability to help maintain natural skin moisture with the help of agaric acid. It is of the opinion that linoleic acid – its main fatty acid – provides relief from eczema and has therapeutic properties in the treatment and cure of dermatitis (Wagemaker *et al*., 2011). Additionally, there is evidence that coffee oil is able to absorb UV radiation in UVB range, which causes the greatest damage to the human skin (Pereda *et al*., 2009).

Coffee beans are rich in unsaponifiable matter are of the opinion that, while the content of unsaponifiable matter varies greatly in coffee beans and may reach levels of up to 12 %, the content of unsaponifiable matter of most vegetable oils falls in the range of 1.0 % to 1.5 %. The constituents of green coffee oil have valuable properties for formulating cosmetic products like antioxidants and UVB protectors. To enhance these properties, one can take advantage of 4 coffee oil's richness in unsaturated fatty acids and unsaponifiable matter. Notwithstanding, the content of these constituents varies between plants and species. Recently characterized the lipid fraction and determined the sun protection factor of 10 species of Coffee (Speer and Kolling-Speer, 2001). For all the parameters investigated great variability was observed. The wax content varied between 0.0 and 2.8 %, the oil content ranged from 6.9 % to 32.4 %, unsaponifiable matter from 0.3 % to 13.5 % and the sun protection factor from 0.0 to 4.1. Fatty acids widely employed in the cosmetics industry, like linoleic and oleic acid were present in excellent proportion.

The effect of green coffee oil on skin health has been investigated extensively. Green coffee oil showed a dose - dependent stimulation of collagen, elastin and glucosamine glycans synthesis by fibroblasts in vitro in addition to increasing release of growth factors, TGF-b1 and GM-CSF. The authors also found AQP-3mRNA expression 6.6-fold higher in the presence of green coffee oil, indicating a protective effect of this oil on physiological balance of the skin (Nakayama et al., 2003). From these observations concluded that green coffee oil is effective against cellulitis. Lack of toxicity of cosmetic formulations containing green coffee oil in vitro and in clinical evaluation. These effects of green coffee oil on skin health may probably be related to its lipid fraction rich in triacylglycerols, sterols and tocopherols, as well as diterpenes of the Kaunene family, which have been previously connected to benefit actions to the skin (Savian *et al*., 2011). Nevertheless, the most important dermatological application of green coffee oil is certainly as a photoprotection aid. A non-ionic O/W emulsion containing 3 % (w/w) green coffee oil was proposed as a topical formulation for photoprotection (Jimenez *et al*., 2006). Recently, a study of green coffee oil as an additive to sunscreen formulation containing ethyl hexyl methoxy cinnamate showed a synergistic effect of this oil by increasing the Sun Protection Factor (SPF), by 20 % as compared to synthetic sunscreen alone.

In weight loss the diterpenescafestol and kahweol present in green coffee oil have also been implicated. Applied for a European patent that disclosed the composition of a topical slimming cosmetic formulation containing cafestol or kahweol. The formulation was intended to prevent and treat cellulite, to refine contours of the face, skin firming, to reduce the deposit of fat on the thighs, to decrease the fatty overload of the hips and to reduce deposits of excess fat at waistline of men and women. One of the drawbacks of the cosmetic application of vegetable oils or fats is their lipid oxidative in stability, since the

unsaturated waxy acids may undergo photo oxidation, thermal oxidation, auto oxidation and enzymatic oxidation. By microencapsulation photo oxidation of green coffee oil can be minimized, which is an effective way to protect components like the diterpenes from lipid oxidation and other environmental factors (Nosaria *et al*., 2015; Wagemaker *et al*., 2015). Recently improved green coffee oil antioxidant activity for cosmetic purpose by spray drying microencapsulation. Microcapsules containing 10 and 30 % of oil showed 7-fold and 3-fold increase in antioxidant activity when compared to pure green coffee oil.

