



Therapeutic Prospects and Bioactive Constituents of *Syzygium laetum* from the Southern Western Ghats Biodiversity Hotspot

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Abstract

Syzygium is one of the larger generic groups in the Myrtaceae family. Phytochemicals from the *Syzygium* genus have attracted the interest of humans for centuries due to their multifaceted applications. The plants have a diverse range of biological activities. including, antioxidant, antihypoglycemic, anticarcinogenic, anti-inflammatory, antifungal, antibacterial, antiviral, cardioprotective, antidiarrhoeal, diuretic, hypothermic, and antihypertensive properties. The *Syzygium laetum* is an endemic tree of the family Myrtaceae, growing in the Western Ghats, especially in evergreen forests. There have been no reports on the pharmacological potential of *S. laetum*. The purpose of this study was to search into the possible benefits of *S. laetum* leaves and bark. The pharmacological characterization of the plants uncovers the possible medicinal properties of *S. laetum*. Methanol extract of *S. laetum* leaves and bark contain a high concentration of total phenolics and flavonoids. Methanol and distilled water extracts of the leaves and bark have higher antioxidant capacity than chloroform and ethyl acetate extracts. Alpha-amylase and alpha-glucosidase enzyme inhibition activity were found to be significant in the anti-diabetic study. The results of the physicochemical studies on *S. laetum* are extremely crucial in assessing the freshness and quality of the crude drug. The methanol extracts of the plant confirmed that both the leaves and bark have substantial antioxidant and anti-diabetic properties. Phytochemical analysis reveals the existence of several pharmacologically active bioactive compounds, such as alkaloids, tannins, glycosides, phenolics, carbohydrates, essential oil, reducing sugar, and saponins, and that might be responsible for its bioactivity. *S. laetum*, leaves, and bark demonstrate a broad spectrum of activity throughout all bioactivities evaluated.

Keywords: Antidiabetic, Antioxidant, Fluorescence analysis, Physicochemical, Powder microscopy, *Syzygium laetum*.

Introduction

Traditional medicines have always depended solely on the medicinal plants. The plants belonging to the genus *Syzygium* has received much attention since ancient times due to its multidimensional uses for mankind. These plants generally reported to contain a wide array of phytomolecules with a broad spectrum of biological activities including antihypoglycemic, antioxidant, anti-inflammatory, anticarcinogenic, and antihypertensive

properties. Organic products, whether pure compounds or standardized plant extracts offer unlimited possibilities for drug development. *Syzygium laetum* (Buch. - Ham.) widely distributed in the Western Ghats and Evergreen Forests Myrtaceae is a pantropical tree and shrub family with nearly 55000 species divided into two subfamilies, 17 tribes, and 142 genera. *Syzygium* is a well-known genus that has a massive effect on the

rainforest ecosystem. The Western Ghats are home to 27 endemic *Syzygium* species, including *S. laetum*. In traditional medicine, various parts of the plant have already been classified as having a variety of therapeutic properties [1].

The plants have white color bark smooth; blaze brown. Leaves simple, opposite, decussate, Inflorescence in terminal or axillary divaricate cymes or solitary. Fruits are Berry, ovoid, 2.5 - 3 cm long, crowned with persistent calyx. In the last few years there has been an exponential growth in the field of herbal medicine, and these drugs are gaining popularity in both developing and developed countries because of their natural origin and lesser side effects. *Syzygium cumini* (syn. *Eugenia jambolana*, *Syzygium jambolana*, *Syzygium cumini*, *Syzygium jambos*), commonly known as jamun in India, is an evergreen tree distributed throughout the Indian subcontinent, Southeast Asia and East Africa. It is mainly utilised as a fruit producer and for its timber. Medicinally, the fruit is reported to have antidiabetic, antihyperlipidaemic, antioxidant, antiulcer, hepatoprotective, antiallergic, antiarthritic, antimicrobial, anti-inflammatory, antifertility, antipyretic, antiplaque, radioprotective, neuropsychopharmacological, nephroprotective and antidiarrhoeal activities. The plants belonging to the genus *Syzygium* has received much attention since ancient times due to its multidimensional uses for mankind. These plants in general, reported to contain a wide array of phytomolecules with a broad spectrum of biological activities that include antihypoglycemic, antioxidant, anti-inflammatory, anticarcinogenic, and antihypertensive properties.

