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## Potential Industrial Applications of *Luffa Cylindrica* Seed Oil

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**Abstract** Extraction of oil from *Luffa cylindrica* seeds was done by solvent extraction method with soxhlet extractor, using petroleum ether (60-80 °C) as solvent. The percentage oil yield was 28.90. The physiochemical qualities of the oil was assessed in terms of colour, odour, texture, acid value, iodine value, saponification value, peroxide value, and free fatty acid value. The iodine value of 86.50 confirmed the oil was a non drying oil and the saponification value of 65.96 indicated that the oil could be used for the production of alkyd resins, soap, and grease production. The oil yield of 28.90 showed that *Luffa cylindrica* seeds had appreciable oil content and could be commercialized.

**Keywords** *Luffa cylindrica*, oils, Industrial, applications.

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### Introduction

*Luffa cylindrica* is an annual, climbing or trailing herb up to 15 m long, finely hairy, with three lobed leaves usually 7-20 cm across, and very bright yellow flowers. In planting, a trellis is often used to support the climbing stem. Propagation is by seed, germination is best at temperature of 20-30 °C and its plantation can be established by direct sowing or transplanting preferably on a deep sandy loamy soil. *Luffa cylindrica* has a moderate nutrient requirement [1]. The plant is sensitive to frost and excessive rainfall during flowering and fruiting adversely affects fruit yields [2]. However, it grows very well in tropical regions. In Africa, *Luffa cylindrica* is often grown in homes with little management. For commercial production of *Luffa cylindrica* sponges, it is important to adequately manage the plant spacing, fruit size and the number of fruits per plant as this influence yields [1].

This paper reports the extraction, characterisation and potential industrial applications of *Luffa cylindrica* oil.

### Methods

*Luffa cylindrica* seeds were picked from a small bush located in Uli, Anambra state Nigeria, and were washed with clean water. The seeds were sundried for 2 to 3 days and were ground to powder form in a mortar.

### Oil Extraction and Analysis

Oils were extracted from the ground seeds by solvent extraction method using soxhlet extractor with petroleum ether (60-80 °C) as solvent, and the solvent was distilled off at 80 °C. The oil content was calculated from the mass of oil and the mass of the ground seeds. Free fatty acids and gums were separated from the crude oil by the methods described by America Oils Chemists Society AOCs official methods (1981) [3]. The acid value, peroxide value, saponification value, free fatty acid value, and iodine value, were determined standard methods described by Lambert and Muir 1968 [4].

### Production of Alkyd Resin

Alkyd resin was produced from *Luffa cylindrica* seed oil by alcoholysis method. *Luffa cylindrica* oil (23.05%), glycerol (33.85 %) and Phthalic anhydride (43.00 %) were refluxed under carbon IV oxide with continuous stirring at 240 °C until alkyd resin was formed [5].



### Production of Solid and liquid soaps

50 % of Sodium hydroxide was added to 14.25 % of *Luffa cylindrica* seed oil in 35.50 % water and 0.02 % Sodium silicate. The mixture was boiled under reflux until solid soap was formed. The liquid soap was produced from *Luffa cylindrica* by saponification of 30 % of the oil with 8% potassium hydroxide, 58,8 % water and 3.2 % alcohol or formaldehyde [6].

### Production of Grease

Production of grease from *Luffa cylindrica* seed oil was done by cold saponification method as described [7].

### Results and Discussion

**Table 1:** Physical and Chemical characteristics of *Luffa cylindrica* seed oil

Properties	Values
Colour	Yellowish Green
Odour	Sweet fruity
State @ room temperature	Liquid
Texture	Lightly viscous
Acid value (mgKOH/g)	0.70
Saponification value (mg/g)	65.96
Peroxide value (meq/kg)	13.00
Free fatty acid value (mg/g)	0.35
Iodine value (g/100g)	86.56
Oil yield (%)	28.90

The Physical and chemical characteristics of the *Luffa cylindrica* seed oil are shown in table 1. The oil obtained from *Luffa cylindrica* seed had a yellowish green colour and remained liquid at room temperature. The percentage oil yield of 28.90 was of economic value compared to some commercial available seed oils like *Vitex doniana* seed oil (27 %), *Citrullus vulgaris* seed oil (28 %), Sunflower (25 %), Soya bean (11-25 %) et cetera, thus could be commercialized. The acid value of 0.70 mg/g and free fatty acid value of 0.35mg/g suggested that the oil would have a long shelf life, require little or purification before use and would not pose any economic risk during storage [6]. The iodine value of 86.56 g/100g placed the oil in the non drying oil category, thus could be used for grease and alkyd resin productions while the saponification value of 65.96 mg/g showed that the oil could be used for soap production.

### Conclusion

All products formulated by *Luffa cylindrica* oil compared favourably with similar commercial products available in the local market.

### References

- [1]. Oboh, I.O, and Ahiyor E.O (2009). *Luffa cylindrica* an emerging cash crop. African Journal of Agricultural Research 4(8):684-688
- [2]. Du, Q., Xu, Y., Li, L., Zhao, Y., Jerz, G. and Winterhaller, P. (2006). Antioxidant constituents in the fruits of *Luffa cylindrica*. Journal of Agricultural and Food Chemistry 54(12) 4186-4190.
- [3]. AOCS Official Methods (1960). Sampling and analysis of commercial Fats and Oil. AOCS, Washington. pp 801-855
- [4]. Lambert J., and Muir J. A (1968). Practical chemistry 2<sup>nd</sup> edition. Heinemann Education Books, London. pp315-318
- [5]. Boxal, J. and Van Fraunhofer, J.A. (1980). Paint formulation, 1<sup>st</sup> edition. Pp 4-6.
- [6]. Chinweuba A.J.,(2014). Characterisation and Industrial Applications of Oils extracted from *Vitex doniana* and *Citrus vulgaris* seeds. International Journal of Advance Research 2(2):1-4.



- [7]. Ajiwe, V.I.E, Okeke, C.A, Nnabuike, B., Ogunleye G.A and Emeka, E (1997). Applications of Oils extracted from African star apple (*Chrysophyllum africanum*), Horse eye bean (*Mucana sloanei*) and African Pear (*Dacryodes edulis*) seeds. *Bioresources technology* 59; 259-261. Britain.

