

A low-calorie cooking oil obtained from *Pithecellobium dulce*

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Abstract

Pithecellobium dulce is belonging to the Fabaceae family. It is native to pacific coastal region and also in central & northern South America. Belong to the countries, the name can be different. In common, it is called as "Madras thorn" or "Manila tamarind" (which is similar to tamarind). The fruit alone consumed, they are sour in taste and due to some medicine values in the pods as well as in leaves, they are consumed to cure the diseases like leprosy, peptic ulcer, toothache, and control blood sugar etc. The seeds are thrown as a waste and they are only used for cultivation proses. Then, analysis the medicinal values in the seeds of *P. dulce*. It is processed to obtain oil with low calorific value and they are mainly used to cure heart related problems, reduce cholesterol and control diabetics. Some of the analysis are taking with these oils are TOTOX, density test, viscosity and specific gravity. These tests are used to analysis the quality of the oil.

Keywords: Seeds, low calorific value, oils, madras thorn & cholesterol.

Introduction

Pithecellobium dulce is a flowering plant and it belonging to the Fabaceae family. These plants are native to pacific coastal region and also in central & northern South America. They are also called as Camachile, Manila tamarind, madras thorn and Seema chintakaya etc. [1]. These names are various depend on the countries and their habitats. The *P. dulce* is derived from the Greek word, they mean Pithekos- ape & lobos, which refers to as pod and dulce is a Latin word which meant sweet in allusion. In some regions, they are called as "Jungli jalebi", because they resemble like jalebi. Normally, most of the people consume only their fruits alone. They are taste like sweet, when it fully matured (i.e. in pink colour) or otherwise it tastes like sour (i.e. white in colour). They are rich in nutrition & minerals (ca, Mg, Fe, K etc.) and they are mainly used

to treat gastrointestinal disorder like peptic ulcer [2]. All parts of the tree have medicinal values, but they are not reached to the people. Their leaves are boiled along with the water and that drink is used to prevent the diseases like leprosy, intestinal disorder, peptic ulcer, toothache etc. their peels are chewed as raw or otherwise boil to consume as drink, which are responsible to control diabetics. It also has an anti-bacterial, anti-oxidant and wound healing potential. In pharmaceutical industries, the extract from the peels are used to make a drug, which are used to inhibit the diabetes mellitus. Because, they contain a chemical compound like stigmasterol, sitosterol, quercetin and pinitol [3]. The bark of the tree also contains a medicinal value and mainly used in pharma industry. They contain alkaloids, anthraquinones, tannins, terpenoids and sterol (which has anti-microbial activity) and these compounds are used to treat eye inflammation, febrifuge, dermatitis antivenomous activity & astringent for dysentery. Then, the roots of the tree are mainly involved to treat dysentery, which is a traditional method. Finally, the waste product from the Camachile seeds are processed to form oil, which has low calorific value and it is mainly useful to maintain a healthy heart and inhibit the cholesterol level in the body. In recent days, the seeds are powdered and consumed to control the diabetes mellitus. They are undergoing a methanolic extraction process and made into a drug or tablet form and supplied as a medicine for controlling diabetes mellitus. Some of the people causes stomach ache due to consuming tablets. So, alter the product with daily usage and the seeds are crushed to obtain oil and it also do the same process to cure the disease [4].



