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Physico-chemical Composition and lipid classes of *Aegle marmelos*(Bael)and *Citrullus colocynthis*(*Tumba)* Seed Oils.

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ABSTRACT

Aegle marmelos (Bael) *and Citrullus colocynthis (Tumba,) seeds* Bel*onging to the Rutacaeae and Cucurbitaceae families, which have medicinal properties, were extracted with n- hexane and Chloroform:Methanol (2:1) (v/v) to yield the oils and total lipids respectively. The seed oils were examined for physical and chemical characteristics. GLC analysis of their fatty acid methyl esters showed the presence of palmitic, stearic,oleic, linoleic and linolenic acids in appreciable quantities. TLC analysis of the total lipids showed the major lipid classes to be neutral lipids , glyco lipids, phospho lipids and sterol lipids, identity of which was further confirmed by applying specific color reactions.*

Key Words: Seed oils, physico-chemical characteristics, fatty acid composition, lipid classes., neutral, glyco- and phospholipids.

INTRODUCTION

In recent years there has been much interest in developing new oilseed crops which could be useful in food, medicines and other industries. India is a veritable emporium of medicinal plants since ancient times. Rapid industrialization and urbanization has led to the over-exploitation and loss of valuable resources including medicinally important plants. These plants are important source of compounds for the pharmaceutical industry.

Aegle marmelos or Bael[1] is a handsome and deciduous sacred tree,popular in temples of 'Lord *Shiva*'and 'Lord *Vishnu*'. It is a slow-growing, medium sized tree, up to 12 to 15 m tall with short trunk, thick, soft, flaking bark,and spreading, sometimes spiny branches. Thel tree is native to India and is found growing wild in Sub-Himalayan tracts from Jhelum eastwards to West Bengal, in central and south India.

Bael has enormous traditional values against various diseases. Fruits are astringent, digestive, tonic, stomachic, laxative and acts as remedy in cases of chronic diarrhea, dysentery and in loss of appetite. Fresh leaves are astringent, digestive, laxative and febrifuge; useful in eye-diseases and inflammations. The pulp of the fruit is sweet and is highly aromatic. Essential oil exhibits antifungal activity against fungi. Seeds are beneficial to in treating diabetes, high blood pressure and high cholesterol levels. Seed oil exhibits antibacterial activity against different strains of vibrios.

Citrullus colocynthis or Tumba[2] is a perennial, trailing, scabrid herb. Dried pulp of unripe fruit of it is used medicinally for its purgative and hydragogue cathartic action on the intestinal tract. It acts as a blood purifier and a good remedy in cases of snake and scorpion bite poisoning. The fruits which are globular, smooth, like a gourd are available in the months of October and November and are used to repel moths from wool. From ancient times, Tumba seeds are known as a source of oil. and protein which can be utilized on an industrial scale. Oil composition nearly resembles safflower oil. Considering it.'s potential as an oilseed feedstock, it can be regarded as the alternative source for Bio- Diesel industry of future generation..

Work[3,4,5] has been reported on composition of non-traditional oilseeds . Some work on composition of *Aegle marmelos* [6] and *Citrullus colocynthis* seed oil[7] has been reported.

This piece of work reports on the physico-chemical characteristics, fatty acid profile and lipid classes of total lipids of Bael and Tumba seed oils.

EXPERIMENTAL SECTION

Seeds Materials

The Bael seeds were collected from trees around Nagpur city and Tumba seeds were purchased from seed merchants. Good seeds were cleaned, decorticated ,de-shelled ,sun dried , dried at 100–105 $^{\circ}$C and powdered using grinder prior to extraction.

Oil and Total lipids extraction

The powdered seed kernels were defatted in a soxhlet apparatus, using hexane (B.Pt. 40–60 $^{\circ}$C) and chloroform: methanol [8] to yield the oils and total lipids. The solvent was removed using rotary evaporator apparatus at 40 $^{\circ}$C. Extracted seed oil was stored in freezer at−20 $^{\circ}$C for subsequent physico-chemical analysis. The total lipids were concentrated to thickness under reduced pressure and diluted with chloroform and stored at -20^{o}C for further use.

