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# *Aegiceras corniculatum* L. (Blanco): Potential source of saturated fatty acids

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**ABSTRACT:** In present investigation, fatty acids (FAs) were estimated from the leaves of *Aegiceras corniculatum* (L.) Blanco. It was found that in leaves of the species showed more saturated FAs than unsaturated FAs. Arachidic acid, Heneicosanoic acid, Myristoleic acid, Linolelaidic acid, Linoleic acid and cis-4,7,11,14,17-Eicosapentaenoic acids are major FAs present in leaves. The mixture of saturated and unsaturated FAs present in the leaves of *A. corniculatum* suggests that the leaves are rich source of FAs and therefore, it can be used as alternative source of FAs in different industries for various purposes.

*Keywords*: *Aegiceras corniculatum*, *Leaves, Fatty Acids (FAs), Arachidic acid*

**INTRODUCTION**: A fatty acid is a carboxylic acid, often with a long aliphatic tail, either saturated or unsaturated. Fatty acids are required in the body for cell membrane function and integrity, healthy skin, cholesterol metabolism and prostaglandin production. They are also necessary for the function of thyroid and adrenal glands. Fatty acids are used in cosmetics as emollients, thickening agents and mixed with glycerin, cleansing agents. They are also used in production of soaps, detergents and are a component of some low toxicity pesticides. The most common fatty acids are myristic acid (C14:0), palmitic acid (C16:0), stearic acid (C18:0), oleic acid (C18:1) and linoleic acid (C18:2) [1]. The present work was carried out on fatty acid extraction of the leaves *A. corniculatum*. Fatty acids are saturated, monounsaturated or polyunsaturated.

Fatty acids are the constituents of all plant cells, where they function as membrane components, storage products, metabolites, and as a source of energy [2]. Saturated FAs include butyric, capric, myristic, palmitic arachidic acids. Polyunsaturated FAs include linoleic, linolenic, Arachidonic acids. Oleic acid is an example of monounsaturated FA. Capric acid widely used in perfumes, cosmetics and creams. Myristic acid is used in the food industry as a flavoring agent. Both capric and myristic acid are used as raw material for emulsifiers, in toiletiries soaps & detergents anionic and nonionic surfactants. Palmitic acid is used in the manufacture of pharmaceuticals, cosmetics, lube oils, water proofing and food grade additives. Stearic Acid is used widely in cosmetics, candles, rubber industries, lubricants, hardening of soaps, shoe & metal polishes. Arachidic acid is used for the production of detergents, photographic materials and lubricants. Linolenic acid is an unsaturated FA, considered essential to the human diet, which is an important component of natural drying oils such as linseed oil,

and used in making paints and synthetic resins. For cosmetic products, linoleic acid is the most frequently essential FA. It prevents barrier and cornifications disorders, lowers the transepidermal water loss and increases skin moistness. Caproic, caprylic and carpric acids have similar biological activities. Both caprylic and capric acid have antiviral activity against HIV [3, 4]. Caprylic acid has also been reported to have antitumour activity in mice [5]. However, fewer data are available for the fatty acids of mangroves & sediments in mangrove swamps [6, 7]. The present work was attempted to profiling the fatty acids from leaves of *Aegiceras corniculatum*, which shows rich source of saturated fatty acids. These fatty acids are used as various industrial as well as pharmaceutical purposes suggesting the potentiality of mangrove species as a bioresource.

**MATERIALS AND METHODS:** For the extraction of fatty acids, leaves of mangrove *Aegiceras corniculatum* were collected from west coast of Maharashtra (Sindhudurg District). Collected fresh leaves were washed and blotted to dry. Then the samples were then subjected to extraction in methanol by using Soxhlet Apparatus. To analyze fatty acids from the oil fractions by gas chromatography technique, the oil was subjected to transesterification to obtain the fatty acid methyl esters. The fatty acid methyl ester fraction was eluted with petroleum ether: diethyl ether= 50:50 (v/v), the fractions were redissolved in hexane and subjected to GC analysis. GC-FID analysis Fatty acid methyl esters were analyzed by GC-FID. A SHIMADZU GC17-A- gas chromatograph with flame ionization detector (FID) was used. Fatty acid methyl esters were separated on CHROMOPACK WCOT 25mX 0.25 mm ID, 0.2 µm film thickness capillary column using temperature programme from 150C/5 min, 40C / min until 2350C and 50 min at 2350C with the following conditions: Injector temperature 2600C, FID temperature 2600 C and carrier gas-Helium. The identification of fatty acids was done by comparison with the methyl esters of standard fatty acids.

