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POTENTIALS OF JATROPHA AND RUBBER SEED OILS IN THE PRODUCTION OF OIL PAINT

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Abstract: **Jatropha (curcas) seeds were collected from the Abuja campus of the University of Port Harcourt and the rubber seeds were purchased from Etche near Port Harcourt. The seed extracts were screened by determining their fatty acid profile using GC-FID. It was found that the concentration of both acids were high. The oleic acid in jatropha was 48.57mg/kg and linolenic acid was 36.30mg/kg being the highest in both oils. Thus these oils can be used in the production of oil paint. The two oils were used in formulating two different paints. Then a performance test was carried out on them to ascertain their suitability. The test showed that the formulated paints had good drying times and adhesion. Therefore, they can be used for the production of oil paint.**

Keywords: **Jatropha, Rubber, Oleic, Linolenic, Seed.**

1. INTRODUCTION

The jatropha plant is a native of tropical America, but now thrives in many parts of the tropics and sub-tropics in Africa (OpenShaw, 2000; Martinez-Heriera et al, 2006). It is an established fact that jatropha oil cannot be used for nutritional purposes without detoxification. Thus there will be high need for it in industrial applications. The high content of unsaturation in the fatty acid profile such as oleic and linolenic 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 (Atintayo, 2004, Eromosele et al, 1997).

The rubber seed is a rich source of polyunsaturated fatty acids that make up 52% of its total acid composition (Gandhi et al, 1990). It has been shown to have many industrial applications including the manufacture of paint, soap (Chin et al, 1977; Gandhi, et al, 1990) and surface coatings (Aigbodin and Pillai, 2000). The rubber seed oil has potential applications in the manufacture of some consumer goods (Iyayi, et al, 2007). Furthermore, studies have also shown that rubber seed oil could be used in industries, especially the paint, lubricating, cosmetic, as well as in the putty industries (Njoku, et al, 1995a, 1995b, and 1995). Research has also shown that rubber seed oil may not be a good source of anti-oxidants, but it can provide adequate essentials metals in nutrition (Ononogbu, et al, 2001).

An emerging trend in the 21st century is the production of sustainable green polymeric materials and chemicals from renewable resources. Seeds and fruits of plants are veritable sources of oil for domestic and industrial utility (Thakur and Singha, 2010). Many vegetable oils are drying, semi-drying, or non-drying in nature and it is this property that accounts for the suitability of many drying oils. Vegetable sources occupy an important position in the provision of individual raw materials for paint production. This because they are readily renewable resources and contain high levels of unsaturated fatty acids. Furthermore, they are environmentally friendly, less expensive, and easy to obtain using conventional extraction techniques and produced easily in rural areas. Although vegetable sources of raw materials are readily renewable, the utilization of wholly inedible and “unuseful” seeds as sources of industrial raw materials will help in sustaining the high demand for industrial raw materials and reduce the environmental pollutions usually caused by the indiscriminate dumping of such wastes (Akaranta, 1999).

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2. MATERIALS AND METHODS

Jatropha seeds were obtained from the trees in Abuja campus of the University of Port Harcourt, Nigeria. The thick, top skin was removed by hand to obtain the endosperm. The endosperm of the seeds were dried in the oven at 70^0C for 8hrs. They were ground into tiny pieces with a grinding machine for extraction. The oil was extracted using hexane as solvent with the soxhlet extraction method. The rubber seeds were obtained from Delta Rubber Estate in Etche, close to the city of Port Harcourt, Nigeria. The hard shells were removed and the endosperms were dried in an oven at 80^0C for forty-eight hours. They were ground into tiny pieces for extraction using hexane as solvent with the soxhlet extraction method.

Prepared alkyd resins were formulated into white gloss paints without the use of driers. This was to determine the drying rate of the oils. The alkyd resins and part of the solvent were premixed in a clean vessel. The pigment, TiO_2 was added and mixed to uniform consistency. Talc powder was finally added and mixed while stirring vigorously. The viscosity of the mixture was adjusted by the addition of more solvent. Aluminium panels measuring 3.5cm x 10cm were wiped with a clean cotton cloth dipped in ethanol and allowed to dry in air. Paint samples were applied on the panels with a paint brush to obtain uniform coats. The panels were then left to air dry. The touch method was used to determine the drying performances of the paints. The films were monitored to determine the extent of drying. The results of the drying performances of the paints were recorded.

3. RESULLTS AND DISCUSSION

Results:

Table 1: Fatty Acid Composition of Jatropha and Rubber Seed Oils.

Unsaturated Fatty Acids.

Fatty Acid	Jatropha Seed Oil(mg/kg)	Rubber Seed Oil(mg/kg)
Oleic	46.37±0.21	19.16±0.34
Linoleic	10.36±0.25	24.23±0.15
Linolenic	14.20±0.32	34.50±0.19

Saturated Fatty Acids.