December-July is the flowering and fruiting seasons. To the best of our knowledge, no work has been carried out on the phytochemical analysis and antimicrobial activity of barks extracts of *S. laetum*

Medicinal plants are considered a local heritage with global importance due to their traditional uses and advantages that led to the discovery of synthetic drugs. Active compounds are in the form of secondary metabolites determine the bio-efficacy of the medicinal plants. The systematic screening to discover new bioactive compounds is a routine activity in many laboratories.

Secondary metabolites include alkaloids, polyphenolic compounds such as terpenes,

flavonoids, and glycosides that are responsible for plants medicinal properties. Plants are the major source of bioactive compounds used in the innovation of several active pharmaceutical ingredients [2].

Several *Syzygium* species have previously been studied for their antioxidant, antibacterial, antifungal, anticarcinogenic, analgesic, anti-inflammatory, anti-hypoglycemic, antiviral, cardioprotective, anti-diarrhoeal, diuretic, hypothermic, and antihypertensive properties.

Consequently, the following studies were done to examine the plant's pharmacological and biological activities and to determine its advantages.

Material and Methods

Plant sample collection and authentication

S. laetum leaves and bark were collected from the Nelliampathy area in the Nemmara forest division in Palakkad, Kerala, India. Dr. P. Sujanalal, Scientist, Silviculture Department, Kerala Forest Research Institute, Peechi, Thrissur, and Dr. A.K. Pradeep, Assistant Professor, Department of Botany, University of Calicut, identified and authenticated the samples. Collected samples were dried in the shelter and finely ground independently. The voucher specimen was cataloged as accession number 7055 in the Calicut University Herbarium, Department of Botany.

Pharmacognostic studies

Powder microscopy

Standard procedures were used to examine the cell structure and behavioral patterns of leaf and bark powders of *S. laetum* [3].

Fluorescence analysis

Acetone, acetonitrile, methanol, and distilled water were used to treat the leaf and bark powders of *S. laetum* [4].

Physicochemical studies

Physicochemical were analyzed on powders of *S. laetum* leaves and bark [5, 6].

Phytochemical studies

Extraction of plant samples

Leaves and bark powder (20 g) were wrapped in filter paper and placed in a Soxhlet device (Rotek).

The extraction was continued for 24 hours for each solvent at 60-100°C with chloroform, ethyl acetate, methanol, and distilled water. A rotary evaporator (LabTech EV311 Plus) was used to evaporate the solvents, after extraction. Extracts were stored for further studies at 4°C in a refrigerator.

Qualitative phytochemical studies

The standard procedures were used to perform qualitative phytochemical analyses on the extracts [7, 8].

Quantitative phytochemical studies

The total alkaloids, flavonoids, tannin, phenolics, glycosides, saponins, reducing sugar, and total carbohydrates were quantified from the leaves and bark of *S. laetum* by conventional techniques [9-11].

***In vitro* antioxidant studies**

DPPH radical scavenging assay

Various amount of the sample has been introduced to 0.375 ml of DPPH (2, 2-diphenyl-1-picrylhydrazyl) solution in methanol. With the appropriate solvents (chloroform, ethyl acetate, methanol, and distilled water), the volume was increased to 2 ml. The reaction mixture has been kept in the dark for 20 minutes before reading the absorbance at 517 nm [12].

Superoxide radical scavenging assay

The plant extracts were added in varying concentrations to a reaction mixture including, 0.1 M EDTA (Ethylenediaminetetraacetic acid), 0.3 mM NaCN, 0.12 mM riboflavin, 1.5 mM NBT (Nitroblue tetrazolium), and 0.067 M phosphate buffer in a total volume of 3 ml. For 15 minutes, an incandescent lamp has been used to consistently illuminate the tubes, as well as the optical density at 560 absorbance, was determined before and after illumination. [13].