Physical and Chemical analysis of seeds and oils

The oil content from seeds powders was measured by the soxlet method The oils were analyzed for characteristics such as acid value, iodine value ,saponification value , Unsap.matter content ,specific gravity, refractive index according to the standard methods[9].

Fatty Acid Composition

Fatty acid methyl esters(FAME) of the oils were prepared [10] and composition of FAME was determined using gas liquid chromatography (GLC) unit packed with 15%Chromosorb-w (40-60 mesh) ,equipped with flame ionization detector programmed at 280ºC with flow rate of 0.8 ml/min and capillary column (30m×0.25mm×0.25mm). The conditions of GLC were: chart speed 60 cm/hr; injection port temperature and column temperature 200°C and 300°C, respectively and nitrogen flow rate 60 mL/min. The identification of the peaks was achieved by retention times by comparing with authentic standards analyzed under the same conditions. The quantification was carried out by Caroll method[11]

Fractionation of total lipids

The total lipids were fractionated on a silicic acid column[12] and eluted successively with chloroform(for neutral lipids), methanol(for glycolipids) and acetone(for phospholipids)[13].Identity was confirmed by Dubois method(total sugars) [14], by Bartlett method(phosphorus) [15] and by Kjeldah's [9] method(for nitrogen). Sterol lipids were identified by applying H_2SO_4-Acetic acid reagent[16].The total lipids were separated by TLC using solvent system, chloroform/methanol/water (65:35:5 v/v/v)[17].

RESULTS AND DISCUSSION

The seeds had comparable oil contents of 33 and 23 percents. The physical and chemical characteristic of the seed oil, summarized in Table, clearly shows that the iodine value was especially high in case of Bael seed oil.The properties of the seed oils were similar to oils rich in linoleic acid. [18].The Table also demonstrates that the linoleic acid (18:2) is the major fatty acid(66.1%) in the *Citrullus colocynthis* seed oil which appears to be an excellent source of the linoleic acid. The high linoleic acid value is similar to those found in other oils, such as hempseed oils [19].Oleic acid (18:1) accounted for 30.0% in *Aegle marmelos* seed oil. The total unsaturated fatty

acids level was 85.2 and 78.3%. The total saturated acids made up a moderate proportion of 14.8 and 21.4% of the total fatty acids content of the seed oil. The palmitic acid accounted for 14.4, 11.7% and the stearic acid accounted for 0.4, 9.7 % of the total fatty acid content..

TLC analysis of the total lipids showed the presence of nitrogen, sugar and phosphorus indicating the presence of major lipid classes namely neutral lipids , glyco lipids, phospho lipids and sterol lipids, identity of which was further confirmed by applying specific color reactions[19,20]. The fatty acid profile of the seed oils and lipid classes obtained in our study were in largely in general agreement with the results obtained in earlier studies[21,22,23,24] on seed oils from same families.

Table : Physico-Chemical properties and Fatty acids composition of Seed Oils

Seed oils	Oil %	R.I. (25 °C)	Sp. Gr. (15 °C)	Acid value	Iodine value	Sap. value	Unsap. matter %
Aegle marmelos	33	1.4814	0.943	3.2	141	194	2.2
Citrullus Colocynthis	23	1.4 730	0.919	1.2	122	189	1.4
Fatty acid composition (by wt%)							
Seed oils	C 16:0	C 18:0	C 18:1	C 18:2	C 18:3	C 20:0	
Aegle marmelos	14.4	0.4	30.0	28.1	27.1	--	
Citrullus Colocynthis	11.7	9.7	11.4	66.1	0.8	0.3	

R.I. -Refractive index, Sp.gr - specific gravity

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