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Short Communication

POTENTIAL SOURCE OF α –ELEOSTERIC ACID OF *MOMORDICA CHARANTIA* SEED OIL OF ARID ZONE PLANTS OF RAJASTHAN, INDIA

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ABSTRACT
Momordica charantia or Bitter gourd, also known as Balsam pear or *Karela*, is a tropical vegetable, and has been used extensively in medicine as a remedy for diabetes and as a food in Asian countries. It produces high level of α-eleosteric acid [C18:3,(9Z,11E,13E)] (59%), having an unusual conjugated fatty acid. The exact location of double bond in unsaturated fatty acids in the seed oil of *Momordica charantia* is defined by Gas chromatography. This was reflected in the higher refractive index (1.4995) and higher melting point of the oil. The oil is unusual in composition, since the fatty acids consist almost entirely of α-eleosteric acid (59%) and stearic acid (23%). There is less than 10% each of palmitic, oleic, and linoleic acids. The acid value, the saponification value and the iodine value were 1.854 mg/g KOH, 185.08 mg/g and 129.06 g I_2/100g, respectively. The presence of a high amount of α-eleosteric acids, low acid value, high saponification value, moderate iodine value are promising indicators of the potential of *Momordica charantia* seed oil as a good drying oil for the paint and coating industry.

Key Words: Cucurbitaceae, seed oil, fatty acid, Momordica charantia, α-eleosteric acid

INTRODUCTION
India is called the botanical garden of the world for its natural resources. Over 6000 plants in India are in used in traditional, folklore and herbal medicine. The Indian system of medicine has identified 1500 medicinal plants of which 500 are commonly used. The family Cucurbitaceae lies within the class of dicotyledonous and in the division of anthophytha. There are about 100 known genera and almost 700 species in this family.

The plant *Momordica charantia* Linn. a climber belonging to family Cucurbitaceae commonly known as bitter gourd or bitter melon in English and *Karela* in Bengali. The Latin name *Momordica* means "to bite" (referring to the jagged edges of the leaf, which appear as if they have been bitten). All parts of the plant, including the fruit have bitter taste. (Satyawati *et al.,* 1987; Ali *et al.,* 2008). In Ayurveda, the fruit is considered as tonic, stomachic, stimulant, emetic, ambitious, laxative and alternative. Bitter melon has been used in various Asian traditional medicine systems for a long time. Like most bitter-testing foods, bitter melon stimulates digestion. While this can be helpful in people with sluggish digestion, dyspepsia, and constipation (kumar *et al.,* 2010; Dhalla *et al.,* 1961; Giron *et al.,* 1991). Bitter melon rarely does have negative effects. Flowers yellow in colour and monoceous. Each plant bears separate male and female flowers. *Momordica charantia* seeds have been found potentially rich in oil, with the content of 25% as reported elsewhere, which is higher than that contained in many of other plant sources. The seed oil of *Momordica charantia* contains a large amount of α-eleosteric acid. The presence of α-eleosteric acid in substantial amounts improves the drying rates of thin films of fatty acids when exposed to air (Change, 1996; Grover *et al.* 2004). Seed oil of M. charantia had been identified as a good material for making wrinkle varnish. The present study analyses the composition and the physical properties of the seed oil of arid zone cultivar and their use as a drying oil for manufacturing alkyd resins. (Prashantha *et al.,* 2009; Suhail *et al.,* 2005).

MATERIALS AND METHODS

Seed Material

Momordica charantia fruits were collected from arid or semi arid zone of Rajasthan, India. Seeds of fruits were separated from the fleshy part and were cleaned to remove the mucilaginous materials. The weight of cleaned seeds was approximately 150 g.

Oil extraction

The cleaned seeds were dried in an oven at 105^0C for nearly 6 hours until the weight reached a constant value. The cleaned and dried seeds were ground using mechanical grinder put in air tight containers and stored in desiccators for further analysis. The seed oils are generally extracted with solvent like n-hexane and light petrol or petroleum ether(40^-60^0C). About 15 g powder sample was extracted using petroleum ether for 8 hours by using a soxhlet extractor. The solvent is removed under reduced pressure and the oils are stored under nitrogen atmosphere in a refrigerator until further use.

Fatty acid extraction and sample preparation

Seed oil was refluxed with ethanolic potassium hydroxide. The unsaponifiable matter was removed and free fatty acids were obtained in usual manner. Wherever required, the saponification was carried out under nitrogen and samples were stored at low temperature in a nitrogen atmosphere.

The esterification was carried out by usual procedure, except where specified.

The methyl esters derivatives are of particular value for analysis by GC-MS. Methyl esters were prepared by boron-trifluoride methanol complex method.

The Fatty acid composition of *Momordica charantia* seed oil was determined as their methyl esters prepared by boron-trifluoride methanol complex method. The resultant methyl esters were analyzed by GLC. equipped with a flame ionization detector and 15m X 0.24mm capillary column. The column, injection port, and detector were operated at 200^0C, 220^0C and 240^0C, respectively. Helium was used as a carrier gas at a flow rate of 1 ml/min.

Chemical properties

The analytical values of the oils and seeds and the physico-chemical characteristics like acid, saponification, iodine values of the oil was determined using standard AOCS methods.

RESULTS AND DISCUSSION

The seed oil of *Momordica charantia* is a reddish-brown colored liquid at room temperature. The average moisture content of fresh seeds was found of 52 % (w/w). There are high values of standard deviation present in *Momordica charantia* seeds due to the different levels of maturity of the fruits at the time of collection. The oil content of the seed, given as a percentage to the dry weight of the kernel, was found to be 35%. The refractive index which was fairly constant at 1.4995 for the oil sample. The refractive index is useful in detecting the adulteration of oils that contain substantial amounts of conjugated double bonds.

Table 1: Analytical and Physico-chemical characteristics of the seeds and oils

Seed Properties		Oil Properties	
Moisture content	**52**	**Refractive Index**	**1.4995**
Oil Content (% by w)	**24.5**	**Acid value (mg/g KOH)**	**1.854**
		Iodine value (g I_2/100g)	**129.06**
Protein Content (% by w)	**21.36**	**Saponification value (mg/g KOH)**	**185.08**
		Un-saponified matter (%w/w)	**1.19**

Table 2 -Fatty acid contents in plant seeds

Fatty Acid	Obtained % by weight
α-eleosteric acid	59
stearic acid	23
Oleic Acid	7.80
Linoleic Acid	4.80
Palmatic Acid	2.30
Unidentified miner acid	3.10

The iodine value obtained is 129.06 which indicate the average molecular mass of fatty acid present in oil. The saponification value of *Momordica charantia* seed oils 185.08 indicated that it contained mainly high molecular mass fatty acids. The lower amount of Un-saponifiable matter (1.19%) shows the lower amount of hydrocarbon. The results of GLC analysis of the fatty acid composition, given in Table 2 were in *Momordica charantia*. The predominant fatty acid was α-eleosteric acid with a percentage of 59%. They also had substantial amount of stearic acid (23%) and other fatty acids like linoleic acid, Palmatic acid, Oleic acid were less than 10%.

Conclusion

The GLC analysis shows that the oil of *Momordica charantia* seeds found in this area are of high quality and medicinal values domestic and industrial applications. Its seed oil contain high amount of α-eleosteric acids and it is good drying oil for the paint and coating industry.

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