Safety of green coffee oil

The safety of green coffee oil-containing cosmetic formulations was established recently. Cytotoxicity of green coffee oil and of formulations containing 2.5 – 15 % of green coffee oil was evaluated by the MTT (3-(4, 5-dimethylthiazol-2-y1)-2, 5-diphenyltetrazolium bromide) reduction assay, in human keratinocytes. Formulations containing 15 % of green coffee oil and the vehicle were applied under in-use conditions in the volar forearm of human volunteers for 3 days. Transepidermal water loss, stratum corneum water content and erythema index were evaluated every 24 hours using biophysical techniques. The same formulations were studied for skin tolerance through a patch test. Neither pure green coffee oil nor its formulations showed cytotoxic effects in concentrations up to 100 μg ml^{-1}. Trans epidermal water loss values showed a slight reduction when the formulation containing green coffee oil was applied. Stratum corneum water content and erythema index did not show significant differences, as the results observed in the first day of the study were maintained throughout 3 days. None of them displayed any reaction after using an occlusive patch and the products showed good skin compatibility under experimental conditions. Green coffee oil showed no cytotoxic effect for skin and liver cells in vitro, even at high concentrations. Therefore, it is evident that green coffee oil or its formulations are safe for topical use in humans.

Stability of formulations

In many skins care products green coffee oil is being used as an active ingredient, due to its properties as an emollient, improver of skin hydration and absorbent of UVB radiation. However, to obtain a stable, effective and pleasant formulation containing variable amounts of green coffee oil it is necessary to know specific chemical characteristics of the combined ingredients. Thus, evaluated the rheological behaviour, presence of liquid crystals (LCs) and skin protective effects of green coffee oil-containing formulations for correlating these parameters with green coffee oil concentrations. Formulations containing 0- 15% of green coffee oil were submitted to physical stability assays by determinations of rheological behaviour after 90 days storage, detection of LCs by polarized light microscopy and in vitro determination of the sun protection factor (SPF). *In vivo* protective effects in mice were evaluated with biophysical techniques and histological analysis. Data were correlated using principal component analysis. Despite the low SPF values, addition of green coffee oil to formulations resulted in significant and proportional increases of these values. The authors concluded that formulation stability and skin protective properties are influenced by green coffee oil.

Suggested Use

Green coffee oil can be added to sensitive skin products like creams, serums, and facial masks. This highly moisturizing oil is the best choice for body lotions, lip and body balms, butters, bath melts, and so on. Green coffee oil is a highly recommended ingredient in products for mature, aging, dry and cracked skin, eczema, psoriasis and lip care. It is most suitable for dry, brittle and damaged hair.

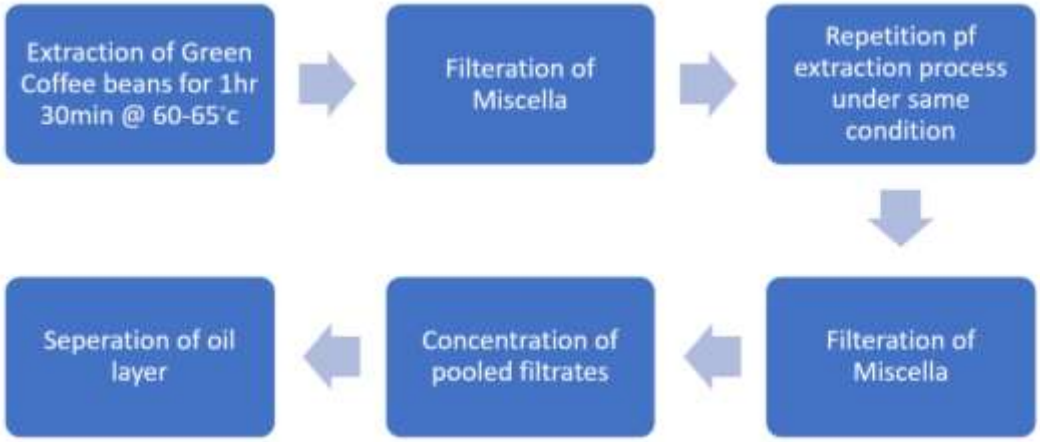
4. Materials and Methods

Sample collection

The coffee bean used in this study is *Coffee arabica.* These coffee beans were collected from the local market of Chikmagalur, is then stored in moisture free area. These coffee beans were used for further analysis.

Manufacturing process:

Green coffee beans are extracted with ethyl alcohol for 1 hour 30 minutes at 60-65°C. Then the miscella is filtered. The beans are again extracted with alcohol under the same conditions and the miscella filtered. The two filtrates are pooled together and concentrated. The clear oil layer is separated and stored in containers.



Determination of Acid Value

Mix the oil or melted fat thoroughly before weighing. Weigh accurately a suitable quantity of the cooled oil or fat in a 200-ml conical flask. The weight of the oil or fat taken for the test and the strength of the alkali used for the titration shall be such that the volume of alkali required for the titration does not exceed 10 ml. Add 50 to 100 ml of freshly neutralized hot ethyl alcohol and about one millilitre of phenolphthalein indicator solution. Boil the mixture for about, five minutes and titrate while as hot as possible with standard aqueous alkali solution, shaking vigorously during titration.

