Chemistry and Materials Research
ISSN 2224- 3224 (Print) ISSN 2225- 0956 (Online)
Vol.8 No.5, 2016

The Effect of Temperature, Moisture Content and Contact Time on the Time Extract from Bitter Kola (garcinia kola)

OKONKWO SYLVIA, EMILY JAJA, OKAFOR E.C

1. Department Of Pure And Industrial Chemistry, Chukwuemeka Odumegwu Ojukwu University
2. Department Of Applied And Environmental Biology,Rivers State University Of Science And Technology, Port Harcourt
3. Department Of Science Education, Chukwuemeka Odumegwu Ojukwu University

ABSTRACT

The effects of temperature, moisture content and contact time on the extract from garcinia kola were studied. From the results obtained, the yield increases as the temperature were being raised. At the temperature of 75°C,85°C,95°C and 105°C, the yield were 2.2g, 2.7g, 2.9g, and 3g respectively. Moisture decreases with an increase in the oil yield. Sun dry the maximum yield of 2.5g with the lowest moisture content of 9%. The yield increased with an increase in contact time but leveled out as the maximum contact time required for the extraction was exceed. Analysis on the oil such as free fatty acid, refractive index, viscosity, yield capacity, density, specific gravity, pH boiling point, flash point,iodine value and saponification value were carried

INTRODUCTION

Bitter kola,(garcinia kola) belong to a family of tropical plants known as guttiferae and it grows abundantly west and central African (Hutchinson and Datziel 1954). It is a monocotyledon which grows as a medium size tree up to 12m high. Bitter kola as a nut can be identified with brownish outer cover while the inner part is yellowish in colour. The edible seed is valued in Nigerian houses as a substitute for the kola nuts (colanitidais).

Extracts from garcinia kola are most consistently recommended in recent medical texts for relief of cold,cough,hoarseness of voice, throat infection and also s use as a masticator (Iwu et al, 1999). It is said to clean up the abdominal problems, even when a lot of nuts are chewed phytochemical analysis of extract from the root, stem and seeds of garcinia kola and other members of the genus shows that they contain good amount of phenoli compound which includes bioflavonoids (GB-1, GB-2), xanthones and benzophenones (Onukwu et al, 2004). The seed itself is said to be rich in flavonoids and hence it's antimicrobial, anti-inflammable and anti-parasitic activities;hence, it has been employed in the treatment of various ailment(Madubuiyi, 1995).

LITERATURE REVIEW

Ogbadoyi et al., (2011), carried out research to evaluate the therapeutic potentials of methanol extracts of *G. kola nuts* in the chemotherapy of experimental African typanosomiasis. Mice infected with *Trypananosoma brucei brucei* were treated with 100% and 50% (v/v) methanol extracts of *G. kola* nut at dose levels of 200,400 and 600mg/kg body weight per day for 21 consecutive days. Parasitemia in all treated animals continuously increased till death except for the group administered 600mg/kg body weight per day of the 50% v/v methanol extract which maintained very low parasite count for close to four month after treatment was stopped. It is concluded that 50% methanol extract of *G. kola* nut extract is highly trypanostatic.

Ajibade et al., (2011) the study investigated some effect of ethanolic extract of Garcinia kola (bitter kola) on the histology of the testes of male adult Wister rats weighing between 150-200g were used for the study. These groups were separated into control and experimental groups of five rats each. The control group A were given distilled water only for four weeks. Ethanolic extract of Garcinia kola at doses 75, 150 and 300 mg/kg body weight were administered orally to the three treatment groups B,C and D respectively for thirty days. In conclusion, the finding indicates that dose dependant. Studies indicated that the seeds are rich in flavonoid,

which have been show to have antibiotic property (Hong-ix and Song 2001), anti-inflammatory property (Braide, 2003) andante microbial activity (Madubunyi, 1995)

MATERIALS AND METHODS

The seeds of garcinia kola were procured from both Imo and Anambra state. It was identified and confirmed to be true species of garcinia kola in the department of chemical and petroleum engineering of the Rivers state university of science and technology, Port-Harcourt, Nigeria. The seeds were dehulled and crushed to a relatively small size in order to increase the surface and the rate of ectraction. 100g of sample was washed at 80^0C, 90^0C and 100^0C for 20minutes respectively. 100g of the sample was also sundried for 1 week.