Fig:1- Camachile fruit along with seeds

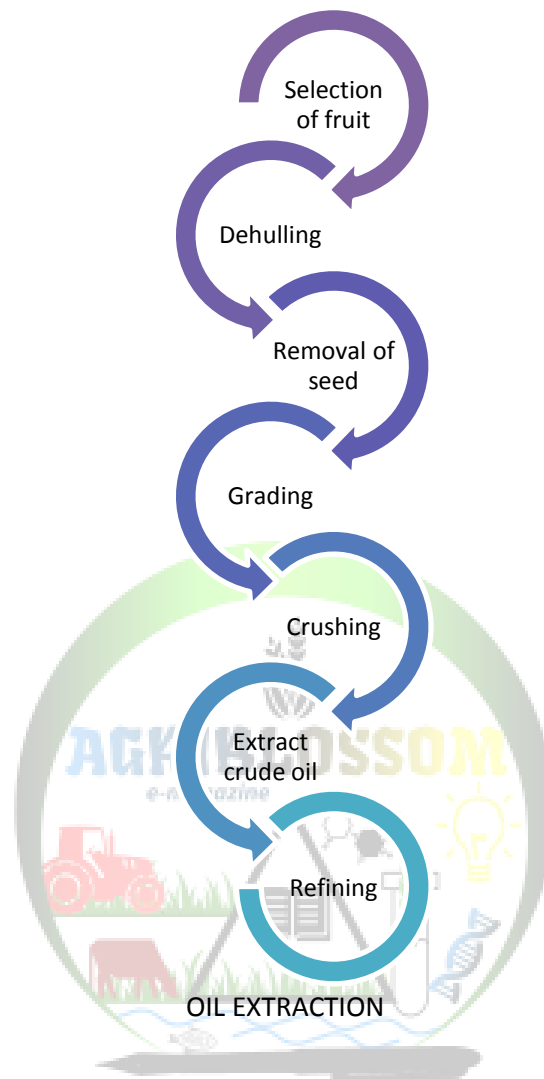


Fig:2- Camachile seed oil

The fruits are selected and with the help of dehulling process, to remove the seeds for further process or otherwise the seeds are obtained as waste. The seeds are undergoing a grading process, to obtain a good quality of oil. So contaminated seeds are removed and collected a good condition seed. Then, the seeds are crushed with the help of crusher to extract the oil from the seeds. The cake obtained during the extraction process are used as fertilizer or animal feed. The oil which is obtained during the extraction process is in crude oil. The crude form of oil is not used for cooking. So, the refining is the important process to obtain cooking oil [5]. Otherwise, distillation is also done to get a pure form of oil. Then, we get pure oil, which can use for cooking with low-fat content.

Medicinal content in seeds

It contains 13 amino acids and in those five essential amino acids they are valine, histidine, threonine, and leucine. They are mainly rich in amino acids like tyrosine (4,7 %) and leucine (2.4%).

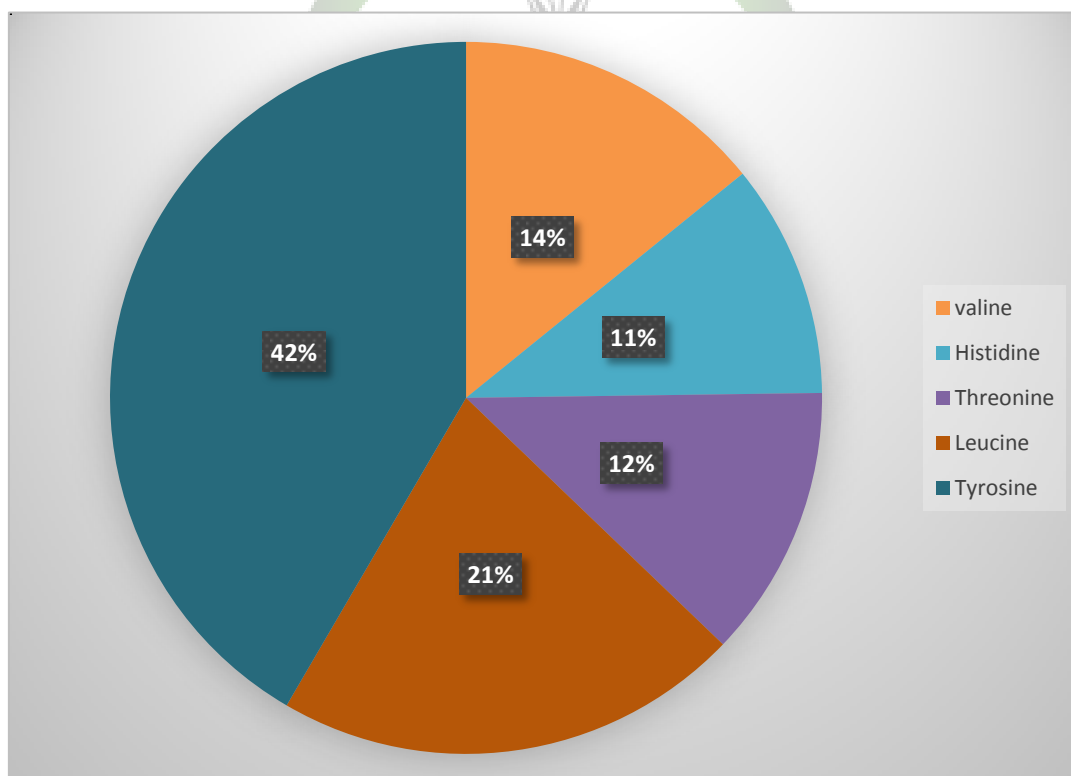


Fig:3- Amino acids present in Camachile seed oil

Analysis in Camachile oil

1] TOTOX: it is used to determine the oxidation state of the oil and it also involves preventing rancidity with the help of oxidation state [6].