Hydroxyl radical scavenging activity

The reaction mixture was prepared by mixing EDTA (100 µM), deoxy-2-ribose (2800 µM), phosphate buffer (100 µM, pH 7.4), ferric chloride (100 µM), ascorbic acid (100 µM), hydrogen peroxide (100 µM), and different concentrations of the sample (2-12 µl), finally made up to 1 ml. At 37°C, the reaction mixture has been incubated for 1 hour. This is followed by the addition of, 1.5 ml of

acetic acid (20 %, pH 3.5), 0.2 ml of sodium dodecyl sulfate (SDS, 8.1%), and 1.5 ml of TBA (Tertiary butyl alcohol, 0.8 %) to the 0.4 ml of the reaction mixture. After proper mixing, this reaction mixture was incubated at 100°C for one hour, and the emergence of TBARs (Thiobarbituric acid reactive substances) was analyzed at 532 nm [12].

Ferric reducing antioxidant power assay

900 µl FRAP (Ferric reducing antioxidant power) reagent (25ml 300 mmol/l acetate buffer, pH 3.6; 2.5 ml 10 mmol/l TPTZ (2,4,6-tripyridyl-s-triazine) in 40 mmo/l HCl and 2.5 ml 20 mmol/l FeCl₃.6H₂O solutions), was mixed with different doses of plant extracts and making up to 1 ml with distilled water. For 20 minutes, the reaction system was incubated at 37°C. Distilled water has been used as a blank and the maximum absorption wavelength was 595 nm [13].

***In vitro* antidiabetic studies**

Alpha-glucosidase inhibitory assay

1 mg of the α -glucosidase enzyme (from *Saccharomyces cerevisiae*) was dissolved in 100 ml of neutral phosphate-buffered saline buffer containing 200 mg of bovine serum albumin. The reaction mixture (10 µl of pH 6.8 phosphate buffer; 490 µl of 5 mM p-nitrophenyl- α -d glucopyranoside (p-NPG)) has been mixed with different concentrations (20, 40, 60, 80, and 100 µg/ml) of methanol extract of *S. laetum* leaves and bark. The reaction mixture was incubated at 37°C for 5 minutes before adding 250 µl of α -glucosidase (0.15 unit/ml) and incubating for another 15 minutes at 37°C. After allowing the reaction mixture to cool, 2 ml of sodium carbonate (200 mM) was added to cease the reaction. At 405 nm, the inhibition of the enzyme was evaluated. As a standard reference compound, acarbose has been used [14].

Alpha-amylase inhibitory assay

The starch solution was prepared with 1 % phosphate buffer and followed by incubation for 10 minutes at 37°C with a 500 µl enzyme (α -amylase). 1 ml of each of the concentrations (20, 40, 60, 80, and 100 µg/ml) from methanol extract of *S. laetum* leaves and bark was mixed with the solution containing enzyme. The reaction is then curtailed by the addition of 2 M of NaOH. 1 ml of dinitro

salicylic acid is combined, and the reaction is kept in a hot water bath for 5 minutes. Following incubation, test tubes have been allowed to cool with tap water, and the solution was diluted to 10 ml with distilled water. At 540 nm wavelength was used to determine absorbance. Acarbose was employed as the control [15].

Result and Discussion

Preliminary phytochemical screening, physicochemical analysis, and pharmacological benefits of *S. cumini* were reported by many researchers and stated that *Syzygium* has the significant therapeutic potential [16].

However, no reports on the phytoconstituent evaluation and pharmacognostic efficacy of *S. laetum*, which is endemic to the Western Ghats, have been found in the literature. As a consequence, this is the first study on this plant, and it uncovers the pharmacological prospects of *S. laetum*.

Powder analysis

Powder microscopic analysis exhibited the purity of *S. laetum* leaves and bark, which can be used for future drug development. Powder analysis is crucial in identifying crude drugs. This is among the simplest and easiest methods for finding the proper authenticity of the samples. This will aid in the identification of the correct variety as well as the search for adulterants. Powder analysis is helpful for the therapeutic and pharmacological evaluation of plant samples. The current study, reported the presence of stone cells from petiole, stomata on epidermal cells, vessels and fibers, starch grains, and crystals of calcium oxalate. In bark, pitted parenchyma cells, fiber tracheids, stone cells, starch grains, and crystals were present (Fig. 1-2).

Fluorescence analysis

Fluorescence is a property of many chemical components found in plants. Natural chemicals such as alkaloids do not glow in the sunlight; however, they emit fluorescence when exposed to ultraviolet light. If the chemicals are not fluorescent, certain reagents are being used to transform them into fluorescent derivative products. Thus, a variety of crude drugs are commonly assessed qualitatively, which is an

important pharmacognostic indicator [16]. The fluorescent analysis of plant powder is critical for determining the quality, freshness, and purity of the drug [17].

