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Preliminary Phytochemical Screening of Ipomoea Triloba L.

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Abstract

The present study investigated the preliminary phytochemical profile of a methanolic leaf extract of Ipomoea triloba L. collected from roadside areas of the Amravati region, Maharashtra, India. Qualitative chemical tests were used to screen for major classes of phytochemicals. Positive reactions were recorded for alkaloids, flavonoids, saponins, tannins, phenolic compounds, terpenoid-related compounds, steroid- and phytosterol-related compounds, glycosides, quinone-related compounds, reducing sugars, amino acids and proteins. These observations provide an initial indication of the chemical diversity of the extract. They do not, however, establish the identity or concentration of individual compounds, and some colour reactions may overlap between classes. Further work using validated chromatographic and spectroscopic methods, including HPLC, GC–MS and FTIR, together with properly documented antioxidant and antimicrobial assays, would be needed to characterise the extract and assess its biological activity.

Keywords: Ipomoea triloba L.; methanolic leaf extract; preliminary phytochemical screening; qualitative tests; phytochemicals; Amravati, Maharashtra.

1. Introduction

Ipomoea triloba L. belongs to the family Convolvulaceae and is described as a climbing plant. Plants produce a wide range of chemical constituents, and preliminary phytochemical screening is commonly used as an initial step in investigating their chemical composition. Methanol can extract a broad range of polar and moderately polar constituents, making methanolic extracts useful for preliminary screening. Nevertheless, qualitative tests are presumptive: the observed colour changes, precipitates or foam indicate reactions consistent with particular compound classes, but they cannot confirm the presence of a specific molecule on their own.

The present study examined the methanolic leaf extract of I. triloba collected from roadside areas of the Amravati region, Maharashtra. The objective was to record the responses obtained in selected qualitative phytochemical tests and to present an initial profile of the extract. The findings are intended as preliminary observations that can guide further investigation. Instrumental analyses such as high-performance liquid chromatography (HPLC), gas chromatography–mass spectrometry (GC–MS) and Fourier-transform infrared spectroscopy (FTIR), as appropriate to the compounds being studied, would be needed for more detailed characterisation. Biological activity should be evaluated separately using documented and reproducible assays.

2. Materials and Methods

2.1. Plant Material and Collection

Fresh leaves identified as Ipomoea triloba L. (family Convolvulaceae) were collected from roadside locations in the Amravati region of Maharashtra, India. The leaves were separated from unwanted material and taken for laboratory processing. The collection date, precise locality or coordinates, identification authority and voucher specimen number should be added from the field and herbarium records before submission. Botanical identification should be confirmed by a qualified taxonomist.

2.2. Preparation of Methanolic Extract by Soxhlet Extraction

A methanolic leaf extract was prepared for preliminary phytochemical screening. The original laboratory record must be used to report the exact procedure. Before submission, specify the mass of dried leaf powder, drying conditions, methanol grade and volume, extraction apparatus and duration, filtration procedure, concentration method, storage conditions and extract yield (if measured). The heading refers to Soxhlet extraction; retain that description only if Soxhlet extraction was in fact used. Do not insert estimated or assumed values.

2.3. Qualitative Phytochemical Screening

Qualitative tests were performed to screen the extract for selected phytochemical classes. The tests documented in the photographs and results table were Mayer's, Wagner's and Dragendorff's tests for alkaloids; the Shinoda test for flavonoids; the frothing test for saponins; Salkowski's test labelled for phytosterol-related constituents; Bornträger's test for quinone/anthraquinone-related compounds; ninhydrin for amino acids; Biuret for proteins; Benedict's test for reducing sugars; Keller–Killiani for cardiac-glycoside-related reactions; Liebermann–Burchard for steroids; Salkowski's test for terpenoid-related constituents; and ferric chloride tests for tannins and phenolic compounds. Exact reagent concentrations, sample and reagent volumes, heating or incubation conditions, and decision criteria should be reported from the protocol actually followed. Reagent blanks, suitable positive controls and replicate testing should be documented where performed.

3. Results and Discussion

Positive reactions were recorded for all phytochemical groups included in the screening table. Mayer's and Dragendorff's tests showed appearances recorded as consistent with alkaloid reactions, while the Shinoda test showed pink-red colouration interpreted as a presumptive response for flavonoids. Foam was observed in the frothing test, supporting a preliminary indication of saponin-like constituents. The ferric chloride tests showed dark brown/black and dark green/black colouration in the tubes labelled for tannins and phenols, respectively. Such colour changes are compatible with reactions involving phenolic substances; however, tannins are themselves polyphenolic compounds, so these two results should not be treated as independent confirmation of distinct molecules.