Fatty Acid	Jatropha seed Oil(mg/kg)	Rubber Seed Oil(mg/kg)
Palmitic	18.20±0.46	17.22±0.84
Myristic	0.63±0.13	0.71±0.05
Stearic	8.15±0.51	8.34±0.75
Arachidic	0.37±0.16	----------

Table 2: Major Constituents of Oil Paint.

Component	Weight (kg)
TiO_2	12.939
Talc Powder	27.94
White Spirit	15.03
Alkyd Resin	49.60

Table 3: Drying Time of paints.

TIME	Jatropha seed Oil(hrs)	Rubber Seed Oil(hrs)
Set-To-Touch-Time(STTT)	7	9
Dry-To-Touch-Time(DTTT)	70	73
Dry-Hard-Time(DHTT)	73	76

4. DISCUSSION

The results in table 1 indicate that both oils have high levels of unsaturation. Thus it is expected that they should act as drying oils. From the results in table 3 the jatropha seed paint achieved the set-to-touch and dry-to-touch times of 7 and 70 hours respectively. Whereas the rubber seed oil paint achieved the set-to-touch times of 9 and 73 hours respectively. The

drying time is a very important consideration in a coating formulation as some coated surfaces may need to dry so that they can be put into service immediately after the coating has been applied. According to a report by Wicks and others in 1999, the higher the level of unsaturation, the faster the drying time. So that paint produced with a drying oil is expected to dry hard within four days of application with the exclusion of a drier. The adhesion of the paint films on the surface was found to be quite firm. A coating must adhere well in order to protect the surface of the substrate and to be used for a long time.

5. CONCLUSION

Jatropha and rubber seed oils were extracted and used in the preparation of oil paint. The analysis revealed that both oils have high levels of unsaturated fatty acids. This was confirmed by the fast drying rate of the paints as they dried without the incorporation of driers. Thus these oils were found to be suitable for the production of oil paints.

REFERENCES

[1] Wicks, Z.W.; Jones, F.N.; Paapas,S.P.,(1999). Organic Coatings: Science and Technology. Vol.1 Wiley *Interscience*, New York. Vol. 1

[2] Kumar,A.; Sharma, S.(2008). An evaluation of multipurpose oil seed crop for industrial uses. A review: Industrial crops and products.

[3] OpenShaw, K., (2000). A review of jatropha curcas oil, an oil plant of unfulfilled promise, Biomass and Bioenergy 19, 1-15.

[4] Martinez-Herrera, J; Sidehuraju, P, Francis, G; Davila-Ortiz, G; Becker, K, (2006). Chemical Composition, toxic antimetabolic constituents and effects of different treatments on their levels in four provenances of jatropha curcas L. 96, 80-89.

[5] Akintayo, E.T, (2004). Characteristics and Composition of jatropha curcas oil and cakes. *Bioresource Technology* 92, 307-310.

[6] Eromosele, I.C; Eromosele,C.O; Innazo,P; Njerim, P,(1997).Short Communication Studies on some seeds and seed oils. *Bioresour. Technol.*64, 247-254.

[7] Gandhi, V.M; Cheriank, M and Mulky, M.J, (1990). Nutritional and Toxicoligical evaluation of rubber seed oil, *Journal of American Oil Chemical Society* 67, 883-886.

[8] Chin, HF; Enoch,I.C. And Rajaharun, R.M, (1977). Seed Technology in the Tropics: Faculty of Agriculture, Universiti Putra Malaysia Publishing, Kuala Lumpur, Malaysia.

[9] Aigbodion, A.I and Pillai, C.K.S, (2000). Preparation, Analysis, and Application of rubber Seed oil and its derivatives in surface coatings progress in organic coatings. 38, 187-192.

[10] Iyayi, A.F; Akpaka, P.O; Ukpeoyibo,U; Momdi, I.O,(2007). Rubber Seed Oil .An oil with great potentials. Chem. Tech. J. 3, 507-516.

[11] Njoku,O.U, Ononogbu,I.C,(1995a). Alkyd resins from rubber seed oil. *Indian J. Nat. Rubber Res.*8(1), 63-65.

[12] Njoku, O.U and Ononogbu, I.C, (1995b). Preliminary Studies of preparation of lubricating grease from bleached rubber seed oil. Indian J. Nat. Rubber Res 8(2), 140-141.

[13] Njoku, O.U; Ononogbu,I.C; and Muorieke, SMC,(1996). Wood finish from rubber seed alkyd. Res. Indian J. Nat. Rubber Res. (9(2), 137.

[14] Ononogbu,I.C; Uzoamaka,C.I and Njoku,O.U,(2001). Antioxidants and inorganic elements in rubber seed 0il, Actes du colloque de sainte FOY (Quebec) 7 and 9.

[15] Thakur, V.K; Singha, A.S, (2010). Mechanical and Water absorption properties of natural fibres/polymer biocomposites. Polymer-plastic Technology and Engineering. 49 (2), 694-670.

[16] Akaranta,O (1999). Agro. Based Raw Materials in Nigeria for the Chemical Industry. Timi Hyacinth Enterprises, Lagos 39.