The fluorescent properties of *S. laetum* leaves and bark have been investigated, and color changes have been observed under visible and ultraviolet light. Table 1 displays the results. The fluorescence studies of leaf and bark powder of *S. laetum* exhibited brownish red and dark brown color in 254 nm UV light respectively, black and bluish-black (366 nm UV light) color when these are exposed to acetone. Under visible light, the greenish-black color was emitted when it was treated with methanol. Different colors were noticed under various lighting conditions, including greenish-black, bluish-black, black yellow, and dark green.

Physicochemical studies

This is a useful criterion for assessing the quality of the drug, and any modifications may make a significant difference in the extractive values. As a result, it aids in the verification of adulterated drugs. *S. laetum* had a higher nutritional value in the current study. Similar results were reported by other species *Syzygium* [18]. The combined action of phytochemicals may increase antioxidant capacity through a variety of mechanisms. Phenolic compounds are excellent antioxidants because they are strong donors of hydrogen and are the largest phytocompounds that are distributed widely in medicinal plants [19].

In the current investigation, the phenolic content of the *S. laetum* leaves and bark were 93.3 and 79 µg/mg gallic acid equivalent respectively. The findings indicate that *S. laetum* has a significant phenolic content, which could explain its antioxidant activity. Alkaloids have heterocyclic nitrogen atoms that play a vital role in plant defense and longevity [20]. Alkaloids have been observed in methanol and distilled water extracts of *S. laetum* leaves and bark. Saponins are high molecular weight secondary metabolites found in plants. Saponins were discovered in *S. laetum* leaf and bark aqueous extracts (Table 2).

Phytochemical studies

When compared to other solvent extracts, methanol and distilled water extracts of *S. laetum* leaves and bark bring about an increased percentage of yields (Table 3). The extractive values were found to be

increased according to the polarity of the solvent used.

Qualitative analysis

The common phytoconstituents reported in this investigation include alkaloids, tannins, glycosides, phenolics, carbohydrates, essential oil, reducing sugar, and saponins. Methanolic and distilled water extracts of *S. laetum* leaves and bark encompasses more bioactive components than chloroform and ethyl acetate extracts (Table 4).

Quantitative analysis

Methanolic extracts of *S. laetum* leaves contain 126.31 µg/mg (gallic acid equivalent) alkaloid, 178 µg/mg flavonoids, 265.21 µg/mg glycosides and 187.4 µg/mg tannin. The bark of *S. laetum* has 129 mg/g of total carbohydrates. The study plant species exhibited prominent bioactive potency due to the presence of these bioactive constituents (Table 5).

The prevalent curative use of *S. cumini* in ethnomedicinal necessitates chemical testing to identify the role of active principles in various plant parts. Antianaemic, gingivitis, antidiarrheal, antipyretic, antibacterial, antineoplastic, anti-inflammatory, hypoglycemic, gastroprotective, and hypolipidemic properties have been reported for phytochemicals such as maleic acid, oxalic acid, gallic acid, tannins, cyanidin glycoside, oleanolic acid, flavonoids, essential oils, betulinic acid, and friedelin. The current study also gives a solution for using traditional plants in drug development. Similar reports are found in *Syzygium aqueum* [21].

Antioxidant activity

Antioxidant activity is considered very powerful when the IC₅₀ value is less than 50 µg/ml, strong when the IC₅₀ value is between 50 and 100 µg/ml, moderate when the IC₅₀ value is between 101 and 250 µg/ml, poor when the IC₅₀ value is between 250 and 500 µg/ml, and inactive when the IC₅₀ value is greater than 500 µg/ml [22]. Methanol can solubilize polar organic components such as phenolics and flavonoids in plants. Antioxidant studies in the present study exhibit prominent results due to the higher concentrations of flavonoids or phenolics in methanol extracts of leaves and bark of *S. laetum*. The bioactive compounds in the *S. laetum* depict a positive correlation to antioxidant activities of methanol extracts, which is reported previously in other species of *Syzygium* [23].

