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Qualitative Phytochemical Screening of *Citrullus colocynthis* (L.) Schrad. and *Diplocyclos palmatus* (L.) C. Jeffre

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Abstract:

Medicinal plants are an important source of naturally occurring phytochemicals that contribute to their therapeutic properties. The present study was undertaken to investigate the qualitative phytochemical constituents of *Citrullus colocynthis* (L.) Schrad. and *Diplocyclos palmatus* (L.) C. Jeffrey using petroleum ether, chloroform, and methanol extracts. Preliminary phytochemical screening was performed using standard qualitative chemical tests for alkaloids, flavonoids, phenolic compounds, tannins, saponins, diterpenes, triterpenoids, glycosides, steroids, and anthraquinones. The results demonstrated the presence of several classes of secondary metabolites in both investigated plants, with variation according to the extraction solvent. In *C. colocynthis*, alkaloids, flavonoids, tannins, diterpenes, triterpenoids, glycosides, and steroids were detected in the three extracts, whereas phenolic compounds and saponins were detected mainly in chloroform and methanol extracts. Anthraquinones were not detected. In *D. palmatus*, chloroform and methanol extracts showed a comparatively broad phytochemical profile containing alkaloids, flavonoids, tannins, saponins, diterpenes, triterpenoids, glycosides, and steroids. Phenolic compounds were detected in the methanol extract, while the petroleum ether extract showed tannins, triterpenoids, glycosides, and steroids. Anthraquinones were absent from all extracts of both plants. The findings demonstrate solvent-dependent extraction of diverse phytoconstituents and provide preliminary evidence supporting further chromatographic and quantitative investigation of these medicinal plants.

Keywords: *Citrullus colocynthis*; *Diplocyclos palmatus*; phytochemical screening; secondary metabolites; qualitative analysis; medicinal plants

Introduction:

Medicinal plants have historically served as important sources of therapeutic agents and continue to provide a wide range of chemically diverse natural products. Preliminary phytochemical screening is an important initial step in pharmacognostic and phytochemical investigations because it provides information about the major classes

of secondary metabolites present in plant extracts.

Citrullus colocynthis (L.) Schrad., commonly known as colocynth or bitter apple, belongs to the family Cucurbitaceae. Its phytochemical composition includes cucurbitacins and their glycosides, flavonoids, phenolic compounds, alkaloids, steroids, and other constituents.

Cucurbitacins represent an important group of highly oxygenated tetracyclic triterpenoids reported from this species (Al-Snafi, 2016; Gur et al., 2023).

Diplocyclos palmatus (L.) C. Jeffrey is another medicinal member of the Cucurbitaceae family and is traditionally known as Shivlingi. Different parts of the plant have been investigated for their phytochemical and pharmacological properties. Reported constituents include triterpenoids, phenolic acids, flavonoids, steroids, glycosides, fatty acids, and cucurbitacins. Previous studies have also demonstrated solvent-dependent differences in the distribution of phytoconstituents (Bano & Singh, 2016; Misra et al., 2017).

The present investigation was therefore designed to qualitatively examine the phytochemical constituents of *C. colocynthis* and *D. palmatus* in petroleum ether, chloroform, and methanol extracts and to compare the phytochemical profiles obtained using different solvents.

Materials and Methods

Collection and Preparation of Plant Material

The plant materials of *Citrullus colocynthis* and *Diplocyclos palmatus* were collected and authenticated prior to phytochemical investigation. The collected plant materials were appropriately cleaned to remove adhering soil and foreign matter and subsequently dried under suitable conditions. The dried materials were powdered and stored in airtight containers until extraction.

Preparation of Extracts

The powdered plant materials were subjected to extraction using petroleum

ether, chloroform, and methanol. The extracts obtained with different solvents were separately filtered and concentrated. The concentrated extracts were preserved appropriately and used for preliminary qualitative phytochemical investigation.

Qualitative Phytochemical Examination

The extracts were subjected to qualitative chemical tests for the detection of different classes of phytoconstituents. The tests were selected according to standard pharmacognostic and phytochemical procedures described in the literature, including methods attributed to Finar, Farnsworth, Harborne, Raman, and Wagner and Bladt.

The investigated phytochemical groups included alkaloids, carbohydrates, glycosides, phytosterols/steroids, phenolic compounds, proteins, tannins, flavonoids, amino acids, saponins, gum and mucilage, fixed oils and fats, diterpenes, triterpenoids, cardiac glycosides, and anthraquinones.