Calculation

$$\text{Acid value} = 56.1VN/W$$

where, V = volume in ml of standard potassium hydroxide or sodium hydroxide solution used; N = normality of standard potassium hydroxide or sodium hydroxide solution, and W = weight in g of the material taken for the test.

Determination of Antioxidant Tocoferol

The mobile phase consists of methanol (50 %) and acetonitrile (50 %) at a flow rate of 1 ml/min. The quantitative estimation of α-tocopherol is performed on reversed phase C18 column (250 mm×4.6 mm i.d., particle size 5 µ). The temperature of column oven is set at 40 °C. The detector is set at excitation wavelength of 290 nm and emission wavelength of 330 nm.

Determination of Flash Point

Fill the cup with the oil to be tested up to the level indicated by the filling mark. Place the lid on the cup and properly engage the heating devices. Insert the thermometer, light the test flame and adjust it to 4.0 mm in diameter. Heat the sample so that the temperature increase is about 5 to 6 ºC per min. During the heating, turn the stirring device from one to two revolutions per second. Apply the test flame when the temperature of the sample is a whole number not higher than 17 °C below the flash point at every 5 ºC rise in temperature, discontinue stirring and apply the test

flame by opening the device which controls the shutter and lowers the test flame into the shutter opening. Lower the test flame in for 0.5 second and quickly return to the raised position. Do not stir the sample while applying the test flame. As soon as the test flame has been returned to the raised position, resume stirring. The flash point is the temperature indicated by the thermometer at the time of the flame application that causes a distinct flash in the interior of the cup.

Determination of Hydrocyanic Acid

Heat about 50 ml of the oil in a distillation flask by placing it on a water bath. During heating pass through the oil for about 30 min, air which has been purified by scrubbing through solution of potassium hydroxide and lead acetate. Connect the distillation flask to an absorption tube containing 5 ml of potassium hydroxide solution. The air bubbling through the oil carry with it the hydrocyanic acid and this is absorbed by the potassium hydroxide solution. Shake the solution with few drops of ferrous sulphate solution, acidify with few drops of hydrochloric acid and warm gently for 5 min. Filter and add a few drop of ferric chloride solution. A blue or bluish-green colour or precipitate in the solution indicates the presence of cyanide.

Determination of Iodine Value

Weigh accurately about 5 g of finely ground potassium dichromate which has been previously dried to a constant weight at 105 ± 2°C into a clean one-litre volumetric flask. Dissolve in water, make up to the mark; shake thoroughly and keep the solution in a cool dark place. For standardization of sodium thiosulphate, pipette 25 ml of this solution into a clean glass stoppered 250 ml conical flask or bottle. Add 5 ml of concentrated hydrochloric acid and 15 ml of a 10 % potassium iodide solution. Allow to stand in the dark for 5 minutes and titrate the mixture with the solution of sodium thiosulphate, using starch solution as an internal indicator towards the end. The end point is taken when the blue colour changes to green.

Calculate the normality (N) of the sodium thiosulphate solution as follows:

$$25W/49.03V$$

Where, W = weight in g of the potassium dichromate; V = volume in ml of sodium thiosulphate solution required for the titration.

Determination of Moisture Content

Weigh accurately about 10 g or the oil or fat into moisture dish which has been dried previously. cooled in the desiccator and then weighed. Place the dish in the air-oven for approximately one hour at 105 ± 1°C. Remove the dish from the oven, cool in the desiccator to room temperature and weigh. Repeat this procedure but keep the dish in the oven only for half an hour each time until the difference between the two successive weighing does not exceed one milligram, Preserve the heated oil or fat for the determination of insoluble impurities (Zambonin *et al*., 2005).

Calculation

Moisture and Volatile matter, percent by weight =100 w/W

Where, w = loss in weight in g of the material upon drying, and W = weight in g of the material taken for the test.

Determination of Peroxide Value

Weigh 5.00 ± 0.05 g of sample of fat in a 250-ml glass stoppered conical flask and then add 30 ml of the acetic acid-chloroform solution. Swirl the flask until the sample is dissolved. Add 0·5 ml of saturated potassium iodide solution. Allow the solution to stand exactly one minute with occasional shaking and then add 30 ml or distilled water. Titrate with 0·1 N sodium thiosulphate solution with constant and vigorous shaking. Continue titration until the yellow colour almost disappear. Add 0 - 5 ml of starch solution and continue titration till the blue colour just disappear. If the titre value is less than 0.5 ml, repeat the determination using 0.01 N sodium

thiosulphate solution. Conduct a blank determination of the reagents in the same way. The titration in blank determination should not exceed 0.1 m1 of the 0.1 N sodium thiosulphate solution[29].

