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Short communication

Seed oil of *Sapindus saponaria* L. (Sapindaceae) as potential C16 to C22 fatty acids resource

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ABSTRACT

Vegetable seed oils have been objects of study as a raw material to produce biodiesel. Considering this, the oil extracted from the seed of *Sapindus saponaria* L., cultivated in Brazil, was investigated, concerning its chemical composition, aiming at the extraction of potential raw material for the production of biodiesel, for the first time. Seeds were collected at Maringá State University campus. The oil was extracted by means of Soxhlet method and characterized by Gas Chromatography, coupled with Mass Spectrometry (GCMS). The quantity of oil yielded was of 42.58%. The oil characterization allowed the identification and the quantification of seven fatty acids. From these, 57.60% were unsaturated and 42.40% were saturated. Oleic acid was the most abundant (52.45%) among them.

1. Introduction

Vegetable seed oils, besides being an important nutritional source, can also be useful as an industrial raw material. Recently, the use of these oils as an industrial raw material has been highly valued, once it is a renewable and environmentally safe energy source. In order to be used, specific profiles of fatty acids are required, so as to determine the seed oil suitability to certain technical applications [1]. Oils with a high concentration of monounsaturated fatty acids (such as the oleic acid) have a significant potential as biodiesel and as a renewable resource for the oil chemistry industry [2].

The genus *Sapindus* includes two very known large species: *Sapindus mukorossi* and *Sapindus emarginatus*, found in the north and in the south of India [3]. *Sapindus saponaria* L. (Sapindaceae) is original of tropical regions and is regularly spread within the north, northeast and central west Brazilian states. It is a medium-sized tropical tree (Fig. 1) and is commonly known as wingleaf soapberry, western soapberry, jaboncillo [4]. Palioto et al. [5] characterized the phenology of

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Fig. 1 – *Sapindus saponaria* L. tree – UEM Campus – Maringá/PR/Brazil.

this species and observed that fruiting occurred in all months of the year with the beginning of the ripening of these fruits in August. The extract of *S. saponaria* pericarp showed to have *in vitro* inhibitory action against *Candida albicans* and non-albicans yeasts [6], and anti-inflammatory action [7].

Inside the pericarp, the seeds are found (Fig. 2). Chhetri et al. [8], Sengupta et al. [9] and Sun et al. [10] characterized the oil extracted from *S. mukorossi* chemically, by means of gas chromatography; the authors found fatty acids as the component of this oil. Chhetri et al. also demonstrated the high potential for

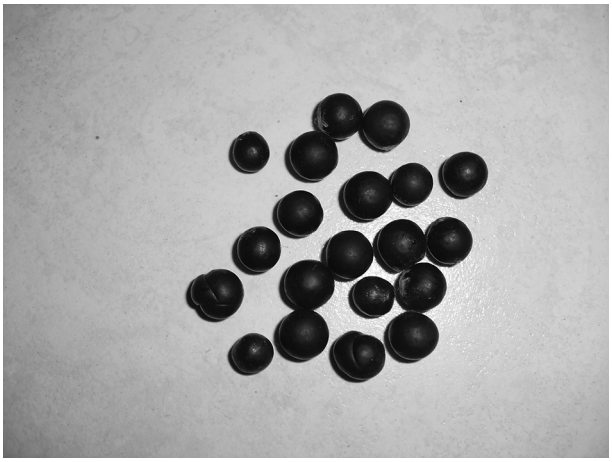

Fig. 2 – *Sapindus saponaria* L seed.

that oil to be used as a raw material to produce biodiesel. Chen et al. [11] evaluated the mixture of two non-edible oils (*Jatropha curcas* and *S. mukorossi*) as potential biodiesel, and verified that they presented complementary fuel properties, resulting in a very good blend for biodiesel.

Flechas et al. [12] characterized the oil extracted from *S. saponaria* L. seeds collected in three Colombian regions by means of gas chromatography, using a flame ionization detector, and discovered fatty acids as constituents of this oil. Until the present moment, we have not found in the literature reports of studies concerning the oils extracted from *S. saponaria* L. seeds. The present study, then, aimed at analyzing, for the first time, the chemical composition of the oil extracted from seeds of *S. saponaria* L. cultivated in Brazil, in order to make use of its resources, with the purpose of extracting potential raw material to produce biodiesel.

2. Materials and methods

2.1. Plant material

The *S. saponaria* L. fruits were collected at the campus of Maringá State University (UEM) (23°24′56.6″ S; 51°56′34.7″ E), in August, 2010. The products were in the post-ripening period, i.e., they were dry, dark and stiff. The Biology Department of Maringá State University identified the material, and a voucher specimen was deposited to UEM herbarium, under the registration number HUM 11710.

2.2. Oil extraction

The pericarp was separated from the seed manually. The seeds were broken, in order to enlarge the surface of contact with the liquid extractor and favor the dissemination of the oil in them. The seed hexane extract was obtained by means of extraction in Soxhlet, using 110.40 g of seeds kept in 750 mL of 100% hexane, under the approximate temperature of 80 °C, protected from light, for 11 h. The solvent was evaporated in a rotatory evaporator, under reduced pressure at the temperature of 40 °C. The oil obtained was weighed and its percentage was calculated over the sample dry weight.

2.3. Oil composition analysis

In order to carry out the characterization of the fatty acids present, they were previously derivatized to fatty acids methyl esters (FAME), following the methodology described by Matos et al. [13].

The FAME were analyzed with a gas chromatograph Thermo, with a quadrupole mass detector Thermo, model DSQ II, of electronic impact ionization 70 eV, and separated in a capillary HP5MS Agilent, with 30 m of length, 0.25 mm of diameter and 0.25 μm of film thickness, composed of 5% phenylmethylpolysiloxane. The operation conditions of the chromatographic analysis were: capillary programed temperature – initial temperature 80 °C (7 min), heating rate 10 °C min^{-1} up to 180 °C (10 min), 180 °C (3 min), heating rate 3 °C min^{-1} up to 200 °C (7 min), heating rate 0.5 °C min^{-1} up to