Colour or phase changes were also recorded in the tests labelled for phytosterol-related compounds, quinone/anthraquinone-related compounds, amino acids, proteins, reducing sugars, glycosides, steroids and terpenoids. These results are best interpreted as preliminary, qualitative indications rather than definitive identification. In particular, the test convention and the observed endpoint should be checked against the validated protocol used; the appearance of a tube alone cannot establish a compound's identity. The results therefore support further investigation of the extract but do not demonstrate concentration, purity or biological efficacy. Follow-up chromatographic/spectroscopic analyses and

independently documented antioxidant and antimicrobial assays would be needed to address those questions.

Table 1. Qualitative phytochemical screening of the methanolic leaf extract labelled as Ipomoea triloba L.

Test / reagent	Target class	Recorded observation	Result
Mayer's reagent test	Alkaloids	Cream/whitish cloudy appearance	Positive (+)
Wagner's reagent test	Alkaloids	Appearance recorded in photograph	Positive (+)
Dragendorff's reagent test	Alkaloids	Orange coloration visible	Positive (+)
Shinoda test	Flavonoids	Pink-red coloration visible	Positive (+)
Frothing test	Saponins	Foam visible above the liquid	Positive (+)
Salkowski's test	Phytosterol-related constituents	Reddish-brown lower phase with yellow-green upper layer	Positive (+)
Bornträger's test	Quinone/anthraquinone-related compounds	Reddish coloration visible	Positive (+)
Ninhydrin test	Amino acids	Yellow-orange solution visible	Positive (+)
Biuret test	Proteins	Violet/lilac coloration visible	Positive (+)
Benedict's test	Reducing sugars	Orange-red coloration visible	Positive (+)
Keller–Killiani test	Cardiac-glycoside-related reaction	Dark reddish-brown interface above a yellow-green phase	Positive (+)
Liebermann–Burchard test	Steroids	Dark green upper phase over a yellow-green lower phase	Positive (+)
Salkowski's test	Terpenoid-related constituents	Reddish-brown upper/interface coloration above a yellow phase	Positive (+)
Ferric chloride test	Tannins (as labelled)	Dark brown/black coloration visible	Positive (+)
Ferric chloride test	Phenolic compounds (as labelled)	Dark green/black coloration visible	Positive (+)

4. Photographic Documentation

Figure 1. Mayer's reagent test for alkaloids.

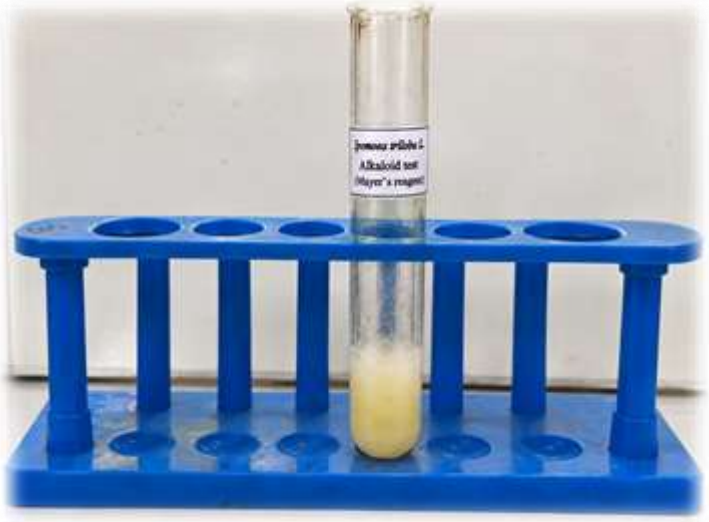


Figure 2. Wagner's reagent test for alkaloids.



Figure 3. Dragendorff's reagent test for alkaloids.



Figure 4. Shinoda test for flavonoids.

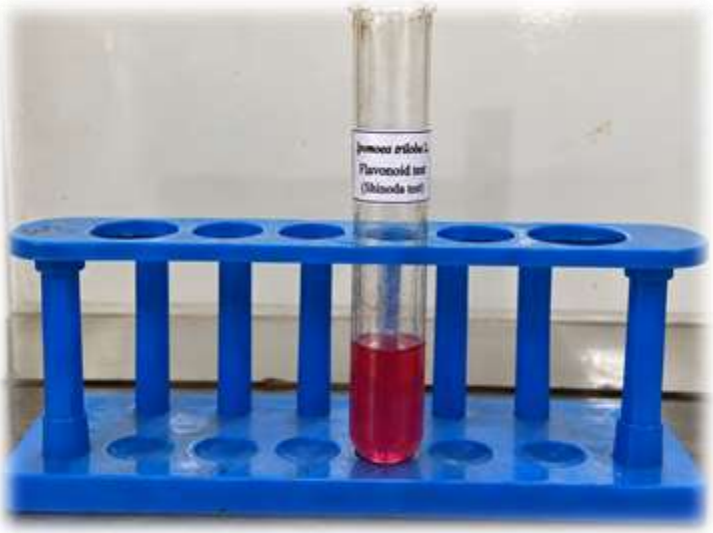


Figure 5. Frothing test for saponins.