Calculation

Peroxide value as milli-equivalents per 1000 grams sample = (S-B) ×N×1000/g

Where, S = volume in ml of sodium thiosulphate solution used up by the sample; B = volume in ml of the sodium thiosulphate solution used up in the blank determination; N = normality of the sodium thiosulphate solution, and g = weight in g of the sample

Determination of Refractive Index

Melt the sample, if it is not already liquid, and filter through a filter paper to remove any impurities and the last traces of moisture. Make sure that the sample is completely dry. Adjust the temperature of the refractometer to 40.0 ± 0.1°C or to any other desired temperature. Ensure that the prisms are clean and completely dry, and then place a few drops of the sample on the lower prism. Close the prisms, tighten firmly with the screw-head, and allow to stand for one or two minutes. Adjust the instrument and light to obtain the most distinct reading possible, and determine the refractive index.

Calculation

Temperature Corrections Unless the correction factors are specified in the detailed specification, approximate corrections shall be made using the following equation

$$R=R'+K(T'-T)$$

Where, R = the reading of the refractometer reduced to the specified temperature at T°C; R'= the reading at T°C; K = constant; T'=the temperature at which the reading R'; T=the specified temperature

Determination of Saponification Value

Melt the sample, if it is not already liquid, and filter through a filter paper to remove any impurities and the lent traces of moisture. Make sure that the sample is completely dry, Mix the sample thoroughly, and weigh accurately by difference about 1.5 to 2g of the sample in a conical flask. Add 25 rot of the alcoholic potassium hydroxide solution and connect the reflux air condenser to the flask. Heat the flask on a water-bath or an electric hot-plate for not more than one hour, boil gently but steadily until the sample is completely saponified as indicated. by absence of any oily matter and appearance of clear solution. After the flask and condenser have cooled somewhat, wash down the inside of the condenser with about 10 ml of hot ethyl alcohol neutral to phenolphthalein. Add about one millilitre of phenolphthalein indicator solution, and titrate with standard hydrochloric acid. Prepare and conduct a blank determination at the same time.

Calculation

Saponification value = 56.1(B-S)N/W

Where, B = volume in ml of standard hydrochloric acid required for the blank; S = volume in ml of standard hydrochloric acid required for the sample; N = normality of the standard hydrochloric acid, andW = weight in g of the material taken for the test.

Determination of Unsaponifiable Matter

Weigh accurately about 5 g of the well-mixed sample into the flask. Add 50 ml of alcoholic potassium hydroxide solution. Boil gently but steadily under a reflux condenser for one hour or until the saponification is complete. Wash the condenser with about 10 ml of ethyl alcohol. Cool the mixture and transfer it to a separating funnel. Complete the transfer by washing the flask with some ethyl alcohol and then with cold water. Altogether. add 50 ml of water to the separating funnel followed by an addition of 50 ml of petroleum ether. Insert the

stopper and shake vigorously for at least one minute and allow to settle until both the layers are clear. Transfer the lower layer containing the soap solution to another separating funnel, and repeat the ether extraction at least six times more using 50ml of petroleum ether for each extraction. If any emulsion is formed, add a small quantity of ethyl alcohol or alcoholic potassium hydroxide solution. Collect all the ether extracts in a separating funnel. Wash the combined extracts in the funnel three times with 25-ml portions of aqueous alcohol shaking vigorously and drawing off the alcohol-water layer after each washing. Again, wash the ether layer successively with 20-ml portions of water until the wash-water no longer turns pink on addition of a few drops of phenolphthalein indicator solution. Do not remove any of the ether layers. Transfer the ether layer to a tared flask containing a few pieces of pumice stone, and evaporate to dryness on a water-bath under a gentle stream of clean dry air. To remove the last traces of ether, place the flask in an air-oven at 80 to 90°C for about one hour. To remove the last traces of moisture, add a few millilitres of acetone and pass a gentle Stream of clean dry air over the surface of the material or evacuate using a water vacuum pump at about 50 ◦C for about 15 minutes. Cool in a desiccator and weigh. Repeat the evacuating, cooling and weighing until a constant weight is-obtained, after weighing, take up the residue in 50 ml of warm neutral ethyl alcohol, containing a few drops of phenolphthalein indicator solution and titrate with standard sodium hydroxide solution.