S. laetum exhibits scavenging properties towards DPPH, hydroxyl, and superoxide radicals. The prominent results were obtained from the ferric reducing antioxidant power assay. The methanol extract of both the leaves and bark of *S. laetum* demonstrated scavenging activity in the range of 1-5 µg/ml, which is dose-dependent. Because of the notable inhibition of methanol extracts of *S. laetum* leaves and bark, it was used for more such biological activities rather than other solvents (Table 6).

In comparison to chloroform, ethyl acetate, and distilled water extracts, methanolic extracts of both leaves and bark of *S. laetum* exhibited remarkable findings in the superoxide radical scavenging assay, hydroxyl radical scavenging activity, and ferric reducing antioxidant power assay (Fig. 3-6). The IC₅₀ value of the methanolic extract of leaves in DPPH, Superoxide radical scavenging assay, Hydroxyl radical scavenging activity, and Ferric reducing antioxidant power assay was found to be 1.6 ± 0.070 , 82 ± 1.369 , 1.975 ± 0.1060 , and 1.477 ± 0.041 µg/ml respectively and in bark 2.2 ± 0.1414 , 85 ± 4.24 , 1.35 ± 0.0707 and 2.305 ± 0.134 µg/ml respectively.

Total antioxidant activity and total phenolic content were found to have a positive relationship. Plants with antioxidant and anti-diabetic properties have higher levels of polyphenols [24]. The antioxidant properties of *Syzygium* species may be attributed to antioxidant vitamins, phenolics, tannins, and anthocyanin compounds found in plant parts. The findings of this study support the use of *S. laetum* leaves and bark extracts as a natural antioxidant and support the ethnobotanical strategy in the search for new drugs and pharmacological substances.

Anti-diabetic studies

A considerable effect was recorded in both the leaves and bark of *S. laetum* in alpha-amylase and alpha-glucosidase inhibitory assays (Table 7 and 8). The percentage of inhibition increased with the increase of solvents utilized. Thus, the plant has notable anti-diabetic properties. The leaves and bark of the study plant demonstrated 83.33 ± 0.14 and 85.77 ± 0.23 percentage of inhibition, respectively in the alpha-amylase inhibitory evaluation. In the alpha-glucosidase inhibitory studies, it was found to be 84.45 ± 0.35 and 86.71 ± 0.28 inhibition percentages in the leaves and bark of *S. laetum* respectively. Bark shows higher antidiabetic activity.

S. cumini leaves inhibited alpha-amylase significantly in a dose-dependent manner [25, 26]. In the current investigation, similar outcomes were observed in the pharmacological properties of *S. palghatense* [27]. In the present investigation,

significant results of the physicochemical, pharmacological, antioxidant, and antidiabetic potentiality of the plant are due to the presence of various bioactive compounds found in the leaves and bark of *S. laetum*

