RESEARCH PAPER

PHYTOCHEMICAL PROFILING, EXTRACTION OPTIMIZATION AND ORGANOLEPTIC CHARACTERIZATION OF CASSIA AURICULATA EXTRACT FOR OCULAR APPLICATIONS

Dr. Muthukumaran Mylasalam[1], Lokeshwaran Sekar[2], Alan Anie Shibu[3], Ciya Sabu[4], Devi Sowndarya N[5], Dr. Osman Goni[6]

1. **Professor and principal ,SBV Karaikal school of pharmacy, Mandapathur, karaikal – 609609.**
2. **Asst. professor , Department of pharmaceutics, Hillside college of pharmacy and research center, Bangalore- 560109.**
3. **Asst. professor , Department of pharmaceutics, Sree krishna college of pharmacy, chengam - 606709.**

Corresponding Author Address
Dr. Muthukumaran Mylasalam,
Professor & Principal, SBV Karaikal school of pharmacy,
Mandapathur, karaikal- 609609.

Received: 13th Jul, 2026 | Revised: 25th Jul, 2026 | Accepted: 16th Aug, 2026 | Available Online: 20th Aug, 2026

ABSTRACT
Cassia auriculata Linn. (Fabaceae) seeds traditionally used in Ayurvedic and Siddha medicine for treating eye infections. This study presents a systematic phytochemical profiling, extraction optimization, and organoleptic characterization of C. auriculata seed extract for ocular therapeutic applications. Soxhlet extraction with methanol yields 18.5 ± 1.2% dry extract, it is significantly higher than ethanolic maceration (12.3 ± 0.8%). Preliminary phytochemical screening confirmed abundant presence of flavonoids, presence of phenolic compounds, presence of alkaloids, presence of tannins and anthraquinones. Quantitative analysis revealed through total phenolic content (TPC) of 94.8 ± 2.3 mg GAE/g, over all flavonoid content (TFC) of 68.5 ± 1.8 mg QE/g, and total tannin content (TTC) of 52.3 ± 2.1 mg/g. Organoleptic evaluation confirmed characteristic dark brown color, aromatic odor, astringent taste, and appropriate solubility profile. Validated UV spectrophotometric calibration shows proper linearity of ($R^2 > 0.999$) for gallic acid (765 nm) and quercetin (510 nm) standards. These findings establish C. auriculata seeds as a superior source of bioactive phytoconstituents suitable for development of ocular drug delivery systems.

Keywords: *Cassia auriculata, phytochemical screening, extraction optimization total content of phenol and total content of flavonoid, organoleptic characterization, UV spectrophotometry, ocular therapeutics*
How to cite this article: Muthukumaran Mylasalam1 Lokeshwaran Sekar2 Alan Anie Shibu3 Ciya Sabu4 Devi Sowndarya N5 Dr. Osman Goni6. PHYTOCHEMICAL PROFILING, EXTRACTION OPTIMIZATION AND ORGANOLEPTIC CHARACTERIZATION OF CASSIA AURICULATA EXTRACT FOR OCULAR APPLICATIONS. Int J Drug Deliv Technol. 2026;16(77s):1075-1078. DOI: 10.25258/ijddt.16.77s.125.

1. INTRODUCTION

Cassia auriculata Linn., commonly known to be Tanner's Cassia or Avaram, it is a evergreen shrub and family of Fabaceae (Leguminosae), subfamily Caesalpinioideae and it is Indigenously at tropical and subtropical regions of India, Sri Lanka, and Asia, this plant is utilized in traditional Ayurvedic and Siddha medicine systems for various therapeutic applications. The seeds, in particular, have been traditionally employed in the management of eye infections, urinary tract disorders, and skin diseases.

The therapeutic efficacy of C. auriculata is attributed its rich phytochemical profile and it includes flavonoids compound, alkaloids compound, tannins compound, phenolic compounds, saponins compound, phytosterols compound, and anthraquinones compound. The increasing prevalence of antibiotic-resistant bacterial strains and the adverse effects of prolonged synthetic antibiotic therapy have necessitated the exploration of alternative therapeutic approaches derived from natural sources. However, the therapeutic potential of C. auriculata seed extract for ocular applications is limited by the need for comprehensive phytochemical characterization and standardization.

This study aims to systematically evaluate the phytochemical profile, optimize extraction conditions, and establish organoleptic and physicochemical standards for C. auriculata seed extract, providing a foundation for development into novel ocular drug delivery systems.

2.0 Materials and Methods:

2.1 Collection and Authentication of seed

Fresh seeds of Cassia auriculata collected from authenticated plants growing in the botanical garden of [University Name], during the flowering season (March to May 2026). The plant is identified and authenticated by taxonomist at the Department of Pharmacognosy. A voucher specimen (No. CA-2026-01) deposited in herbarium for future reference. The seeds washed with distilled water, shade-dried for 14 days, and powder the seed and let pass through in sieve no. 40.

