RESEARCH PAPER

Nutraceutical Potential of Senna auriculata (L.) Roxb. Leaves and Flowers: A Comparative Study

Jenisha J[1], Irene Wilsy J[2], Reginald Appavoo M[3]

[1]Research Scholar (Reg No: 241131623002), Department of Botany and Research Centre, Scott Christian College (Autonomous), Nagercoil, Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India (Corresponding Author)

Email: jenijohn2003@gmail.com

[2]Associate Professor, Department of Botany and Research Centre, Scott Christian College (Autonomous), Nagercoil, Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

[3]Associate Professor & Head, Department of Botany and Research Centre, Scott Christian College (Autonomous), Nagercoil, Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

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ABSTRACT

Senna auriculata (L.) Roxb. is widely recognized for its medicinal significance. This study investigates the nutritional composition of its leaves and flowers through proximate and mineral analyses. Proximate analysis was conducted to determine moisture, ash, lipid, fiber, protein, carbohydrate, and energy content using standard AOAC methods, with the results expressed as percentages (%). Mineral analysis was performed to estimate the levels of calcium (Ca), zinc (Zn), iron (Fe), magnesium (Mg), and phosphorus (P). The concentrations of Ca, Zn, Fe, and Mg were measured using Atomic Absorption Spectroscopy (AAS), whereas phosphorus was determined by a colorimetric method following AOAC guidelines. The mineral contents were expressed in mg/g. The findings demonstrate that Senna auriculata is a rich source of essential nutrients, highlighting its potential as a functional food ingredient with promising nutraceutical applications.

Keywords: Senna auriculata, nutraceutical, proximate analysis, mineral composition

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INTRODUCTION

Nutraceuticals are natural bioactive compounds or chemical substances that provide health-promoting, disease-preventing, and therapeutic benefits in addition to their nutritional value. Herbal nutraceuticals are food products derived from plants and their various parts, including oils, roots, seeds, berries, and flowers, which contribute to the maintenance of health and well-being (Priya *et al.,* 2020) [1]. Numerous studies have demonstrated the potential of nutraceuticals in the prevention and management of several

diseases, including diabetes, atherosclerosis, cancer, neurological disorders, and cardiovascular diseases (Sachdeva *et al.,* 2020) [2].

Senna auriculata (L.) Roxb., commonly known as Avaram or Tanner's Cassia, is a medicinal plant extensively used in the traditional systems of Ayurvedic and Siddha medicine. It is also consumed as a traditional herbal beverage in many Asian countries and has long been valued in Indian traditional medicine for its nutritional and medicinal properties (Juan *et al.,* 2011) [3]. Proximate analysis, also referred to as conventional analysis, is a widely used method for evaluating the major nutritional constituents of food materials, such as protein, fat, carbohydrate, and ash, rather than determining individual nutrients like amino acids, fatty acids, or monosaccharides (Prohp *et al.,* 2006) [4].

Minerals are essential nutrients required for normal physiological functions and play an important role in preventing the development of various diseases. Many medicinal plants contain appreciable amounts of essential minerals, although their composition and concentration vary depending on the plant species, growth conditions, and phytochemical characteristics (Hought, 2007) [5]. The medicinal properties of plants are largely attributed to their diverse phytochemical constituents and elemental composition. Therefore, investigating the phytochemical profile, mineral elements, and vitamin content of medicinal plants is essential for evaluating their therapeutic and nutritional significance. In this context, the present study aims to assess the nutraceutical potential of *Senna auriculata* leaves and flowers through proximate and mineral analyses.

MATERIALS AND METHODS

Collection of Samples

Fresh leaves and flowers of *Senna auriculata* were collected from Nanguneri, Tirunelveli District, Tamil Nadu, India. The collected plant materials were washed thoroughly and shade-dried for approximately one month. The dried samples were pulverized using a mortar and pestle (Jenisha *et al.,* 2026) [6]. The powdered samples were stored in airtight containers for further analysis.

Proximate Analysis

Proximate analysis of *Senna auriculata* leaves and flowers was carried out to determine the moisture content, ash, crude lipid, crude fiber, crude protein, carbohydrate, and energy values using the methods described by Udo and Oguwele [7], James [8], and the Association of Official Analytical Chemists (AOAC) [9]. The proximate parameters were expressed as percentages (%), and all analyses were performed in triplicate.

Mineral Analysis

The mineral composition of *Senna auriculata* leaves and flowers, including calcium (Ca), zinc (Zn), iron (Fe), magnesium (Mg), and phosphorus (P), was determined using an Atomic Absorption Spectrophotometer (AAS) according to the AOAC [9] methods. Phosphorus was estimated by the colorimetric method.

Statistical Analysis

The data were analyzed using SPSS version 20.0. The results were expressed as

Mean ± SD (standard deviation) of three replicate determinations.

RESULTS AND DISCUSSION

Proximate Analysis

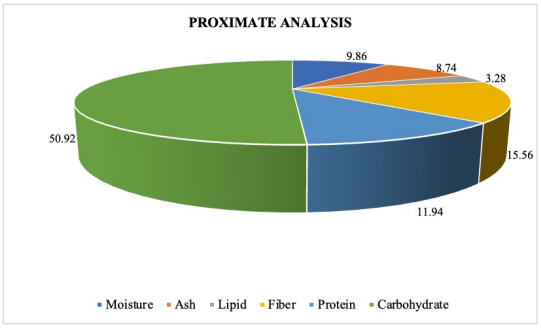
The proximate analysis of *Senna auriculata* leaves and flowers revealed quantitative differences, as shown in **Table 1** and **Figure 1**.