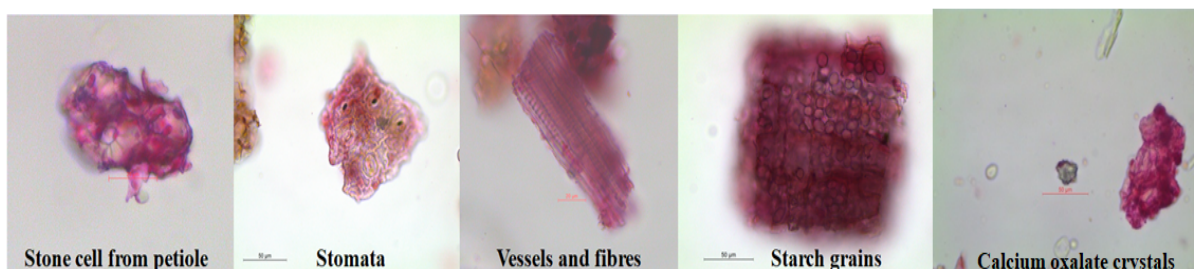


Figure 1: Powder analysis of *Syzygium laetum* leaves



Figure 2: Powder analysis of *Syzygium laetum* bark

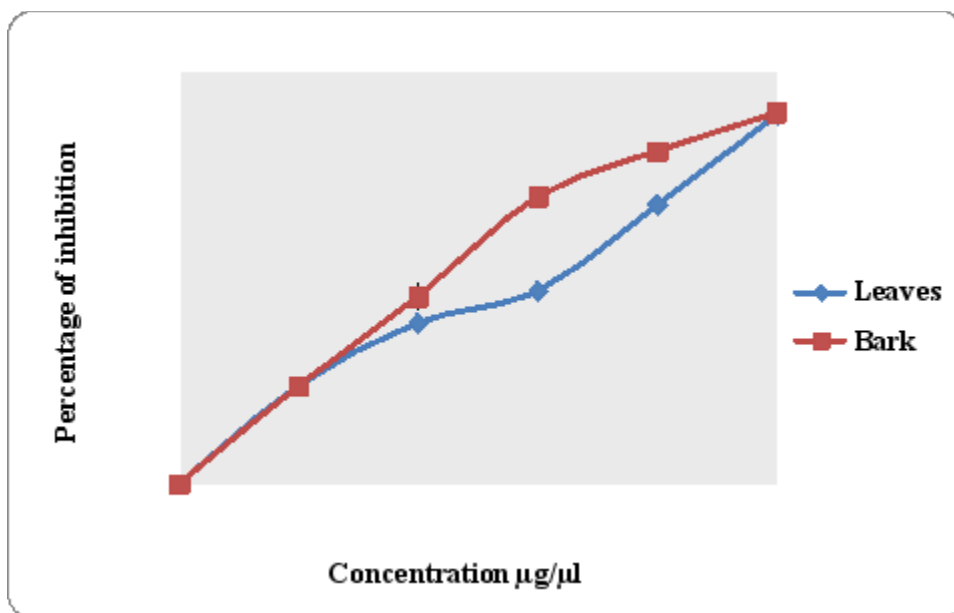


Figure 3: DPPH radical reducing activities of *Syzygium laetum* leaves and bark. Error bars represent the standard error of observed data.

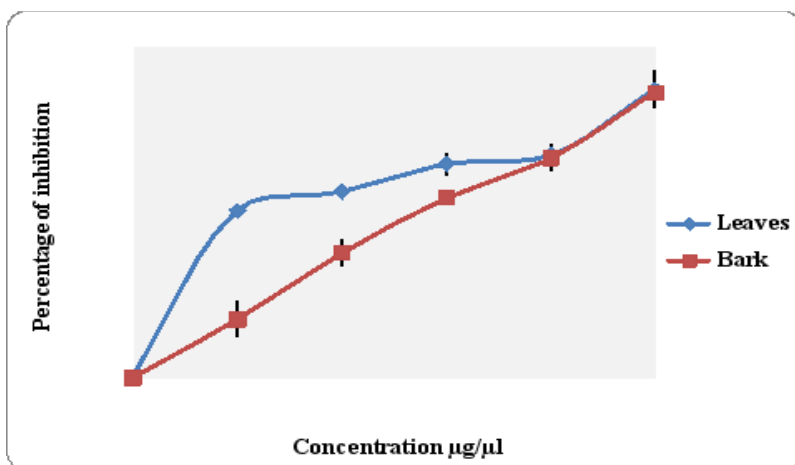


Figure 4: Inhibition of superoxide radicals-riboflavin photoreduction method of *Syzygium laetum* leaves and barks. Error bars represent the standard error of observed data.

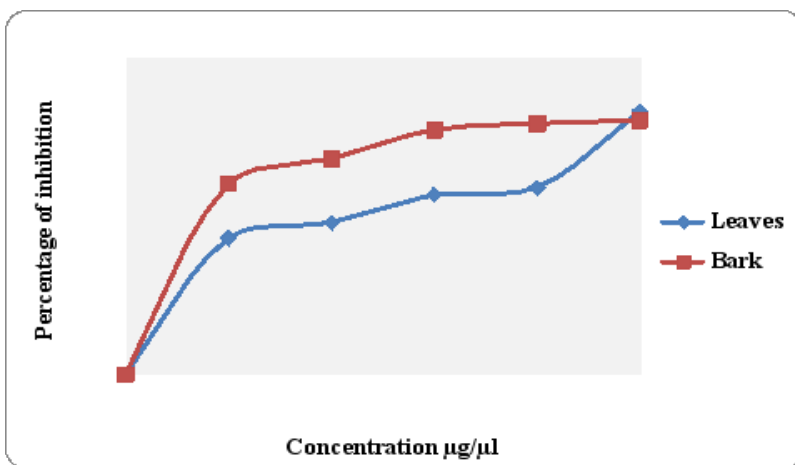


Figure 5: Hydroxyl radical scavenging activities of *Syzygium laetum* leaves and bark. Error bars represent the standard error of observed data.