Tests Applied for Phytochemical Screening

For the present results, the major phytochemical groups reported in the supplied experimental table were alkaloids, flavonoids, phenols, tannins, saponins, diterpenes, triterpenoids, glycosides, steroids, and anthraquinones.

Results

Qualitative Phytochemical Screening

The qualitative phytochemical screening demonstrated variation in the distribution of secondary metabolites between the two plant species and among the different solvent extracts.

Table 1. Qualitative phytochemical screening of *Citrullus colocynthis* and *Diplocyclos palmatus*

Phytochemical	Test	CCPE	CCCH	CCME	DPPE	DPCH	DPME
Alkaloids	Dragendorff's	+	+	+	–	+	+
	Mayer's	+	+	+	–	+	+
	Hager's	+	+	+	–	+	+
Flavonoids	Lead acetate	+	+	+	–	+	+
	Ferric chloride	+	+	+	–	+	+
	NaOH	+	+	+	–	+	+
Phenols	Ferric chloride	–	+	+	–	–	+
	Lead acetate	–	+	+	–	–	+
Tannins	Gelatin	+	+	+	+	+	+
Saponins	Froth test	–	–	+	–	+	+
	Foam test	–	–	+	–	+	+
Diterpenes	Copper acetate	+	+	+	–	+	+
Triterpenoids	Liebermann's	+	+	+	+	+	+
Glycosides/ Cardiac glycosides	Liebermann- type test	+	+	+	+	+	+
	Keller–Killiani	+	+	+	+	+	+
Steroids	Steroid test	+	+	+	+	+	+
Anthraquinones	Anthraquinone test	–	–	–	–	–	–

The petroleum ether, chloroform, and methanol extracts of *C. colocynthis* was mentioned as CCPE, CCCH, CCME respectively.

The petroleum ether, chloroform, and methanol extracts of *Diplocyclos palmatus* was mentioned as DPPE, DPCH and DPME respectively.

Note: (+) = detected; (–) = not detected. The table reproduces the qualitative observations supplied in the original dataset.

Phytochemical Profile of *Citrullus colocynthis*

The petroleum ether, chloroform, and methanol extracts of *C. colocynthis* demonstrated the presence of alkaloids, flavonoids, tannins, diterpenes, triterpenoids, glycosides, and steroids. Phenolic compounds were detected in the

chloroform and methanol extracts, while saponins were detected only in the methanolic extract. Anthraquinones were not detected in any of the investigated extracts.

The broad distribution of triterpenoid-related constituents is consistent with the established phytochemistry of *C. colocynthis*, in which cucurbitacins and their glycosides represent characteristic constituents. ([PubMed Central \(PMC\)](#))

Phytochemical Profile of *Diplocyclos palmatus*

The chloroform and methanol extracts of *D. palmatus* exhibited a comparatively broad phytochemical profile. These extracts contained alkaloids, flavonoids, tannins, saponins, diterpenes, triterpenoids, glycosides, and steroids. Phenolic compounds were detected in the methanol

extract but were not detected in the petroleum ether or chloroform extracts.

The petroleum ether extract showed tannins, triterpenoids, glycosides, and steroids, while alkaloids, flavonoids, phenols, saponins, and diterpenes were not detected in this fraction. Anthraquinones were absent from all three extracts.

The present observations are broadly compatible with previous investigations reporting solvent-dependent phytochemical distribution in *D. palmatus*. Methanolic and more polar extracts have been reported to contain substantial phenolic and flavonoid constituents, while triterpenoids/cucurbitacins are also important chemical constituents of the plant. ([IJSDR](#))

Discussion

The preliminary phytochemical investigation revealed considerable chemical diversity in both *C. colocynthis* and *D. palmatus*. The results also demonstrated that the solvent used for extraction influenced the qualitative detection of phytoconstituents.