Calculation

Weight in g of the fatty acids in the extract (as oleic acid) B = 0·282 VN

Where, V = volume ill ml of standard sodium hydroxide solution, and N = normality of standard sodium hydroxide solution.

Unsaponifiable matter, percent by weight = 100(A-B)/W

Where, A = weight in g of the residue; B = weight in g of the fatty acids in the extract and W= weight in g of the material taken for the Test.

GC-MS Analysis of Extract

GC–MS analysis was performed with an HP 5890 series II gas chromatograph equipped with a HP 5890 GC split/spitless injector and interfaced, by a GC transfer line, to a VG Trio-2000 quadrupole mass spectrometer (VG BIOTECH, Altrincham, UK). The GC chromatographic column consisted of a Supelcowax fused silica capillary column (30 m length, 0.25 mm i.d. with 0.25µm film thickness, Supelco). The carrier gas was helium. GC–MS: the optimized oven temperature program was 40 ◦C (1 min) to 150 ◦C (15 min) at 3 ◦C/min, then 150 - 250 ◦C at 5 ◦C/min (final temperature held for 5 min). A column head pressure of 15 psi and an injector temperature of 250 ◦C were used. The GC transfer line was maintained at 250 ◦C. The mass spectrometer was operated in the electron impact positive ion (EI+) mode with a source temperature of 200 ◦C. The electron energy was 70 eV and the filament current 200 µA. Mass spectra were acquired in the mass range from m/z 50 to 350, using a scan time of 0.45 s and an inter-scan time of 0.05 s and the result is observed.

Pour Plate Method

Use Petri dishes 9 - 10 cm in diameter. Use at least 2 agar media for each dilution. Take 1 ml of the test fluid or its dilution into each Petri dish aseptically, add to each dish 15º 20 ml of sterilized agar medium, previously melted and kept below 45º ºand mix. For bacteria detection, use soybean-casein digest agar medium and for fungi detection, use one of Sabouraud's glucose agar, potato-dextrose agar, and GP agar media, to which antibiotic has previously been added. After the agar solidifies, incubate at least for 5 days at 30º 35º for bacteria detection and at 20º 25º ºfor fungi detection. If a large number of colonies develop, calculate viable counts obtained from plates with not more than 300 colonies per plate for bacteria detection and from plates with not more than 100 colonies per plate for fungi

detection. If counts are considered to be reliable in a shorter incubation time than 5 days, these counts may be adopted.

5.Conclusion

The present study gives evidence about the compounds present in Coffee Bean Oil obtained from Green Coffee Bean. We evaluated the Appearance, Acid value, Anti-oxidant tocoferol, Flash point, Hydrocyanic Acid, Iodine Value, Moisture Content, Volatile matter, Mono unsaturated fatty acids, Peroxide Value, Poly unsaturated fatty acids, Refractive Index, Saponification Value, Saturated fatty acids, Transfer fatty acids Unsaponifiable Matter and Total plate count. The result of the coffee bean oil is tabulated below:

From this study we conclude that coffee bean oil has anti-oxidant tocoferol, anti-inflammatory, contains enzymes that stimulate detoxification and also it is mostly used in production of cosmetics to treat inflamed acne or problematic skin. Agaric acid is a compound that is available plenty in coffee bean oil, it is a natural astringent, that overcomes all excess secretion, smoothing, tightening and moisturizing the skin mostly importantly coffee bean oil prevents aging.

Parameter	Result
Appearance	Golden yellow greenish viscous liquid
Acid value	0.48,
Anti-oxidants Tocoferol	142636mg/kg
Flashpoint	151.94mg/kg
Hydrocyanic acid	310°c
Iodine value	Absent
Moisture & volatile matter	72.6
Monounsaturated fatty acid	5.70g/100g.
Peroxide value	6.53g/100g
Polyunsaturated fatty acid	22.29g/100g
Refractive index @ 40°C	1.446
Saponification value	209.45
Saturated fatty acid	65.48g/100g
Transfer fatty acids	<0.1g/100g
Un-saponifiable matter	2.36g/100g
Aerobic Total Plate Count	NMT1000CFU/g
Yeast & Mold	NMT100CFU/g
Escherichia coli	<3MPN/g
Salmonella aureus	Negative/25g
	Negative/25g
Pseudomonas aeruginosa	Negative/25g

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