

## SHORT COMMUNICATION

### Fatty acid composition of *Sonchus arvensis* L. roots

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The roots of *Sonchus arvensis* L. were extracted with petroleum ether to afford the extract 2.39 % yield to the fresh weight of the material. The fatty acid methyl esters (FAME) was prepared from the extract and analyzed by GC and GC-MS. Eighteen fatty acids were identified and major fatty acids found to be Myristic acid (26.23 %), Palmitic acid (26.23 %), Linoleic acid (19.94 %), Pentadecanoic acid (3.11 %), Stearic acid (1.49 %), Behenic acid (1.27 %). The most abundant fatty acid identified was Myristic acid (26.23 %).

**Keywords:** *Sonchus arvensis*, Field-milk Thistle, Fatty acids, Myristic acid, Linoleic acid, Palmitic acid.

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#### Introduction

*Sonchus arvensis* L., Field-milk Thistle, is an annual plant, easy to grow in rainy and sunshine areas such as on river banks, ridges of rice field and abandoned fields 50-1650 m above sea level. The plant is a native to Eurasia with a tapered root and produces bitter latex. It is considered the most economically detrimental<sup>1-2</sup>.

As a class of edible wild plants, *Sonchus* species are widely distributed in China<sup>3</sup>. The aerial parts of *Sonchus* species, popularly known as 'kucai', which remain the cheapest source of proteins, vitamins, minerals and essential amino acids in the diet of many people, may be of great importance in helping to alleviate hypoalimentation-associated problems<sup>4</sup>. In China wild species of *Sonchus* are used as vegetables and as infusion or decoction they are administered orally or externally to treat acute icterohepatitis, cancer, inflammation, rheumatism, diarrhoea and snake venom poisoning<sup>5</sup>. *S. arvensis* is one of the medicinal herbs used in traditional medicines, in which the leaf extract is used as a diuretic, lithotriptic

and antiurolithiasis agent; also indicated for fever, poisoning and swelling or abscess. *S. arvensis* has long been used as folk medicine for the treatment of fever, stasis and inflammation. They also have effects through the detoxification and mobilization of blood circulation<sup>6</sup>. The plant is valued as a delicious and nutritional herb and has been used for the treatment of caked breasts, asthma, coughs and other chest complaints and for calming the nerves. It also has insecticidal properties and anti-inflammatory activity<sup>7</sup>. Phytochemically, *S. arvensis* has been studied mainly for the presence of flavonoids, triterpenoids, eudesmanolids, quinic acid derivatives and phenylpropanoids<sup>8-9</sup>.

There are three main types of fatty acids such as saturated, monounsaturated and polyunsaturated. The percentage of these compounds differs in each vegetable oil. Fatty acids that are required by the human body but cannot be made in sufficient quantity from other substrates, and therefore, must be obtained from food, are called essential fatty acids. Two essential fatty acids are linoleic acid (LA) and alpha-linolenic acid (ALA). They are widely distributed in plant oils. There are some specific benefits of essential fatty acids, viz. they boost our immune system, muscle of our body and the heart. These essential fatty acids are also vital in providing help in many functions involving the brain and help in soothing inflammations such as joint pains or back pains. Fatty acids with unsaturation, either monounsaturated or polyunsaturated, have been used in lowering the risks of heart diseases against inflammation and in enhancing the immunity or immune system<sup>10</sup>. In recent times the biological importance of fatty acids has gained considerable importance in food evaluation and also in the diagnosis of certain diseases and pharmacology<sup>11-12</sup>.

To the best of our knowledge, studies on the fatty acids of root of *S. arvensis* have not yet been undertaken. The composition of fatty acids from the root of *S. arvensis* is needed in order to explore new frontiers for their pharmacological importance.

#### Materials and Methods

##### Plant Material

The fresh roots of *S. arvensis* were collected from Nawabganj, District-Unnao, U. P. India. The plant was

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identified by Dr. Anand Prakash, Scientist, and Taxonomy Division. A voucher specimen (LMG-81469) was deposited in the herbarium of CSIR-National Botanical Research Institute, Lucknow, India.

#### Soxhlet extraction

The powdered root (500g) was extracted with 500 mL of petroleum ether (40-60°C) in Soxhlet for 10 h. The extract was cooled to room temperature and evaporated under reduced pressure at 40°C to afford (2.39 %) of the extract which was stored in dark bottle and kept at 4°C until analysis.

#### Formation of fatty acid methyl ester (FAME)

The crude extract (500 mg) in concentrated sulphuric acid (2 mL) and methanol (20 mL) was heated under reflux on a water bath for 3 h. It was cooled to room temperature and extracted with petroleum ether (3×20 mL) and water in a separating funnel. The petroleum ether extract was dried over Na<sub>2</sub>SO<sub>4</sub> and under reduced pressure at 40°C. Prepared fatty acid methyl ester (FAME) was stored for further analysis.