Figure 6. Salkowski's test for phytosterol-related constituents.

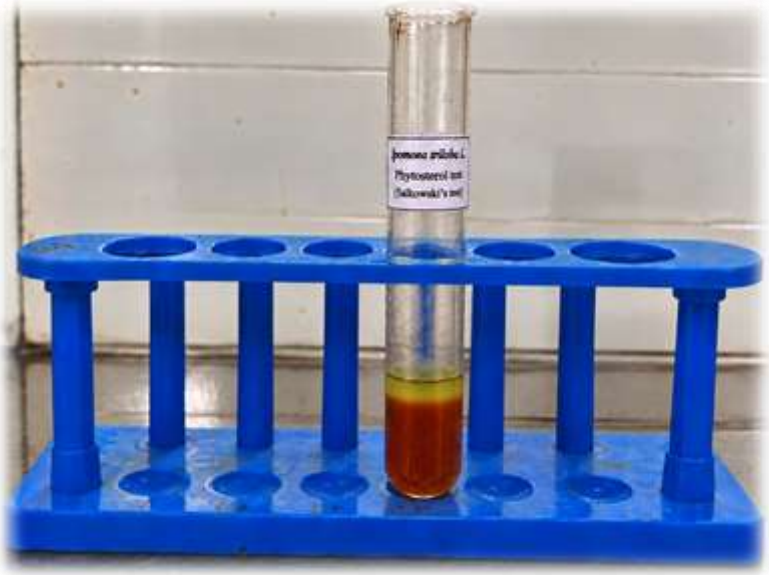


Figure 7. Bornträger's test for quinone/anthraquinone-related constituents.

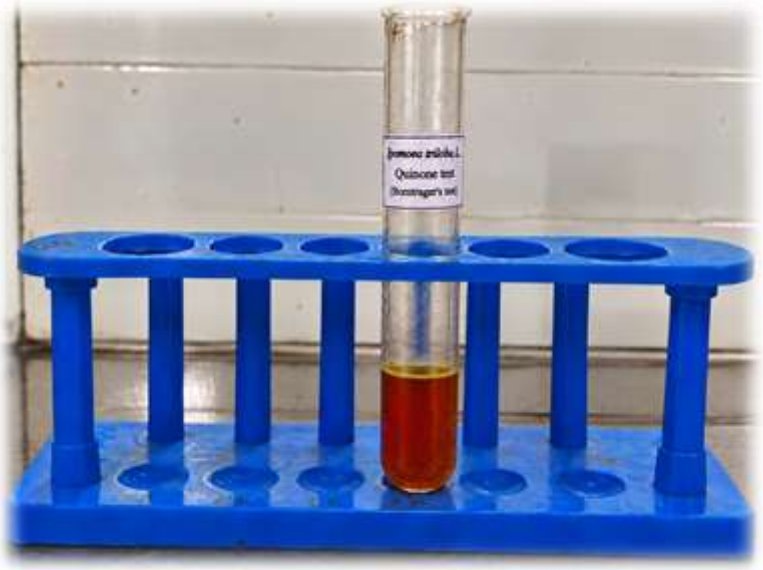


Figure 8. Ninhydrin test for amino acids.

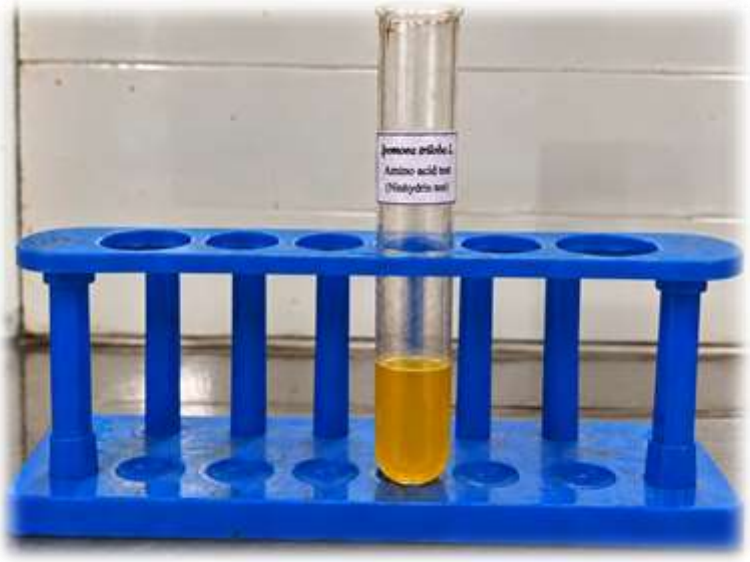


Figure 9. Biuret test for proteins.