Oil EXTRACTION

The oil was extracted from the sample using soxhlet extractor. The solvent that was used was 200ml of N-hexane. The solution of solvent and the extract was distilled to recover both the solvent and the extract.

The following parameters were determined:

1. DETERMINATION OF EFFECT OF CONTACT TIME ON THE TIELD:
   100g of the sample was placed in the central compartment of the solvent extraction apparatus and 200ml of the solvent was placed in lower compartment. The length of time at which the sample was held in direct contact with the solvent was recorded. The length of time varied at 30, 45, 60 and 90 minutes and the corresponding yield were obtained and recorded.
2. DETERMINATION OF THE EFFECTS OF TEMPARATURE ON THE YIELD.
   100g of the sample was used against 200ml of solvent. The extraction temperature was varied at 75°c, 85°c, 95°c and 105°c and the yield was obtained respectively. The extraction time was 60minutes.
3. DETERMINATION OF THE EFFECT OF MOISTURE CONTENT ON THE YIELD.
   100g of the sample was roasted at 80°c, 90°c and 100°c for 20minutes and cooled in desiccators. It was reweighed, followed by the extraction of the oil at each temperature for 60minutes. The same quantity of the sample was sun dried for 1 week followed by extraction of the oil.

OIL ANALYSIS

The oil extraction was analyzed base on the physical and chemical properties. The following were determined on G.Kola oil; free fatty acid, density, specific gravity, boiling point, pH value, colou, taste , yield capacity, odour and flash point, saponification and iodine value.

RESULTS AND DISCUSSION

EFFECT OF MOISTURE CONTENT ON THE YIELD

Contact time of 60minutes at 75°C. Roasting time of 20minute

Types of sample	Temperature (°C)	Weight of extract (g)	Yield (g/)	Yield (g/min)	Moisture (%)
Fresh sample		1.4	1.4	0.023	
Roasted sample	80	2.0	2.0	0.033	49.3
Roasted sample	90	2.2	2.2	0.036	32.1
Roasted sample	100	2.3	2.3	0.038	18.3
Sun dry for one week		2.5	2.5	0.042	9

EFFECT OF CONTACT TIME ON THE YIELD

Sun dry sample at 75°C

Time (minute)	Weight of extract (g)	Yield (g)	Yield (g/min)
30	1.2	1.2	0.04
45	1.9	1.9	0.042
60	2.5	2.5	0.044
90	2.52	2.52	0.029

EFFECT OF TEMPERATURE ON THE YIELD

Sun dry sample at 60°C minutes.

Time (minute)	Weight of extract (g)	Yield (g)	Yield (g/min)
75	2.5	2.5	0.042
85	2.7	2.7	0.046
95	2.9	2.9	0.051
100	3.0	3.0	0.043

CHARACTERIZATION OF *GARCINIA* KOLA OIL AS OBTAINED EXPERIMENTALLY.

S/N	Items	Values	Units
1.	Refractive index	1.48	
2.	Free fatty acid	0.98	Ml/g
3.	Viscosity	8.92	Cst
4.	Flash point	233	^{0}C
5.	Density	1.025	g/ml
6.	Specific gravity	0.838	
7.	Ph	5.10	
8.	Iodine value	78.16	Ml/g
9.	Boiling point	223	^{0}C
10.	Colour	Brown	
11.	Taste	Astringent	
12.	Saponification value	187.23	Ml/g

DISCUSION:

Since an extract from *garcinia* kola can improve body's ability to defend the stomach against gastric ulcer, slow down the process of fat creation, increase the body's ability to turn glucose into glycogen (cells found in muscle), has anti oxidant, anti flammatory, anti bacterial and anti fungal properties. It its important to examine the factor which affects the production capacity.

