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Short Communication

Effect of irradiation and extractive solvents on the Thevetia seed oil

Adeogun, A. I.* and Adeogun, M. B.

Department of Chemistry, University of Ibadan, Ibadan, Nigeria.

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Oil of irradiated thevetia seeds was extracted with different solvents. The effect of irradiation dosages on the extracted oils was studied by comparing the TLC chromatography of irradiated seed oil with that of non-radiated seeds. Saponification values were also compared.

Key words: Thevetia seed, irradiation, saponification value, chromatography, and extraction.

INTRODUCTION

As concern had grown over the use of lipids in the recent years, material chemists are increasingly aware of the need for reliable ways of obtaining oils from various seeds. Thevetia plant is an ornamental plant grown in the tropics; its seeds yield 57% non-drying oil containing glycerides of palmitric, stearic, and linoleic acid (Aswani and Rao, 1958). The total world production of oils and fats currently stand at some 50 million metric tonne per annum excluding dairy and related products. Out of this, some 40 million tonnes are consumed per annum by humans in form of edible oils and fats. Others go to technical applications such as in manufacturing of Industrial and household products like soap, detergents, polish and paints (Chapman and Hall, 1985).

The toxicity of thevetia seed is due to presence of thevetin, thevefoxin, and nerifolin. The seed manifest a digitalis action, a symphatic paralysing effect and simulating of smooth muscle fibre of the uterus and hearth muscle (Belikof et al., 1958). Thevetia species have several folkloric medicinal uses including treatment of tumours. In India, its extract had been used as peduculicide. In West Africa, the seed is used as anti-malaria while the bark is used as a powerful anti-fungal agent (Iccothi, 1938). Thevetia extract has also been dispensed in the Soviet Union for cardiac insufficiency with dyspnoea and for ventricular insufficiency due to hypertension and arteriosclerosis (Oliver-Beaver, 1986). These not withstanding, however, thevetia seeds contain fixed oil and protein which could be of industrial importance on proper detoxification.

Radiation as a source of energy is used industrially, to induce specific chemical, physical and biological changes to improve the qualities of farm products such as disinfections, preservation, decontamination, pasteurisation, sterilization amongst others (Thayer, 1990; Diehl, 1990). In this study, we examine the use of radiation in relation to the quality of the oil extracted from the thevetia seeds. The saponification values and TLC of extracted oils obtained using different solvents in relation to the dosage of radiation are reported.

EXPERIMENTAL

Professor S. A. Ibiyemi of Chemistry Department University of Ilorin, Nigeria, provided the irradiated thevetia seeds (500 and 300 rads). The solvents were all analytical grades and purified by distillation at their boiling point before use. NaOH, KOH, HCl, ethyl ace-tate and silica gels were all products of British Drug House, London.

Extraction of oil of thevetia seeds

The endocarps of seeds of thevetia were crushed; the oils were extracted with petroleum ether, chloroform, and methanol in sequential order according to the Scheme I below. Sohxlex extraction apparatus were used for effective extractions. The solvents were recovered from the extracts by distillation technique in refluxing set up.

Thin layer chromatography analysis (TLC)

Thin layer chromatography plates were prepared by making slurry of silica gel. About 150 g of silica gel was weighed and transferred into 500 ml of water and stirred until the slurry was formed. The slurry was spread on the plate by spraying. The plates were air dried for 30 min and latter dried in the oven for the same period (Smith

*Corresponding author. E-mail: abuaisha2k3@yahoo.com.

Table 1. R_f values of thevetia seeds oil (chloroform and ethyl acetate as mobile phase).

Extraction solvent	Radiation dosage (RADS)	R_F
Pet. Ether	300	0.4257
Pet. Ether	500	0.4594
Chloroform	300	0.5068
Chloroform	500	0.4932
Methanol	300	0.4833
Methanol	500	0.6330

Table 2. R_f values of thevetia seeds oil (petroleum ether and ethyl acetate as mobile phase).

Extraction solvent	Radiation dosage (RADS)	R_F
Pet. Ether	300	0.5484
Pet. Ether	500	0.6258
Chloroform	300	0.4516
Chloroform	500	0.5032
Methanol	300	0.5131
Methanol	500	0.5334

Table 3. R_f values of thevetia seeds oil in chloroform and petroleum ether.