Table 1: Proximate Analysis of *Senna auriculata*

S. No.	Parameters	Leaves (%)	Flowers (%)
1	Moisture	9.86 ± 0.23	11.28 ± 0.15
2	Ash content	8.74 ± 0.18	6.96 ± 0.16
3	Crude lipid	3.28 ± 0.19	2.66 ± 0.09
4	Crude fiber	15.56 ± 0.28	12.48 ± 0.26
5	Crude protein	11.94 ± 0.25	9.84 ± 0.18
6	Carbohydrates	50.92 ± 0.66	56.82 ± 0.72
7	Energy values (Kcal/100 g)	284.46 ± 1.72	301.24 ± 2.04

Note: Values are presented as mean ± SD

Figure 1: Proximate Analysis of *Senna auriculata*



The proximate composition data showed the nutritional differences between *Senna auriculata* leaves and flowers. Moisture content was low in both leaves (9.86 ± 0.23%) and flowers (11.28 ± 0.15%), indicating good shelf stability. Leaves contained higher ash content (8.74 ± 0.18%) than flowers (6.96 ± 0.16%) indicating a higher mineral content. Crude lipid content was low in both samples, with slightly higher values in leaves (3.28 ± 0.19%) compared to flowers (2.66 ± 0.09%). Leaves showed higher crude fiber (15.56 ± 0.28%) and protein content (11.94 ± 0.25%) than flowers (12.48 ± 0.26% and 9.84 ± 0.18%), indicating their nutritional value. Carbohydrates formed the major component, with higher content in flowers (56.82 ± 0.72%) than leaves (50.92 ± 0.66%), which resulted in higher energy values in the flowers (301.24 ± 2.04 Kcal/100 g) compared to leaves (284.46 ± 1.72 Kcal/100 g).

Mineral Composition

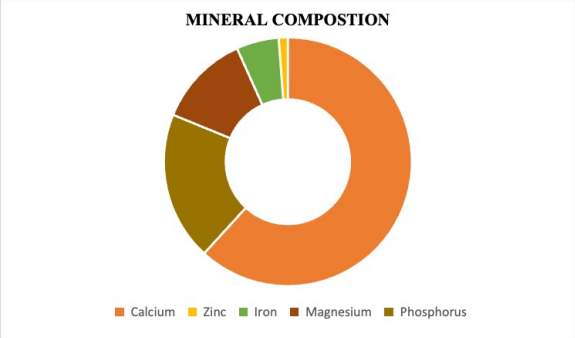
The mineral composition of *Senna auriculata* leaves and flowers was analyzed, and the results are shown in **Table 2** and **Figure 2.**

Table 2: Mineral Composition of *Senna auriculata*

S. NO.	MINERAL COMPONENTS	LEAVES (mg/g)	FLOWERS (mg/g)
1	Calcium	21.86 ± 0.34	17.28 ± 0.27
2	Zinc	0.46 ± 0.04	0.37 ± 0.03
3	Iron	1.98 ± 0.08	1.46 ± 0.06
4	Magnesium	4.26 ± 0.18	3.64 ± 0.13
5	Phosphorus	6.85 ± 0.23	5.93 ± 0.17

Note: Values are presented as mean ± SD

Figure 2: Mineral Composition of *Senna auriculata*



The mineral analysis revealed that *Senna auriculata* leaves are a rich source of essential minerals. Calcium was the predominant mineral, with a significantly higher concentration in the leaves (21.86 ± 0.34 mg/g) than in the flowers (17.28 ± 0.27 mg/g). Similarly, the iron content was higher in the leaves (1.98 ± 0.08 mg/g) compared to the flowers (1.46 ± 0.06 mg/g). Magnesium (4.26 ± 0.18 mg/g) and phosphorus (6.85 ± 0.23 mg/g) were also found in relatively high concentrations in the leaves, whereas the flowers contained lower amounts of these minerals. Zinc was detected in trace quantities in both plant parts, with the leaves (0.46 ± 0.04 mg/g) showing slightly higher levels than the flowers (0.37 ± 0.03 mg/g).

The overall results demonstrate that *S. auriculata* leaves are rich in protein, fiber, and essential minerals, whereas flowers contribute higher carbohydrate and energy content, serving as energy-rich dietary component. Differences between leaves and flowers were statistically significant at **$p < 0.05$**.

The Nutrient composition analysis of *Senna auriculata* flowers indicates the presence of calcium, phosphorous, iron and vitamin C. The presence of minerals in *Senna auriculata* flowers could be utilized as valuable and healthy ingredient of food (Suja and Ambiga, 2021) [10]. Calcium plays a vital role in the normal regulation of blood pressure, muscle activities and skeletal development. Iron could also be valuable in cellular activity, transport of oxygen, prevents anemia, improving immune system and preventing malnutritional diseases (Muhammad *et al.,* 2019) [11].

The various parts of the plant, including the flowers, leaves, bark, roots, and seeds, contain considerable amounts of essential nutrients such as carbohydrates, proteins, lipids, crude fibre, and total soluble sugars, as well as smaller quantities of minerals, including calcium, zinc, sodium, magnesium, copper, iron, and vitamins (Pathumi, 2020) [12].

CONCLUSION

The present study confirms the nutraceutical potential of *Senna auriculata*, demonstrating that the leaves are rich in protein, fibre, and essential minerals, while the flowers contain higher levels of carbohydrates and provide greater energy value. These findings suggest that both the leaves and flowers can be effectively utilized in the development of nutraceuticals and functional food products.

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