**RESULTS AND DISCUSSION**: The different types of oils possess different properties according to their saturated and unsaturated fatty acids. Present investigations showed that leaves of *A. corniculatum* comprises the mixture of saturated and unsaturated FAs with no trans FAs. In the leaves, saturated FAs (53.90%) are more than unsaturated. The leaves show presence of Arachidic acid, Heneicosanoic acid, Myristoleic acid, Linolelaidic acid, cis-5, 8, 11, 14, 17-Eicosapentaenoic acid are in quite higher amount while Caproic acid, Oleic acid and Linolenic acid are in least amount (Table-1). Linolenic acid seems to be the major fatty acid, and arachidic acid was present in much lower amounts in fresh leaves of some mangroves [8, 9]. But in leaves of *A. corniculatum*, Arachidic acid is found in higher amount (42.30%). Arachidic acid is also called eicosanoic acid, is the saturated FA with a 20 carbon chain, which mainly useful in the production of soaps, detergents, for making phographic material and also in lubricants. Leaves of *A. corniculatum* also show presence of some important PUFAs like Linolelaidic acid and Linoleic acid. PUFAs mostly referred as essential FAs, because humans cannot make these acids on their own so it must be obtained from food. Linoelaidic acid is an omega-6 trans fatty acid and is a geometric isomer of linoleic acid, it is found in partially hydrogenated vegetable oils. Linoleic acid belongs to essential fatty acid that humans and animals must ingest for good health,

because the body requires them for various biological processes, but cannot synthesize them from other food components [10]. The key function of Linoleic acid is to maintain the integrity of the skin. It is an important FA mostly used in cosmetic products. Linoleic acid has become increasingly popular in the beauty products industry because of its beneficial properties on the skin. Linoleic acid is anti-inflammatory, acne reductive, and moisture retentive properties when applied topically on the skin [11, 12]. Thus, in the leaves of *A. corniculatum* showed abundant amount of saturated FAs. Saturated oils are more stable and do not become rancid as quickly as unsaturated oils.

| Sr. No. | Name of the Test | FAs in Leaves of *A. corniculatum* |
|---|---|---|
| 1. | Caproic acid methyl ester (C 6:0) | 0.10% |
| 2. | Arachidic acid methyl ester (C 20:0) | 42.30% |
| 3. | Heneicosanoic acid methyl ester (C 21:0) | 11.50% |
| 4. | Total of Fatty Acids : Saturated | 53.90% |
| 5. | Myristoleic acid methyl ester (C 14:1) | 17.50% |
| 6. | Oleic acid methyl ester (C 18:1n9c) | 0.80% |
| 7. | Total of Fatty Acids : Monounsaturated | 18.30% |
| 8. | Linolelaidic acid methyl ester (C 18:2n6t) | 7.80% |
| 9. | Linoleic acid methyl ester (C 18:2n6c) | 4.30% |
| 10. | Cis-5,8,11,14,17-Eicosapentaenoic acid methyl ester (C 20:5n3) | 15.60% |
| 11. | Total of Fatty Acids : Polyunsaturated | 27.70% |
| 12. | Total of Trans Fat | -- |

**Table 1: Fatty acids of leaves of *A. corniculatum***

Rich source of different fatty acids are oils like sunflower, safflower, coconut, linseed, cottonseed, palm oil, olive oil etc. FAs of standard oils compared with the FAs in leaves of *A. corniculatum*, the leaves showed highest amount in all except coconut oil, (Table-2) [13]. So, the present investigation clearly provides the baseline idea that justifies the use of leaves of *A. corniculatum* as a rich source of saturated fatty acids.

| Sr. No. | Name of the oil | Saturated (%) | Monounsaturated (%) | Polyunsaturated (%) | Trans Fat (%) |
|---|---|---|---|---|---|
| 1. | Coconut oil | 85.2 | 6.6 | 1.7 | 0 |
| 2. | Palm oil | 45.3 | 41.6 | 8.3 | 0 |
| 3. | Cottonseed oil | 25.5 | 21.3 | 48.1 | 0 |
| 4. | Olive oil | 14 | 69.7 | 11.2 | 0 |
| 5. | Rapeseed oil | 5.3 | 64.3 | 24.8 | 0 |
| 6. | Leaves of *A. corniculatum* | 53.90 | 18.30 | 27.70 | 0 |

**Table 2: Saturated Fatty Acids of Standard oils in comparison with leaves of *A. corniculatum***

**CONCLUSION**: The role of fatty acids in our body is significant, which determines and regulates proper body functions. FAs extracted from leaves of *A. corniculatum* have a great commercial value. The mixture of saturated and unsaturated FAs present in the leaves of *A. corniculatum* suggests potentiality of species, which provides alternative source of saturated FAs for various industries like soaps, detergents, cosmetics etc.

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