Extraction solvent	Radiation dosage (RADS)	R_F
Chloroform	0	0.2214
Chloroform	300	0.1832
Chloroform	500	0.2121
Pet. Ether	0	0.2481
Pet. Ether	300	0.2030
Pet. Ether	500	0.2105

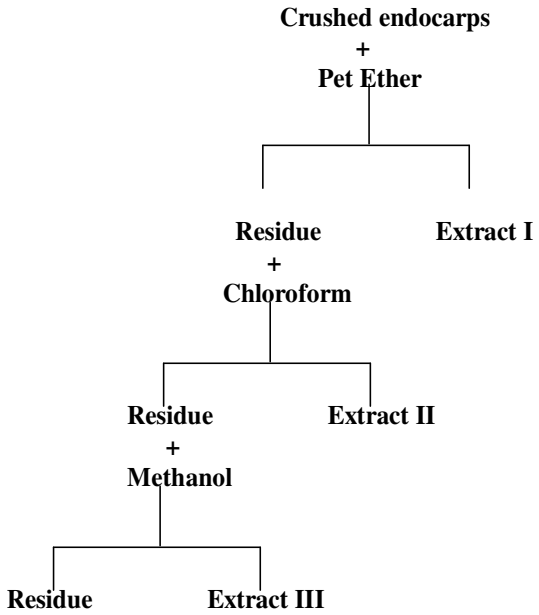
Table 4. Saponification values of thevetia seeds oil.

Radiation dosage (RADS)	Saponification value
0	258.06
300	230.01
500	231.41

and Feinberg, 1980). Extracts purity were determined by spotting a little concentrated extract on the plate and placing in a developing tank containing a mobile phase which is either 3:10 petroleum ether and ethyl acetate or chloroform and ethyl acetate. The developed plates were air dried and viewed under iodine vapour.

Saponification value

About 2 g of extracted oils were weighed and quantitatively transferred into conical flasks. 25 ml of ethanolic potassium hydroxide were added and mixture set in reflux for thirty minutes covered with aluminium foil. The mixture was cooled and titrated with 0.5 N hydrochloric acid using phenolphthalein as indicator. The titration was repeated for each sample and blank. Average titres were determined. Saponification values were estimated using the equation below (James and David, 1976):



Scheme 1. Extraction order of thevetia seeds oil.

$$\text{Saponification value} = \{(B - T) * N * 56.1\} / Ws$$

B and T are titre value of the blank and samples, respectively. N is the normality of the acid and *Ws* is the weight of sample used.

RESULTS AND DISCUSSION

The irradiated seeds produced more oil than non-radiated seeds with the quantity increasing with dosage of radiation. Petroleum ether gives more extract than other solvents considered. Tables 1 - 2 show the R_f values of extracts in different mobile phases. The purity of the extracts is independent of dosage of radiation. However, the irradiated seeds give purer oil than non-radiated seeds.

The purity of oils also depends on the solvent of extraction. The petroleum ether extracts is of higher purity than other solvents under considerations. Table 3 shows R_f values of thevetia seeds oil in chloroform and petroleum ether. The purity here is also independent of the dosage of radiation.

The saponification values point out the fact that the irradiated seeds are rich in lipids than non-radiated ones, the value is independent of the dosage but implies that the oil of irradiated thevetia seeds can supplement Industrial lipids sources. Such oil, when properly treated, can have many industrial applications.

REFERENCES

Belikof AS, Banko S, Isrev AI, Zhurobscheikhim MV (1958). “Hearth Muscle and uterus,bronchus stimulants” J. Sci. Ind. Res. (India) 24: 919-922.

Diehl JF (1990). “Safety of Irradiated Foods.” Marcel Dekker Bookk company New York. p. 25.

HL, Chapman and T Hall (1985). “Food oil and fats” PAN international and Thompson publishing company New York. pp. 39-47.

I Smith and JG, Feinberg (1980). “Paper and TLC electrophoresis” 2nd Edition Longman publishing company New York. pp. 155 –159.

Iccothi DC (1938). Pharmacognostic Chemical and pharmacological studies on thevetia” Arch. Farmacol-sper 65: 201-390.

James A.M and David L (1976). “Experimental methods in organic chemistry” 2nd edition. Dairymple Saunders golden sunburst series. WB Saunders Company Philadephia pp. 90-120.

Oliver-Beaver B (1986). Medicinal plant of tropical West Africa” Cambridge University Press London. p. 275.

R. Aswani and S, Rao (1958). “Cardio-toxic glycoside of thevetia” J. Sci. Ind. Res. (India) 17b: 331-332.

Thayer DW (1990). “Food Irradiation: benefit and concern” Food Qual. 13(3): 144 –169.