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Studiies On The Fatty Acid And Anti-Oxidant Vitamin Content Of Some Ghanaian Jatropha And Neem Seed Oils

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ABSTRACT

The seeds of jatropha contain viscous oil which can be used for the manufacture of candles and soap in the cosmetics industry, or as extender in a diesel/paraffin substitute. This latter use has important implications for meeting the demand for rural energy services and also exploring practical substitutes for fossil fuels to counter green house gas accumulation in the atmosphere. The neem oil, much like other vegetable oils, is composed of triglycerides of oleic, stearic, linoleic and palmitic acids. The "cold pressed oil" is mainly used in lamps, soaps and other non edible products. It is generally dark, bitter and smelly. Unlike most vegetable oils, it contains sulphur compounds whose pungent odor is reminiscent of garlic. Both oils were obtained from Legon campus of the University of Ghana, Ghana. The oils were extracted with hexane as solvent using the soxhlet extraction method. The fatty acid and anti-oxidant composition was determined using the GC-FID technique. It was found that both oils have a high percentage of oleic acid: jatropha-48.59mg/kg and neem-52.69mg/kg. In other words, both oils have a high percentage of unsaturated fatty acid. In the case of the anti-oxidant vitamin content, jatropha oil has 6.55mg/kg and neem oil has 15.45mg/kg of vitamin E. But no vitamin K was detected in both oils.

Key Words: :Jatropha, Neem, Fatty Acid, Anti-oxidant Vitamin, Oleic acid, Vitamin K.

INTRODUCTION

The jatropha tree is a multipurpose tree belonging to the family of Euphorbideae. The plant can be used to prevent or control erosion or to reclaim land; grown as a live-

fence, especially to contain or exclude farm animals; or planted as a commercial crop. It is a native of tropical America, but now thrives in many parts of the tropics and sub-tropics in Africa (Gubitz *et al,* 1993; Kumar and Sharma, 2008; OpenShaw, 2000; Martinez H'eriera *et al,* 2006). Studies have revealed that jatropha grows in tropical and subtropical climates across the developing world (OpenShow, 2000). The fact that jatropha oil cannot be used for nutritional purposes without detoxification makes its use for energy or fuel source very attractive as biodiesel The high content of unsaturation in the fatty acid profile such as oleic and linoleic acids in jatropha places the oil in the drying oil group, and hence the oil can be used in the production of alkyd resin, shoe polish, varnishes etc. (Akintayo,2004, Eromosele *et al* ,1997).

Azadirachtin is the most active component for repelling pests and can be extracted from neem oil. The portion left over is called clarified hydrophobic neem oil which is made of fatty acids and glycerides. Research has shown that neem oil causes 'solitarization of gregarious locust nymphs (Schmutterer and Freres, 1990). Also in a '"taste test"", American cockroach adults preferred neem treated pellets to untreated ones, but neem-treated cartons repelled them (Adler and Uchel, 1988). Neem cake (the residue left after oil has been removed from the kernel) has proved so successful that Philippi farmers are using it on a trial basis against the brown planthopper and other rice pests (Saxena *et al,* 1984, von der Hyde *et al,* 1984).

METHODOLOGY

The fatty acid composition of jatropha oil and neem seed oil was investigated using the GC-FID. Chloroform/methanol containing 0.005% butylated hydroxytolnene, to act as antioxidant, was added to 100ml of sample and mixed vigorously for one minute, then left at 4^0C overnight. Then 1ml of 0.9% NaCI was added and the sample was mixed again.

The chloroform phase containing lipids was collected, pooled and dried under nitrogen, and then subjected to methylation. Peaks were identified by comparisons with fatty acid internal standards area and its percentage for each resolved peak was analysed using an atlas software integrator. The temperature was programmed at 60^0C and held for 6 minutes, then increased to 110^0C at 1^0C/min for 5 minutes. The injector and detector temperatures were set at 90^0C and 110^0C respectively.

The vitamins of these oils were analyzed with a GC-FID System. The following equipment parameters were used:

Column pressure	20psi
Split Ratio	50:1
Column Temperature	250^0C-320^0C
GC Carrier Gas	He, H_2 and Air

An aliquot of the extract was applied to the hexane preconditioned solid phase of the extraction column. The internal standard used was dihydro-vitamins of the vitamins, of which 1ml was injected into the GC, and since not all the vitamins have the same absorbance at a particular wavelength, the instrument was programmed to change wavelength in the course of a run.

RESULTS AND DISCUSSION

JATROPHA SEED OIL

Saturated Fatty Acid(mg/kg)		
Myristic		0.70
Palmitic		16.40
Stearic		9.33
Arachidic		0.27
Unsaturated Fatty Acid(mg/kg)		
Oleic		**48.57**
Linoleic		12.57
Linolenic		12.40

NEEN SEED OIL

Saturated Fatty Acid(mg/kg)		
Myristic		1.27
Palmitic		14.50
Stearic		17.47
Arachidic		1.40
Unsaturated Fatty Acid(mg/kg)		
Oleic		**52.60**
Linoleic		8.33
Linolenic		4.37
Anti-Oxidant Vitamins(mg/kg)		
Jatropha	V_E	6.55
	V_{BCOMP}	1.38
Neem	V_E	15.45
	V_{B1}	0.23
	V_{BCOM}	0.38

From the results, it can be seen that vitamin E is the most active and abundant antioxidamt vitamin in all these oils. Research by Reboul and others in 2006 has revealed that vitamin E is the most abundant in these oils and that alpha-tocopherol is the most active form of vitamin E. Akinson and others in 2008 have found that vitamin E prevents the oxidation of polyunsaturated fatty acids. Herera, Packer and others in 2001 also found that vitamin E stops the production of reactive oxygen. Besides, the work of Kumar and Sharma in 2008 has shown that jatropha seed oil can be used in the manufacture of candles and soap as well as a diesel substitute because they have a high content of vitamin E.

CONCLUSION

All these results lend support to our assertion that these oils have many industrial applications because they contain vitamin E.

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