$$\text{TOTOX} = \text{AV} + 2\text{PV}$$

Where, AV= Anisidine value

PV= Peroxide value

Peroxide value- It is the fat oxidation indicator and it is used to measure lipid peroxides & hydroperoxides. Iodine is also liberated along with sodium thiosulphate, and then iodine amount also calculated.

Reagents:

- Oil sample
- 30ml acetic acid
- 20ml chloroform
- 0.5ml potassium iodide
- 30ml distilled water
- 0.01N, 0.1N- sodium thiosulphate
- Starch solution



Procedure:

- Add all the sample in a conical flask
- Then, add starch solution, it turns into blue colour.
- It is titrated with sodium thiosulphate and find the volume
- Calculate the peroxide value with the formula of, $\text{PV} = \frac{[(V_S - V_B) N \times 1000]}{W}$

Where,

V_S - Volume of sodium thiosulphate titrated

V_B - volume of sodium thiosulphate used in a blank test

N- Normality of sodium thiosulphate

W- Weight of oil sample in grams.

- Anisidine value: To find a TOTOX value with the help of absorbance of fat solution.

Procedure:

- Weigh 0.5-4 g of oil into a 25ml conical flask.
- Dissolve and make up to volume with iso-octane and mix well
- Measure the absorption of the fat solution against pure iso-octane at 350nm in a 1cm glass cell
- Pipette 5ml iso-octane into a test tube B
- Add 1ml anisidine reagent into test tube A and B. stopper the tube, shake vigorously and leave in a dark place for exactly 10 mins.
- Measure the absorbance of the content in the tube A against tube B at 350nm in a 1cm glass.
- Calculate with the formula of, $AV = [25(1.2[E_B - E_A])]/W$

Where,

E_B - Net absorbance of fat solution

E_A - Net absorbance of fat anisidine solution

W- Weight of the sample

2] Density test: it is used to measure the flow process of the oil with the help of pycnometer [7].

Procedure:

- Measure the empty pycnometer.
- Fill the oil and measure the weight of pycnometer along with oil.
- Calculate the weight of the oil alone by neglecting the weight of the empty pycnometer (i.e.) mass value.
- The standard volume is about 25ml.
- Find the density by using the formula, $\rho = m/v$ (ρ - density, m-mass of the sample, v-volume of the flask).

3] Viscosity:

- Clean the viscometer with chromic acid and then wash with distilled water. Along with that, it also washed with alcohol & dry.
- Then, fill the water in the viscometer up to mark C.

- Pipette them up to mark D and do it for 3-4 times and take the mean value.
- Note the time & viscosity of water.
- Wash & dry the viscometer.
- Fill the oil up to mark C and do it for 3-4 times and take the mean value.
- Note the required time to move and calculate the viscosity by, [8]

$$\eta_2 = (\eta_1 \times \rho_2 t_2) / (\rho_1 \times t_1)$$

Where,

η_2 – absolute viscosity of oil

η_1 – viscosity of water

t_2 - time period of liquid

ρ_1 . density of water

ρ_2 – density of oil

4] Specific gravity: The specific gravity of the oil is also called as relative density and it measured with the help of density. The water density is standard as 1000 mg/ml [9].


$$SG = \rho_{oil} / \rho_{water}$$

Result

The result from the oil is to get a low calorific value and it is obtained from the waste product. The also contain many nutrient values. Normally, high blood pressure is caused due to high cholesterol value. So, that kind of people can't consume an oily food. Instead of this, Camachile oil can be used, because it contains low calorific value and it doesn't deposit any fatty tissues to our body. This oil is used to reduces the heart related problem like, resist the cholesterol deposit on the artery vales, cholesterol amount in the body can reduced, maintain a good healthy heart. It also involves maintaining control diabetics mellitus. The analysis report of the Camachile oil is represented in the given below table:

Analysis of oil	Values
Totox value	26
Iodine value	12.69
Density	780 kg/m ³
Viscosity	10.15 at 100°C
Specific gravity	0.5

Table:1- Analysis value of oil at 100°C

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