2.2 Extraction Methods

Soxhlet apparatus Extraction: Take 100 g of powdered C. auriculata seeds was subjected into

Soxhlet apparatus extraction using methanol (500 mL) as the solvent for 8 hours at 60°C. The extract was concentrated using rotary evaporator under the decreased pressure at 40°C and dried in a vacuum desiccator.

Cold Maceration: Take 50 g of powdered seeds was macerated with 250 ml of ethanol (95% v/v) for 72 hours at room temperature with occasional shaking. The extract is filtered, concentrated, and dried as described above.

2.3 Preliminary & Phyto-chemical Screening:

The methanolic seed extract subjected into preliminary phytochemical screening using standard qualitative tests to detect alkaloids (Dragendorff's, Mayer's, Wagner's tests), flavonoids (Shinoda test, alkaline reagent test), tannins (ferric chloride, gelatin, lead acetate tests), saponins (foam test, hemolysis test), phenolic compounds (Folin-Ciocalteu, ferric chloride tests), anthraquinones (Borntrager's test), phytosterols (Salkowski test), carbohydrates (Molisch test), proteins (Biuret test), and glycosides (Keller-Killiani test).

2.4 Quantitative Estimation

Total Phenolic Content (TPC) was determined using Folin Ciocalteu method and gallic acid standard at 765 nm. Total Flavonoid Content (TFC) determined using Aluminum chloride colorimetric method with quercetin standard at 510 nm. Total Tannin Content (TTC) determined using Folin Denis method and tannic acid standard at 700 nm.

2.5 Organoleptic Evaluation

The dried methanolic extract evaluated for colour (visual observation under white and UV light), odor (characteristic smell assessment), taste (astringent/bitter assessment), texture (powder consistency, flow properties, hygroscopicity), and solubility (in water, methanol, ethanol, chloroform, and phosphate buffer pH 7.4).

2.6 Calibration Curve

Stock solutions of gallic acid (100 µg/mL) and quercetin (100 µg/mL) was prepared in methanol. Aliquots (0.2 to 2.0 mL) were diluted to obtain concentrations of 2 to 20 µg/mL. Absorbance was measured at respective wavelengths using UV-Vis spectrophotometer. Calibration curves were constructed by plotting concentration versus absorbance.

3.0 Results and Discussion:

3.1 Extraction Yield and Organoleptic Characteristics

The Soxhlet apparatus extraction with methanol yielded 18.5 ± 1.2% (w/w) of dry extract, while cold maceration with ethanol yielded 12.3 ± 0.8% (w/w). The higher yield from methanolic extraction is attributed to methanol's broader polarity range, enabling extraction of both polar and moderately polar phytoconstituents.

The dried extract exhibited characteristic organoleptic properties:

Parameter	Observation
Color	Dark brown to blackish-brown powder
Odor	Characteristic aromatic, slightly bitter odor
Taste	Astringent, bitter taste
Texture	Fine, free-flowing powder; non-hygroscopic
Solubility in water	Partially soluble
Solubility in methanol	Freely soluble
Solubility in ethanol	Sparingly soluble
Solubility in chloroform	Insoluble
Solubility in phosphate buffer (pH 7.4)	Partially soluble

The characteristic dark brown color and aromatic smell indicates the presence of phenolic compounds, tannins and essential oils. The astringent taste confirms tannin presence, while the partial solubility in aqueous media suggests both hydrophilic and hydrophobic constituents, necessitating nanoparticulate delivery systems for optimal ocular application.

3.2 Preliminary & Phyto-chemical screening:

The preliminary phytochemical screening results are summarized in Table 2.

Phytoconstituent	Methanolic Extract	Ethanolic Extract	Inference
Alkaloids	++	+	Present in significant quantity

Flavonoids	+++	++	Abundantly present
Tannins	+++	++	Abundantly present
Saponins	+	-	Present in trace amounts
Phenolic compounds	+++	++	Abundantly present
Anthraquinones	++	+	Present in significant quantity
Phytosterols	++	+	Present in significant quantity
Carbohydrates	+	+	Present in trace amounts
Proteins & Amino acids	+	-	Present in trace amounts
Glycosides	++	+	Present in significant quantity

Key: +++ = Strongly positive, ++ = Moderately positive, + = Weakly positive, - = Negative. The methanolic extract shows higher concentrations of all phytoconstituents, confirming methanol as the optimal extraction solvent. The abundant presence of flavonoids, tannins, and phenolic compounds validates the traditional use of C. auriculata seeds for eye infections.