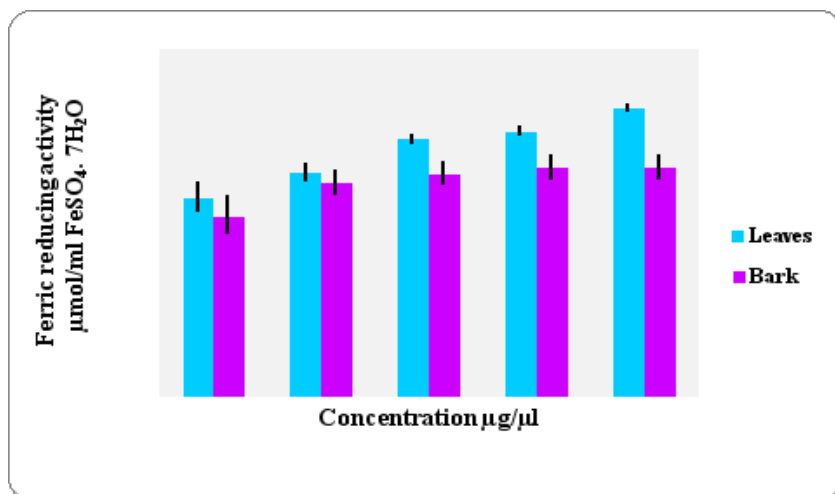


Figure 6: Ferric reducing antioxidant power activities of *Syzygium laetum* leaves and bark. Error bars represent the standard error of observed data.

Table 1: Fluorescence analysis of powdered leaves and bark of *Syzygium laetum*

Plant powder treated with,	Visible light		254 nm UV light		366 nm UV light	
	Leaves	Bark	Leaves	Bark	Leaves	Bark
Acetone	Reddish green	Dark green	Brownish red	Dark brown	Black	Bluish black
Acetonitrile	Green	Dark green	Dark green	Dark	Dark blue	Dark blue
Methanol	Greenish black	Greenish black	Black green	Black	Blackish blue	Blackish blue
Distilled water	Dark green	Green	Black	Black yellow	Bluish black	Black

Table 2: Nutritional composition of *Syzygium laetum* leaves and bark

Parameters	<i>S. laetum</i>	
	Leaves	Bark
Total ash	5.64%	4.48 %
Water-soluble ash	2.67 %	2.25 %
Acid insoluble ash	0.68 %	0.54 %
Sulphated ash	4.84 %	3.89 %
Water soluble extract	28.56 %	26.78 %
Alcohol soluble extract	23.89 %	22.48 %
Petroleum ether extract	9.03 %	8.45 %
Ethyl acetate soluble extract	11.82 %	11.45 %
Crude fiber	13.55 %	12.24 %
Vitamin A	Not detected	Not detected
Vitamin C	6.28 %	Not detected
Calcium	2.30 %	2.45 %
Potassium	0.53 %	0.68 %
Sodium	0.17 %	0.28 %
Copper	4.33 mg/kg	5.21 mg/kg
Zinc	11.35 mg/kg	11.86 mg/kg
Manganese	18.10 mg/kg	18.35 mg/kg

Table 3: Yield percentage of different extracts of *Syzygium laetum* leaves and bark

Solvents	Plant material (g)	Color		Dried extract (g)	Extractive value (%)
		Leaves	Bark		
Chloroform	20	Yellowish green	Pale brown	0.13	0.65
Ethyl acetate	20	Green	Yellow	0.15	0.75
Methanol	20	Black green	Yellow-brown	3.88	19.4
Distilled water	20	Dark green	Blackish brown	3.91	19.55

Table 4: List of secondary metabolites detected in *Syzygium laetum* leaves and bark

