Int. J. Chem. Sci.: 11(2), 2013, 850-854
ISSN 0972-768X
www.sadgurupublications.com

ISOLATION AND STUDY OF FAT FROM STEM OF *ELEUSINE COROCANA* (GAERTN)

SHAILENDRA BADAL*

Department of Chemistry, Hindustan College of Science and Technology, MATHURA (U.P.) INDIA

ABSTRACT

The fat isolated from the stem of *Eleusine corocana* (Gaertn) (Natural order -Gramineae) on chemical and chromatographic analysis including Gas Liquid Chromatography was found to consist of the triterpene β-amyrin as deposit along with arachidic acid (15.7), linoleic acid (12.6), lauric acid (13.7), myristic acid (17.8), oleic acid (10.8), palmitic acid (12.0), ricinoleic acid (6.2), and stearic acid (10.8).

Key words: *Eleusine Corocana* (Gaertn), Fatty acids, β-Amyrin.

INTRODUCTION

Eleusine corocana[1], is commonly known as Mandua or Mandal in Hindi, Marua in Bengali and Ragulu in Telgu. It belongs to natural order Gramineae. The grains of this plant are reported as tonic and for cooling. It has the reputation of being useful in biliousness and is also astringent. This plant is cultivated in all parts of the country. In view of it's important medicinal values, it was decided to investigate it's stem phytochemically.

EXPERIMENTAL

About 400 g of air dried and powdered stems of *Eleusine corocana* (Gaertn) were extracted with petroleum ether ($60\text{-}80^0$) in a Soxhlet extractor for 72 hrs. There after, the petroleum ether extract was kept in the refrigerator over night. A white coloured deposit was obtained at the bottom of the flask, which was separated by filtration.

Study of the deposit

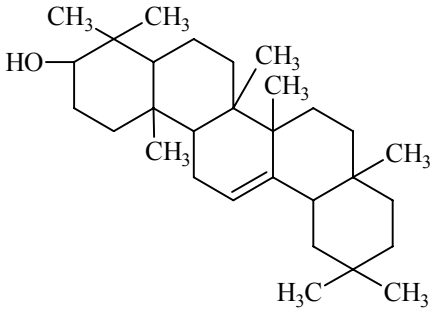
The deposit was analysed for the molecular formula, $C_{30}H_{50}O$. It had m.p. $198\text{-}199^0$C and $M^+ = 426$. It is optically active and gave pale red colour in Liebermann Burchard reaction, purple with thionyl chloride (Noller's reaction) and yellow colour with

*Author for correspondence; E-mail: badal70@rediffmail.com

tetranitromethane showing that it is a triterpene[2]. It reacts with ceric ammonium nitrate and formed an acetyl derivative, $C_{32}H_{52}O_2$, m.p. 236^0, and a benzoyl derivative, $C_{37}H_{54}O_2$, m.p. $229\text{-}230^0$, which indicated that it had one –OH group. Methyl group estimation in the deposit by the method of Wiesenberger as described by Belcher and Godbert[3] showed the presence of eight methyl groups in the deposit.

Mixed m.p. determination with authentic sample of β-amyrin showed that it was identical to β- amyrin. The melting points of acetyl derivative and benzoyl derivative of β-amyrin corresponded to that of its acetyl and benzoyl derivatives, respectively; thus, indicating that the triterpene was β-amyrin[4-7].

The infrared spectrum of the compound exhibited bands at 3225 cm^{-1} (-OH), 2910 cm^{-1} (-CH_3, -CH_2), 1472 cm^{-1} (C-CH_3), 1385 cm^{-1}, 1344 cm^{-1} (-CH-) 1040 cm^{-1}, 1010 cm^{-1} (cyclohexane) and 824 cm^{-1} –$C(CH_3)_2$. It further confirmed that the deposit was β-amyrin.



β-Amyrin

Study of the fat

After the removal of solvent, the filtrate yielded a yellow coloured fat which on analysis, was found to give the following physico-chemical constants (Table 1).