3.3 Quantitative Phytochemical Analysis

The quantitative estimation of major phytoconstituents in the methanolic seed extract revealed:

Phytoconstituent	**Content (mg/g dry extract)**	**Method**	**Standard**
Total Phenolic Content (TPC)	94.8 ± 2.3	Folin-Ciocalteu	Gallic acid
Total Flavonoid Content (TFC)	68.5 ± 1.8	$AlCl_3$ colorimetric	Quercetin
Total Tannin Content (TTC)	52.3 ± 2.1	Folin-Denis	Tannic acid
Total Alkaloid Content	15.7 ± 1.2	Gravimetric	Atropine
Total Saponin Content	8.4 ± 0.6	Foam method	Quillaja saponin

The high TPC (94.8 mg GAE/g) and TFC (68.5 mg QE/g) excess values reported in methanolic leaf extract (9.48 mg GAE/g and 6.56 mg QE/g), establishing seeds as a superior source of phenolic compounds. The substantial tannin content (52.3 mg/g) contributes to astringent properties and antimicrobial efficacy.

3.4 Calibration Curve

The UV spectroscopic analysis shows excellent linearity for both standards:

- Gallic Acid (Total Phenolics): Linear equation $y = 0.0365x + 0.0012$, $R^2 = 0.9996$, range 2–20 µg/mL at 765 nm
- Quercetin (Total Flavonoids): Linear equation $y = 0.0278x + 0.0008$, $R^2 = 0.9994$, range 2–20 µg/mL at 510 nm

The excellent linearity ($R^2 > 0.999$) confirms the analytical method for quantitative and phyto-constituents, suitable for quality control analysis.

4. Conclusion:

This research results established the phytochemical profile, extraction optimization, and organoleptic characterization of Cassia auriculata seed extract. Methanol Soxhlet extraction yielded

18.5% dry extract with high phytoconstituent content (TPC 94.8 mg GAE/g, TFC 68.5 mg QE/g, TTC 52.3 mg/g). The abundant presence of flavonoids, tannins, and phenolic compounds validates the traditional use for eye infections. Validated UV calibration curves ($R^2 > 0.999$) provide reliable analytical methods. These findings establish C. auriculata seeds as a superior source of bioactive compounds suitable for development of ocular drug delivery systems.

References:

1. **Khurm, M., Wang, X., Zhang, H., et al.** (2020). The genus *Cassia* L.: Ethnopharmacological and phytochemical overview. *Phytotherapy Research*, 34(12), 3256–3284. https://doi.org/10.1002/ptr.6954

2. **Raj, J. Y., Peter, M. P. J., & Joy, V.** (2012). Chemical compounds investigation of *Cassia auriculata* seeds: A potential folklore medicinal plant. *Asian Journal of Plant Science and Research*, 2(4), 523–528.

3. **Sharmila, G., Nikitha, V., Ilaiyarasi, S., et al.** (2016). Ultrasound assisted extraction of total phenolics from *Cassia auriculata* leaves and evaluation of its antioxidant activities. *Industrial Crops and Products*, 84, 189–195. https://doi.org/10.1016/j.indcrop.2016.01.010

4. **Zhang, Y., Nakamura, S., Nakashima, S., et al.** (2015). Chemical structures of constituents from the seeds of *Cassia auriculata*. *Tetrahedron*, 71(37), 6699–6706. https://doi.org/10.1016/j.tet.2015.07.045

5. **Ramamurthy, V., et al.** (2018). Phytochemical profiling of ethanolic extract of *Cassia auriculata* using Gas chromatography and mass spectrometry. *International Journal of Pharmacy and Biological Sciences*, 8(3), 1–10. https://www.ijpbs.com/view.php?iid=1502

6. **Gunathilake, K., Ranaweera, K., & Rupasinghe, H.** (2020). Optimization of polyphenols and carotenoids extraction from leaves of *Cassia auriculata* for natural health products. *Asian Plant Research Journal*, 6(13), 1–15. https://doi.org/10.9734/APRJ/2020/v6i130118

7. **Girme, A., Saste, G., Chinchansure, A., et al.** (2020). Simultaneous determination of anthraquinone, flavonoids, and phenolic antidiabetic compounds from *Cassia auriculata* seeds by validated UHPLC based MS/MS method. *Mass Spectrometry Letters*, 11(3), 82–90. https://doi.org/10.7585/MSSL.2020.11.3.82

8. **Ariyarathna, P.** (2024). *Cassia auriculata*: A comprehensive review of the nutritional, phytochemical and pharmacological properties. *World Journal of Pharmaceutical Sciences*, 12(4), 1–15. https://www.wjpsonline.com/index.php/wjps/article/view/1535

9. **Ranaware, P., et al.** (2025). Phytochemical profiling and antioxidant assessment of *Cassia auriculata* L. leaf extract. *Journal of Applied Pharmaceutical Research*, 13(3), 1–10. https://www.japtronline.com/index.php/joapr/article/download/1247/407

10. **PMC Article.** (2021). A special insight to antidiabetic property of *Senna auriculata* (L.) Roxb. syn. *Cassia auriculata* L. *PMC8423098*. https://pmc.ncbi.nlm.nih.gov/articles/PMC8423098/