Secondary metabolites	Solvent extracts							
	Chloroform		Ethyl acetate		Methanol		Distilled water	
	SLL	SLB	SLL	SLB	SLL	SLB	SLL	SLB
Essential oil	+	+	+	+	+	+	+	+
Fatty oil	-	-	-	-	-	-	-	-
Amino acids	-	-	-	-	-	-	-	-
Proteins	-	-	-	-	-	-	-	-
Alkaloids	-	-	-	-	+	+	+	+
Phenolics	-	-	-	-	+	+	+	+
Flavonoids	-	-	-	-	+	+	+	+
Tannin	-	-	-	-	+	+	+	+
Glycoside	-	-	-	-	+	+	+	+
Anthraquinone	-	-	-	-	-	-	-	-
Steroids	-	-	-	-	-	-	-	-
Coumarin	-	-	-	-	-	-	-	-
Starch	-	-	-	-	-	-	-	-
Reducing sugar	-	-	-	-	+	+	+	+
Carbohydrate	-	-	-	-	+	+	+	+
Saponins	-	-	-	-	-	-	+	+

(SLL- *Syzygium laetum* leaves; SLB- *Syzygium laetum* bark; +: Present; -: Absent)

Table 5: Quantitative screening of secondary metabolites of leaves and bark of *Syzygium laetum*

Secondary metabolites	Leaves (µg/mg gallic acid equivalent)		Bark (µg/mg gallic acid equivalent)	
	Methanol	Distilled water	Methanol	Distilled water
Alkaloids	126.31 µg/mg	77.2 µg/mg	48 µg/mg	157.5 µg/mg
Phenol	93.3 µg/mg	92.5 µg/mg	79 µg/mg	78.4 µg/mg
Flavonoids	178 µg/mg	138.25 µg/mg	130.66 µg/mg	59.14 µg/mg
Tannin	187.4 µg/mg	235 µg/mg	178.4 µg/mg	129 µg/mg
Glycosides	265.21 µg/mg	254.10 µg/mg	138.43 µg/mg	129 µg/mg
Reducing sugar	1.8 mg/g		3.67 mg/g	
Total carbohydrate	71.33 mg/g		129 mg/g	
Saponin		165.12 µg/mg		38.18 µg/mg

Table 6. DPPH radical reducing activity of *Syzygium laetum*

Extracts	DPPH (IC ₅₀) µg/ml	
	<i>S. laetum</i> leaves	<i>S. laetum</i> bark
Chloroform	No activity	No activity
Ethyl acetate	39 ± 1.414	13 ± 1.4
Distilled water	31.5 ± 0.707	10.25 ± 0.35
Methanol	1.6 ± 0.070	2.2 ± 0.1414

(IC₅₀, Inhibitory concentration at 50%; Values are mean ± Standard deviation (SD))

Table 7: Alpha-amylase inhibitory activities of *S. laetum* leaves and bark

Concentration (µg/ml)	Percentage of inhibition (%)	
	Leaves	Bark
62.5	15.35 ± 0.98	19.17 ± 0.85
125	33.52 ± 0.56	38.88 ± 0.65
250	43.27 ± 0.48	44.88 ± 0.50
500	75.73 ± 0.33	77.13 ± 0.28
1000	83.33 ± 0.14	85.77 ± 0.23

(All data are expressed as mean ± Standard deviation-SD)

Table 8: Alpha-glucosidase inhibitory activities of *Syzygium laetum* leaves and bark

Concentration (µg/ml)	Percentage of inhibition (%)	
	Leaves	Bark
62.5	17.86 ± 0.81	18.18 ± 0.79
125	39.91 ± 0.73	41.94 ± 0.69
250	49.56 ± 0.62	56.06 ± 0.55
500	64.66 ± 0.54	77.57 ± 0.49
1000	84.45 ± 0.35	86.71 ± 0.28

(All data are expressed as mean ± Standard deviation-SD)

Conclusion

This study describes for the first time the physicochemical studies, powder studies, fluorescence analysis, antioxidant and antidiabetic efficacy of *S. laetum* leaves and bark. According to the findings, methanolic extract of *S. laetum* leaves and bark has significant biological potential. Bark exhibits prominent antidiabetic activities. Phytochemical studies have revealed the occurrence of numerous biologically active metabolites, including alkaloids, tannins, glycosides, phenolics, carbohydrates, essential oil, reducing sugar, and saponins, that may be responsible for the plant's biological activities. The present investigation uncovers the various benefits of this traditional medicinal plant *S. laetum*, which depicts an effective pharmacological potential. This is the first report unraveling pharmacological features of *S. laetum* endemic to the Western Ghats.

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