Moisture content is one the factors that affect the production capacity of the extract. From experimental results and graph plotted, the moisture content decreased with an increase in the yield and corresponding increase in the temperature. Sundry gave the maximum yield of 2.5g with the lowest moisture content of 9%. Moisture content affects some physical properties (size, shape, density, porosity) of G. Kola which directly affects the extract. From the contact time analysis, it was observed that the longer the time a sample was held i direct contact with the solvent (n hexane), the large the yield. But the yield levelled out as the maximum time (60minutes) required for the extraction was exceeded. As the temperature increased, yield also increase the graph of this was linear because the boiling point temperature has not been reached or exceeded. The oil has an astringent taste and yellow colour when in solution with the solvent. But in distillation to get a high purity of the oil, it was observed that the oil change to brown. Flavonoids are responsible for the yellow or brown pigment of the oil. Flavonoids is responsible for the bitter principle or astringent flavour of the G. seed and oil respectively. The conjugation of electrons on heterocyclic ring within the aromatic system may be responsible for the yellow colour of the flavonoid compound isolated from G. kola seed. Flavonoids are phenol potent water soluble super anti-oxidant

and free radical scavengers which prevent oxidation cell damage, have strong anti-cancer activity and anti-inflammatory properties (Olaleye et al., 2000). Since flavonoids are phenol, the presence of the phenolic compound in G. kola indicates that the plant may be anti-microbial agent since phenol and phenolic compounds are extensively used in disinfections and remains the standard with which other bactericides are compared (Okwu, 2005, 2003).

Conclusion:

Examination of the effects such as moisture content, temperature and contact time are important in order to optimize the production capacity of the G. kola extract. Higher moisture content should be avoided in order to obtain a larger quantity of extract. Though high temperature increases the rate of extraction and the yield, temperature of the extraction should not exceed the boiling spoint of the oil because it reduces the quality of the oil.

Until now, G. kola seeds, leaves, oil, trees bark and stems have provided a source of inspiration for novel drug compounds as plant derived medicines which have a large contribution to human health and well being. It may become one of the bases for the development of medicine, a natural blue print for the development of new drugs or a phytomedicine to be used for the treatment of diseases.

REFERENCES:

Ajibade A.J, Oyewopo A.O, Fakunle P.B, Ashamu E.A (2011). Effects of crude ethanolic extract of garcinia kola (bitter Kola) on the histology of the testis of male adult wistar rats. Vol. (2), No.1 Pp. 24

Braide V.B, (2003). Effect of Garcinia kola seed alkaloids extract on levels of Gonadal Hormone and Pituiatary gonadotrophins in rat serum. Nig. Phy. Sci. 18(1-2); 59-64.

Madubuiyi, l.l (1995). Antimicrobial activities of the constituents of garcinia kola seeds. International Journal of Pharmacols.

Emmanuel O. Ogbadoyi, Adamu Y. Kabiru, and Roseline F. Omotosho (2011); Preliminary Studies of the Antitrypanosomal Activity of *Garcinia kola nut* Extract in Mice Infected with Trypanosoma *brucei brucei* Journal of Mdicine and Medical Sciences Vol. 2(1) pp. 628-631.

Onukwo G.C. Egeonu, H.C, Adikwu, M.U, Ojile, J.E, Olowosu, A.K, (2004). Some physical properties of tabulated seed of *garcinia kola* (heckle). Journal of Chemistry pharma. Vol (52); 649-653.

Okwu D.E, 2003. Investtigation into the medicinal and nutritive potential of G, kola heckle and Dennettia tripetala, G. baker. PhD Thesis, University of Agriculture Umudike, Nig. Pp 5-10, 130-140

Olaleye S.B (2000). Analgesic and anti-flammable effects of Gkola seed extract. Africa Journal Biomedical Research Vol. (3); Pp 171-174

Hutchinson J and Dalyiel J.M (1956). Flora of west tropical Africa, 2nd edition. Vol 1, Pp 295 HMSO London.

Iwu M.M, Duncan A.R. and Okunji, C.O. (199). New antimicrobial of plant origin; perspectives on new crops and news uses. Journal of Natural products (Lioydia) 650-651.