



PHYTOCHEMICAL ANALYSIS OF SEEDS OF *CAJANUS SCARABAEOIDES*: A WILD EDIBLE PLANT FROM GADCHIROLI

Biswas S. K.*¹, Manchalwar A. K.², Halami R. R.³

¹Assistant Professor Department of Chemistry, Rajee Dharmarao College of Science, Aheri. (M.S.), India.

²Assistant Professor Department of Botany, Rajee Dharmarao College of Science, Aheri. (M.S.), India.

³Assistant Professor Department of Botany, Rajee Dharmarao College of Science, Aheri. (M.S.), India.



*Corresponding Author: Biswas S. K.

Assistant Professor Department of Chemistry, Rajee Dharmarao College of Science, Aheri. (M.S.), India.

DOI: <https://doi.org/10.5281/zenodo.18439253>

How to cite this Article: Biswas S. K.*¹, Manchalwar A. K.², Halami R. R.³. (2026). PHYTOCHEMICAL ANALYSIS OF SEEDS OF *CAJANUS SCARABAEOIDES*: A WILD EDIBLE PLANT FROM GADCHIROLI. World Journal of Pharmaceutical and Life Science, 12(1), 44–48.

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Article Received on 17/12/2025

Article Revised on 07/01/2026

Article Published on 01/02/2026

ABSTRACT

Cajanus scarabaeoides (L.) Thouars belongs to the family Fabaceae. The fresh and raw seeds of this nutritious and palatable wild vegetable are traditionally consumed by the tribal communities of Gadchiroli district, Maharashtra, throughout the year. The present study aims to determine the bioactive chemical constituents of the seeds of this wild edible plant. Phytochemical screening of the methanolic, aqueous, and petroleum ether extracts revealed the presence of phenols, saponins, flavonoids, proteins, diterpenes, tannins, alkaloids, phytosterols, and carbohydrates.

KEYWORDS: *Cajanus scarabaeoides* (L.) Thouars, Fabaceae, phytochemical screening, bioactive compounds, wild edible plant, tribal food resource, Gadchiroli district.

INTRODUCTION

Mother Nature has always served as the greatest provider of humanity's dietary needs. In ancient times, hunter-gatherer communities primarily relied on fruits and easily available vegetables from their immediate surroundings. Despite the advancement of civilization, the domestication of animals, and the development of agriculture, a considerable portion of rural populations continues to depend on wild plant species for sustenance. Tribal communities, in particular, have traditionally utilized the rich natural resources available in nearby forests to supplement their diets.

The Australian Aboriginal people, for example, believe that certain wild seasonal plants promote good health and provide protection against diseases, especially during the rainy season when infections are more prevalent. These wild vegetables are not only nutrient-dense and palatable but also economically valuable, as their collection and sale provide temporary employment opportunities for local communities. Thus, wild plants constitute an

essential component of the diet of indigenous populations residing in remote forested regions.^[1]

According to the Food and Agriculture Organization (FAO), rural populations often consume wild foods regularly, not merely during times of food scarcity. The frequent inclusion of wild edibles in the diet contributes significantly to improving the overall nutritional status of tribal communities. Compared to many commonly cultivated vegetables, traditional leafy plants often possess higher levels of nutrients and antioxidants, which play a protective role against cardiovascular diseases, cancers, and other chronic ailments. Moreover, these traditional vegetables have the potential to address nutritional deficiencies and support the dietary requirements of the growing global population.

The primary objective of the present study is to determine the presence of various phytochemical constituents in the seeds of selected wild edible plants from the Gadchiroli district, Maharashtra. These plants are traditionally used by tribal communities to enhance

vitality and stamina, and their phytochemical characterization may provide scientific validation for their ethnobotanical significance.

MATERIALS AND METHODOLOGY

Plant material

The present study focused on the wild legume *Cajanus scarabaeoides* (L.) Thouars (Fabaceae). Seeds were collected from naturally growing plants in the forests of Khamancheru village, near Aheri Tahsil, Gadchiroli district (M.S.). The species was identified and authenticated at the Department of Botany, Raje Dharmarao College of Science, Aheri.

Cajanus scarabaeoides, locally known as **Junglee tur**, is a perennial twining herb commonly found in forest margins, hedges, and open fields during the post-rainy and winter seasons. The plant has slender, pubescent stems with trifoliate leaves bearing ovate to lanceolate leaflets. Its yellow flowers with reddish streaks are typical of the Fabaceae family, and the pods are hairy, enclosing several small brown to black seeds. These seeds are traditionally consumed by tribal communities as a seasonal food source.