#### Gas Chromatography (GC)

Gas chromatography was accomplished with a Thermo Fisher TRACE GC ULTRA using a TR 50 MS column (30 m × 0.25 mm ID × 0.25 μm, film thickness); carrier gas, helium; temperature programming, 2 min. delay for solvent, at 50°C temperature rising at 2°C/min to 120°C and at 3°C/min. to 250°C and finally held isothermally for 15 min. The injector temperature was 230°C and carrier flow was constant flow 1 mL/min, in split mode (1:50) with injector volume 1 μL. The relative proportion of the sample constituents were percentages obtained (% area) by FID peak–area normalization without the use of response factor.

#### Gas Chromatography-Mass Spectrometry (GC-MS)

GC-MS analysis was performed with a Thermo Fisher TRACE GC ULTRA coupled with DSQ II Mass Spectrometer instrument using a TR 50MS column (30 m × 0.25 mm ID × 0.25 μm, film thickness); carrier gas, helium; temperature programming, 5 min. delay for solvent, at 50°C temperature, hold time 5.0 min, rising at 4°C/min to 250°C and finally held isothermally for 5 min. The injector temperature was 230°C and carrier flow was constant flow 1 mL/min, in split mode (1:50) with injector volume 1 μL. The ion source temperature was set at 220°C, transfer line temperature was 300°C and the ionization of the sample components

was performed in EI mode at an ionization voltage of 70eV. Mass range was used from m/z 50 to 650 amu.

#### Compound identification

Identification of individual compounds was made by comparison of their mass spectra with those of the internal reference mass spectra library (NIST/Wiley) or with authentic compounds<sup>13</sup>.

## Results and Discussion

#### Fatty acid analysis

The fatty acid composition of the root of *S. arvensis* is summarized in Table 1. Eighteen fatty acids were identified in the petroleum ether extract of its roots representing 83.19 %. The major fatty acids found were Myristic acid (26.23 %), Palmitic acid (26.23%), Linoleic acid (19.94%), Pentadecanoic acid (3.11%), Stearic acid (1.49%) and Behenic acid (1.27%). The most abundant fatty acid identified was Myristic acid (26.23%), as shown in Table 1. Myristic acid is a saturated fatty acid commonly found in animal and vegetable fats that is frequently used in cosmetics, soaps, perfumes and flavorings. It increases low

Table 1—Fatty acid composition in petroleum ether extract of *S. arvensis* root

S. No.	Fatty acid name	Percentage (%)
1.	Butanoic	0.41
2.	Hexanoic	0.48
3.	Heptanoic	0.02
4.	Caprylic	0.03
5.	Azelaic	0.17
6.	Myristic	26.23
7.	Pentadecanoic	3.11
8.	Palmitic	26.23
9.	Heptadecanoic	0.05
10.	Stearic	1.49
11.	Oleic	0.12
12.	11-Octadecanoic	0.15
13.	Linoleic	19.94
14.	10,12-Octadecadienoic	1.17
15.	Eicosanoic	0.63
16.	Behenic	1.27
17.	Erucic	0.79
18.	Tetracosanoic	0.90
	Others (unidentified)	16.81
	Fatty acid categories	
1.	Saturated fatty acid	61.02
2.	Monounsaturated fatty acid	1.06
3.	Polyunsaturated fatty acid	21.11

density lipoprotein cholesterol, making it one of the most hypercholesterolemic of the saturated fatty acids<sup>14</sup>. In addition, linoleic acid has also been known for its cholesterol lowering property<sup>15-16</sup>.

The saturated fatty acid (61.02 %), found in the petroleum ether extract includes: Eicosanoic acid, Lauric acid, Myristic acid, Palmitic acid, Stearic acid, Arachidic acid and Behenic acid. The monounsaturated fatty acids (1.06 %) includes Oleic acid (0.12 %), Erucic acid (0.79 %), 11-Octadecanoic acid (0.15 %) whereas polyunsaturated fatty acids (21.11%) includes Linoleic acid (19.94 %) and 10, 12-Octadecadienoic acid (1.17 %). Total unsaturated fatty acids constituted polyunsaturated fatty acid (21.11 %) and monounsaturated fatty acid (1.06%). The fatty acids can be used in various pharmaceutical products as they contain different bioactive constituents<sup>17</sup>.

### Conclusion

The present investigation reveals the newer source of oil and contains beneficial saturated and unsaturated fatty acid of significant value. Oil is rich in linoleic and linolenic acid content which is beneficial for lowering body cholesterol if taken on daily basis for dietary supplements. Beside this presence of palmitic, oleic and stearic acid increases the nutritional value and adds to the overall health benefits of oil. Oil and fatty acid values analyzed meet the set standards and are significant in terms of nutritional value and various pharmaceutical products.

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