In *C. colocynthis*, alkaloids and flavonoids were detected in petroleum ether, chloroform, and methanol extracts, while phenolic compounds and saponins showed a more restricted distribution. The detection of triterpenoids and steroids in all three extracts is particularly relevant because *C. colocynthis* is known to contain cucurbitacins, which are structurally related tetracyclic triterpenoids. ([PubMed Central \(PMC\)](#))

The phytochemical profile of *D. palmatus* showed a greater representation of several secondary metabolite classes in the chloroform and methanol extracts. The methanol extract showed alkaloids, flavonoids, phenolic compounds, tannins, saponins, diterpenes, triterpenoids,

glycosides, and steroids. Previous research has similarly demonstrated the presence of phenolic acids and flavonoids in *D. palmatus*, with gallic acid, caffeic acid, and protocatechuic acid reported from aerial-part extracts. ([Phcogj](#))

The detection of triterpenoids in *D. palmatus* is also of particular interest because cucurbitacins have been isolated and investigated from this species. Optimized extraction studies have specifically demonstrated the occurrence of cucurbitacin I and cucurbitacin B in *D. palmatus*. ([PubMed](#))

The absence of anthraquinones from all investigated extracts indicates that this particular group was not detected under the qualitative test conditions used. However, qualitative phytochemical tests are preliminary screening tools and should not be interpreted as definitive evidence of the complete absence of a compound class. Differences in extraction conditions, concentration, test sensitivity, and matrix effects may influence the observed reactions.

Overall, the findings indicate that both plants possess diverse phytochemical profiles, with methanol and chloroform extracts generally demonstrating broader detection of secondary metabolites than petroleum ether extracts. These observations provide a preliminary basis for subsequent quantitative estimation and chromatographic characterization.

Conclusion

The present qualitative phytochemical investigation demonstrated the presence of several important classes of secondary metabolites in *Citrullus colocynthis* and *Diplocyclos palmatus*. *C. colocynthis* showed alkaloids, flavonoids, tannins, diterpenes, triterpenoids, glycosides, and steroids across the investigated extracts,

while phenolic compounds and saponins showed solvent-dependent distribution. *D. palmatus* exhibited a broad phytochemical profile particularly in its chloroform and methanol extracts, including alkaloids, flavonoids, phenols, tannins, saponins, diterpenes, triterpenoids, glycosides, and steroids. Anthraquinones were not detected in either plant.

The results support the presence of diverse phytoconstituents in both medicinal plants and demonstrate the importance of solvent selection during preliminary phytochemical investigation. Further studies involving total phenolic and flavonoid estimation, HPTLC/HPLC profiling, GC-MS/LC-MS analysis, isolation of individual constituents, and pharmacological evaluation are recommended to establish the chemical and biological significance of the detected phytoconstituents.

References

1. Bano, P., & Singh, N. (2016). Preliminary phytochemical investigation on leaves and seeds extract of *Diplocyclos palmatus* (L.) C. Jeffrey medicinal plant. *International Journal of Scientific Development and Research*, 1(7), 63–66. ([IJSDR](#))
2. Farnsworth, N. R. (1966). Biological and phytochemical screening of plants. *Journal of Pharmaceutical Sciences*, 55(3), 225–276.
3. Finar, I. L. (1962). *Organic chemistry: Stereochemistry and the chemistry of natural products*. Longmans.
4. Harborne, J. B. (1973/2005). *Phytochemical methods: A guide to modern techniques of plant analysis*. Chapman and Hall.
5. Misra, A., Shukla, P. K., Kumar, B., Niranjana, A., Rawat, A. K., & Srivastava, S. (2017). Simultaneous-HPLC quantification of phenolic acids in traditionally used Ayurvedic herb *Diplocyclos palmatus* (L.) Jeffrey. *Pharmacognosy Journal*, 9(4), 483–487. ([Phcogi](#))
6. Raman, N. (2006). *Phytochemical techniques*. New Indian Publishing Agency.
7. Thakur, N., & Puri, R. (2025). *Diplocyclos palmatus* (L.) C. Jeffrey—An important medicinal plant: A review on taxonomy, ethnobotany, and pharmacological prospects. *Journal of Phytopharmacology*, 14(4), 247–257. ([Phytopharma Journal](#))
8. Wagner, H., & Bladt, S. (1996). *Plant drug analysis: A thin layer chromatography atlas* (2nd ed.). Springer.
9. Gur, S., et al. (2023). *Citrullus colocynthis* (L.) Schrad.: A promising pharmaceutical resource for multiple diseases. [Journal details to be verified before submission]. ([PubMed Central \(PMC\)](#))
10. *Citrullus colocynthis* (L.) Schrad.: Phytochemical and pharmacological investigations. Relevant literature documenting cucurbitacins, flavonoids, phenolics, alkaloids, steroids, and related constituents. ([PubMed Central \(PMC\)](#))