Table 1: General information of *Cajanus scarabaeoides* (L.) du-Petit-Thouars.

Botanical name	Family	Local name	Habit	Habitat	Parts used
<i>Cajanus scarabaeoides</i> (L.) Thouars	Fabaceae	Junglee tur	Twining herb (climber)	Forest areas (winter season)	Seeds



Fig. 1: *Cajanus scarabaeoides* (L.) Thouars .

Chemicals

Distilled water, ethanol, methanol, Fehling's solution A and B, aqueous hydrochloric acid (HCl), chloroform, concentrated sulphuric acid (H₂SO₄), ammonia solution, hexane, and picric acid were used for the phytochemical analysis.

Collection of sample

Seeds of the wild edible plant *Cajanus scarabaeoides* were collected locally from the forests of Gadchiroli district (M.S.), specifically from Khamancheru village near Aheri Tahsil. The plant was taxonomically identified and authenticated at the Department of Botany, Raje Dharmarao College of Science, Aheri. The collected seeds were used for subsequent phytochemical analysis.

Preparation of plant extract

The collected seeds were thoroughly cleaned under running water to remove dust and impurities. The seeds were shade-dried for several days, ground into a fine powder, and stored in clean, airtight polyethylene containers under dry conditions until further use. For

extraction, a known quantity of seed powder was mixed with the appropriate solvent (methanol, distilled water, or petroleum ether) until fully saturated. The mixture was allowed to stand for 48–72 hours with occasional shaking. It was then filtered through Whatman No. 1 filter paper, and the resulting extracts were used for phytochemical analysis.

Phytochemical tests

The seeds of *Cajanus scarabaeoides* (L.) Thouars were subjected to preliminary phytochemical screening to detect the presence of bioactive chemical constituents. Standard qualitative tests were performed on extracts prepared in different solvents, including water, ethanol, methanol, petroleum ether, and acetone. These procedures were carried out following established protocols to confirm the presence or absence of major phytoconstituents.

Alkaloids test

The extract was dissolved in dilute hydrochloric acid and filtered. The filtrate was then subjected to the following tests:

a) Mayer's test: The filtrate was treated with Mayer's reagent (potassium mercuric iodide solution). The formation of a yellowish-white precipitate indicated the presence of alkaloids.

b) Dragendorff's test: The filtrate was treated with Dragendorff's reagent (potassium bismuth iodide solution). The appearance of an orange-red precipitate confirmed the presence of alkaloids.

Carbohydrate tests

The extract was mixed with 5 mL of distilled water and filtered. The filtrate was then subjected to the following tests for carbohydrates:

a) Molisch's test: Two drops of alcoholic α -naphthol solution were added to the filtrate in a test tube. A violet ring at the junction of the two liquids indicated the presence of carbohydrates.

b) Benedict's test: The filtrate was treated with Benedict's reagent and heated moderately. The formation of an orange or red precipitate indicated the presence of reducing sugars.

c) Fehling's test: The filtrate was mixed with Fehling's solutions A and B in equal proportions and heated. The formation of a red precipitate confirmed the presence of reducing sugars.

Glycoside tests

The extract was hydrolyzed with dilute hydrochloric acid (HCl) and then tested for the presence of glycosides.

a) Legal's test: The hydrolyzed extract was treated with sodium nitroprusside in pyridine, followed by sodium hydroxide. The development of a pink to blood-red coloration indicated the presence of cardiac glycosides.

Saponin test

a) Froth test: About 0.5 g of the extract was shaken vigorously with 2 mL of distilled water. The formation of a stable, persistent foam lasting for at least 10 minutes indicated the presence of saponins.

Phytosterol tests

a) Salkowski's test: The extract was dissolved in chloroform and filtered. The filtrate was treated with concentrated sulphuric acid, shaken gently, and allowed to stand. The development of a reddish color indicated the presence of triterpenes and sterols.

b) Libermann-Burchard's test: The extract was dissolved in chloroform, boiled, and cooled. A few drops of acetic anhydride were added, followed by concentrated sulphuric acid along the side of the test tube. The formation of a brown ring at the junction confirmed the presence of phytosterols.

Phenol test

a) Ferric chloride test: The extract was treated with 3–4 drops of ferric chloride solution. The appearance of a bluish-black coloration indicated the presence of phenolic compounds.