Table 1: Physico-chemical constants of the fat

Constant	Value
Acid value	7.01
Saponification value	210.25
Iodine value	45.8
Specific gravity (28^{o}C)	0.7984
Refractive index (27^{o}C)	1.7628

Subsequently, the mixed fatty acids were separated into solid and liquid fatty acids, by Twitchell's[8] lead salt alcohol process, which was modified by Hilditch[9]. The observation and results are recorded in the Table 2.

Table 2: Separation of fractions and physico-chemical constants

Fraction	Percent	Acid value	Saponification value	Iodine value
Solid	69.87	5.1	228.76	00.0
Liquid	30.10	6.3	190.82	179.26

The solid and liquid fatty acids were identified by chromatography using Whatmann No. 1 paper in different solvent system by ascending and descending techniques.

The chromatography was done using Whatmann No. 1 filter paper impregnated with 10% solution of liquid paraffin in benzene. The spots were applied using authentic fatty acid samples. The Whatmann No. 1 paper was then run in (1) acetic acid : water (9 : 1) and (II) 75% ethanol as solvent, using descending technique. Chromatograms were heated at 100^0C followed by immersing in 500 mL of water containing 25 mL of the saturated solution of copper acetate. It was washed with water containing 0.02% potassium ferrocyanide. The acids as identified by chromatography were arachidic acid, linoleic acid, lauric acid, myristic acid, oleic acid, palmitic acid, ricinoleic acid, and stearic acid. The fatty acids were characterized by their respective R_f values.

Gas liquid chromatographic analysis of mixed fatty acids

The mixed fatty acids were converted into their methyl ester derivatives and were then analyzed by G. L. C. on a CIC gas chromatograph attached with flame ionization detector and digital recorder. The column consisted of copper, which was packed with Repplex and good results were obtained with the following parameters.

Carrier gas	Nitrogen
Rate of flow	120 mL. / minute
Chart speed	15" / hr.
Attenuation	55 x 100
Column temperature	188^0
Injection part	275^0
Detector	FID

RESULTS AND DISCUSSION

The fatty acids were identified by the peaks by comparison of their retention time with those of authentic samples of fatty acid and the peak areas were calculated by triangulation method. The observation and results are recorded in the Table 3.

Table 3: Percentage of fatty acids

Fatty acid	Percentage
Arachidic acid	15.7
Linoleic acid	12.6
Lauric acid	13.7
Myristic acid	17.8
Oleic acid	10.8
Palmitic acid	12.0
Ricinoleic acid	6.2
Stearic acid	10.8

The deposit was found to be β-amyrin.

REFERENCES

1. R. N. Chopra, I. C. Chopra and B. S. Verma, Supplement of Glossary of Indian Medicinal Plants, C. S. I. R., Pub. Reprint (1980) p. 106.
2. E. Twitchelle, Indian Eng. Chem., **13**, 803 (1921).
3. R. Belcher and A. L. Godbert, Semi-micro Quantitative Organic Analysis, 2nd Ed., Longman & Green Co., London (1954) pp. 102-107.
4. O. Dischenderfer, Phytochemical Studied β-Amyrin of Elemi-resion, Monatsh, **46**, 399 (1926).
5. R. C. Burrell and F. G. Houston, Isolation of β-Amyrin and a Fatty Acid of High Molecular Weight from *Solidago Leavenworthii*, J. Am. Chem. Soc., **70**, 447 (1948).
6. Y. Sakato, The Chemical Constitution of Tea II, Theosterol and β–Amyrin, J. Agr. Chem. Soc., Japan, **26**, 1 (1952).

7. L. C. King, C. D. Ball, B. Riegel, C. E. Schweitzer, P. G. Smith and E. W. Meyer, The Isolation of β-Amyrin from the Leaves and Seeds of Alfalfa, J. Am. Chem. Soc., **65**, 1168 (1943).

8. K. Peach and M. V. Tracey, Modern Methoden der Pflanzenanalyse, Springer Verlag, Berlin, 3 (1955) pp. 472-473.

9. T. P. Hilditch, Chemical Constituents of Natural Fat, 3rd Ed., Chapman and Hall Ltd., London (1956) p. 34, 577.

Revised : 22.04.2013 *Accepted : 25.04.2013*