

## Screening of *Sterculia guttata* Seeds alongwith Extraction and Characterization of Seed Oil

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The present study describes the preliminary study of seeds of *Sterculia guttata* with extraction and characterization of seed oil. In preliminary study, screening of seeds by phytochemical tests, cold solvent extractions of non-polar, semi-polar and polar solvent, volatile matter, moisture content and steam distillation experiments were carried out. The oil was extracted using soxhlet apparatus and was found that *S. guttata* seed were rich in oil content, which was 37.74 % by weight. Some of the physical and chemical characteristics of the oil such as acid value, saponification value, unsaponifiable matter, specific gravity, iodine value, viscosity, refractive index and peroxide value were determined. The values of these parameters were compared with some most common vegetable oil. The results showed that *Sterculia guttata* seed oil is not edible oil.

**Key Words:** Extraction, Seed oil, *Sterculia guttata*.

### INTRODUCTION

*Sterculia guttata* Roxb. (Sterculiaceae) is a medicinally important plant. Sterculiaceae plants in the world are estimated to be 1546 species in 60 genera, which distributed mainly in the tropics and subtropics with a few temperate regions. These plants are large and deciduous. The leaves and bark of *Sterculia guttata* is used as folk medicines. This plant is reported as a famine food<sup>1</sup>. The seeds are eaten raw or roasted by tribes, especially in times of scarcity<sup>1,2</sup>. If the seeds are eaten more than a handful quantity at a time, the person feels lethargic<sup>3</sup>. The juice obtained from the bark and phangali (*Pogosteman benghalensis*) leaves by crushing in water, is used in folk medicine, to cure fever and diarrhoea<sup>4</sup>. So far, malvelic and sterculic (2.1 and 5.8 %, respectively), hexadecanoic (palmitic), octadecanoic (stearic), 9,12-octadecadienoic(Z,Z) (linoleic), 9-octadecenoic(Z) (oleic) and 9-hexadecenoic(Z) (palmitoleic) acids have been reported from the seeds of *Sterculia guttata*<sup>5</sup>.

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## EXPERIMENTAL

The leaves and seed of *Sterculia guttata*, Roxb. were collected from deciduous forests near Pune, India in bulk quantity. The plant specimen was authenticated by matching with the voucher specimen BSI/WC/Tech/2000/358 available at the Botanical Survey of India, Pune, India.

**Extraction of seed oil:** Air-shade-dried, powdered material of *Sterculia guttata* (150 g) was extracted in a soxhlet extractor for 15 h using *n*-hexane (40-60). Solvent was removed under reduced pressure. The hexane extract 37.74 % by weight of the seeds obtained as yellow thick viscous oil.

**Characterization of oil:** Some of the physical and chemical characteristics of *S. guttata* seed oil were determined. These include acid value, saponification value, unsaponifiable matter, specific gravity, iodine value, viscosity, refractive index and peroxide value. All the characteristics were determined by using standard methods.

## RESULTS AND DISCUSSION

The preliminary study of the seed material was performed and the results are given in Table-1.

TABLE-1  
PRELIMINARY TEST FOR AIR SHADE DRIED SEED POWDERED  
MATERIAL OF *Sterculia guttata* SEED

Test for	Results
Loss on drying	12.07 %
Moisture (%)	4.457 %
Phytochemicals	Alkaloids, starch, proteins, tannins, sugars and oil
Extractive values	Hexane (28.61), benzene (31.38), chloroform (32.72), ethyl acetate (30.87), acetone (31.89 %) and ethanol (25.52 %)
Amount of sublimate in %	20.7 %
% of steam volatile compound	10.61 %

The contents of oil in *S. guttata* seeds were found to be high, ranging up to 37.74 % by weight of the seeds. This value is close to those obtained from the other common oil-bearing seeds<sup>6</sup>.

The acid value of *S. guttata* seed oil was found to be in the range 17-21 mg KOH/g. This value is very high than the acid values of common oil (Table-2).

The vegetable oil from fresh seeds contains only a small amount of free fatty acids but their quantity increases due to hydrolytic changes. Thus,

TABLE-2  
CHEMICAL PROPERTIES OF SEED OIL OF *Sterculia guttata* COMPARE  
WITH SOME MOST COMMON VEGETABLE OIL<sup>8</sup>

Properties	<i>S. guttata</i> oil	Tobacco oil	Linseed oil
Acid value (mg KOH/g)	17-21	6.8	5.9
Saponification value (mg KOH/g)	737-740	189.3	196
Unsaponifiable matter	23-27 %	1.2	1.3
Iodine value	27-33	140.27	180-190
Specific gravity	0.874 at 26 °C	0.917 at 15 °C	0.938 at 15 °C
Viscosity	46.60 centipoise at 26 °C	–	–
Refractive index	1.49 at 27 °C	–	1.472-1.475 at 40 °C
Peroxide value	2.0 milli-equivalent	–	–
Ester value	717.16	–	–
Properties	Soybean oil	Cotton oil	Coconut oil
Acid value (mg KOH/g)	6.2	6.4	–
Saponification value (mg KOH/g)	192	193	257
Unsaponifiable matter	1.5	1.3	–
Iodine value	120-135	110	8.8
Specific gravity	0.936 at 15 °C	0.923 at 15 °C	–
Viscosity	–	–	–
Refractive index	1.4649-1.4710 at 40 °C	1.463-1.466 at 40 °C	1.448-1.449 at 40 °C
Peroxide value	–	–	–
Ester value	–	–	–

they impart a sharp and unpleasant flavour to edible oils and their action is especially injurious in the used for pharmaceutical or medicinal purposes<sup>7</sup>. It was found that, in *S. guttata* seed oil free fatty acids, in terms of oleic acid is 10.40 % by weight, laeic acid is 7.382 % by weight, ricinoleic acid is 10.99 % by weight and palmitic acid is 9.44 % by weight.

The saponification value of *S. guttata* seed oil was found to be in the range 737-740 mg KOH/g. This value is very high. Saponification value range of common vegetable oil were found to be approximately<sup>8</sup> 190-196 mg KOH/g.

The unsaponifiable matter in percentage of *S. guttata* seed oil was found to be in the range 23-27 %. This value is very high. In the most common vegetable oil, percentage of unsaponifiable matter ranges from 1.0-1.5 approximately<sup>8</sup>. Unsaponifiable matter includes those substances which

are frequently found dissolved in fats and oils and cannot be saponified by the caustic alkalis but are soluble in ordinary fat solvents<sup>9</sup>.

The iodine value of *S. guttata* seed oil was found to be in the range 27-33 which was less than common vegetable oil. The iodine value of most of the vegetable oils were observed within the range 104-132 except coconut oil and palm-kernel oil which has much lower iodine value, *i.e.*, 8.8 and 14.5, respectively<sup>8</sup> (Table-2).

The specific gravity of *S. guttata* seed oil was determined by specific gravity bottle and was found to be 0.874 at 26 °C. It was found to be slightly less than most of the vegetable oils (Table-2).

The viscosity of *S. guttata* seed oil was determined by Ostwald viscometer and it was found to be 46.60 centipoise at 26 °C.

Refractive index of *S. guttata* seed oil was determined Butyro refractometer and it was found to be 1.49 at 27 °C. These values were comparable with value of most of the vegetable oils.

The peroxide value is a measure of the peroxides contained in a sample of fat, expressed as milli-equivalents of peroxide/1000 g of the material. The peroxide value of *S. guttata* seed was found to be 2.0 milliequivalent.

Ester value is the no of mg of potassium hydroxide required to saponify the ester present in 1 g of substance. The value *S. guttata* seed oil was found to be 717.16.

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