Tannin tests

a) Ferric chloride test: About 0.5 g of the extract was mixed with 2 mL of distilled water and 5–6 drops of 5% ferric chloride solution. The development of a dark green coloration indicated the presence of condensed tannins, while a dark blue coloration indicated hydrolysable tannins.

b) Lead acetate test: About 0.5 g of the extract was mixed with 2 mL of distilled water and treated with 10% lead acetate solution. The formation of a white precipitate confirmed the presence of tannins.

Flavonoid tests

a) Alkaline reagent test: The extract was treated with a few drops of sodium hydroxide solution. The development of a bright yellow color, which became colorless upon the addition of dilute acid, indicated the presence of flavonoids.

b) Lead acetate test: The extract was treated with a few drops of lead acetate solution. The formation of a yellow precipitate confirmed the presence of flavonoids.

Protein test

a) Xanthoproteic test: The extract was treated with a few drops of concentrated nitric acid. The development of a yellow coloration indicated the presence of proteins.

Diterpene test

a) Copper acetate test: The extract was dissolved in water and treated with 3–4 drops of copper acetate solution. The appearance of an emerald-green coloration indicated the presence of diterpenes.

Table 1: Phytochemical analysis of *Cajanus scarabaeoides* (L.) Thouars in different solvent extracts.

Sr. No.	Phytochemical test	Distilled water extract	Methanol extract	Petroleum ether extract
1. Alkaloids	a) Mayer's test	+	–	+
	b) Dragendorff's test	+	–	+
2. Carbohydrates	a) Molisch's test	+	+	–
	b) Benedict's test	+	+	–
3. Glycosides	a) Legal's test	–	–	–

4. Saponins	a) Froth test	+	-	-
	b) Foam test	+	-	-
5. Phytosterols	a) Salkowski's test	-	-	-
	b) Libermann-Burchard's test	-	-	-
6. Phenols	a) Ferric chloride test	-	+	+
7. Tannins	a) Ferric chloride test	+ (dark blue)	+ (dark blue)	-
	b) Lead acetate test	+	+	-
8. Flavonoids	a) Alkaline reagent test	-	+	+
	b) Lead acetate test	-	+	+
9. Proteins/Amino acids	a) Xanthoproteic test	+	+	-
10. Diterpenes	a) Copper acetate test	+	++	+

Note: + = Present; - = Absent; (++) = Moderate presence; (+++) = High presence.

RESULTS

This study confirmed the presence of several phytochemicals in the seeds of *Cajanus scarabaeoides* (*L.*) *Thouars*.

In the methanol extract, carbohydrates, phenols, tannins, flavonoids, and proteins/amino acids were observed, while diterpenes were present in moderate amounts. Glycosides, phytosterols, saponins, and alkaloids were not detected.

In the petroleum ether extract, phenols, flavonoids, alkaloids, and diterpenes were present, while carbohydrates, glycosides, saponins, tannins, proteins, and phytosterols were absent.

In the aqueous (distilled water) extract, alkaloids, saponins, carbohydrates, tannins, diterpenes, and proteins were present, whereas phenols, flavonoids, glycosides, and phytosterols were absent.

These results show that different solvents extract different groups of phytochemicals from the seeds. Many of these compounds are known for their therapeutic importance. For example, dietary flavonoids are reported to reduce the risk of coronary heart disease, while alkaloids are used in medicine for their analgesic and antipretic properties.^[6,7]

DISCUSSION

The seeds of *Cajanus scarabaeoides* were found to contain several important phytochemicals, including carbohydrates, phenols, tannins, flavonoids, proteins, diterpenes, and alkaloids, while glycosides and phytosterols were absent in all extracts.

Methanol extract showed the richest profile of compounds, while petroleum ether extract had the least. This variation reflects the role of solvent polarity in extracting different groups of phytochemicals.

The presence of flavonoids and phenols is significant since these compounds are known for their antioxidant and protective health benefits. Alkaloids, also detected in some extracts, are widely recognized for their medicinal value. These results support the traditional use of *C. scarabaeoides* seeds as a wild food among tribal

communities and suggest that the plant may have potential nutritional and therapeutic applications.

CONCLUSION

Medicinal plants are valuable sources of secondary metabolites such as tannins, saponins, phenols, alkaloids, flavonoids, proteins, diterpenes, and carbohydrates. These compounds are linked to a wide range of biological activities, including antioxidant, anti-inflammatory, antibacterial, and anticancer effects.

The present study showed that the seeds of *Cajanus scarabaeoides* contain several of these important phytochemicals, especially in the methanol extract. These findings support the traditional use of this wild edible plant among tribal communities and suggest its potential as both a nutritional resource and a source of therapeutic agents. Further detailed studies may help in exploring its role in developing novel plant-based medicines.

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