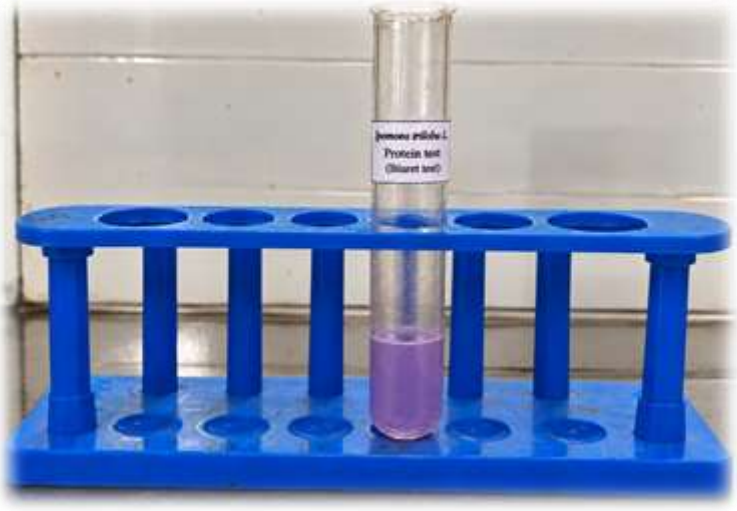


Figure 10. Benedict's test for reducing sugars.



Figure 11. Keller–Killiani test for glycoside-related reactions.

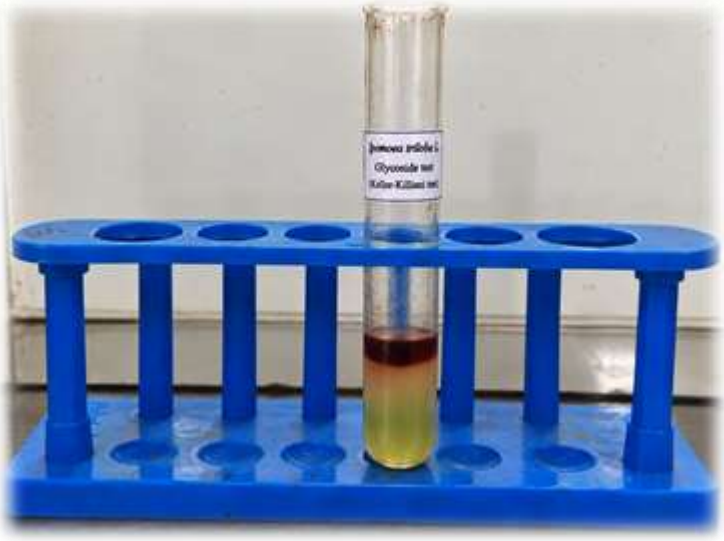


Figure 12. Liebermann–Burchard test for steroids.

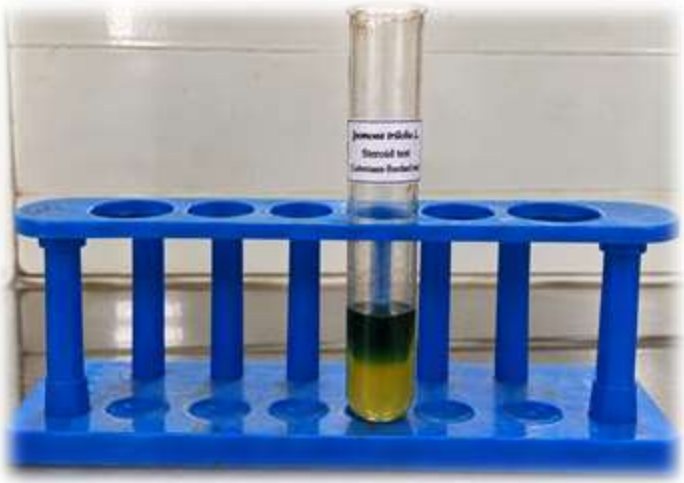


Figure 13. Salkowski's test for terpenoid-related constituents.

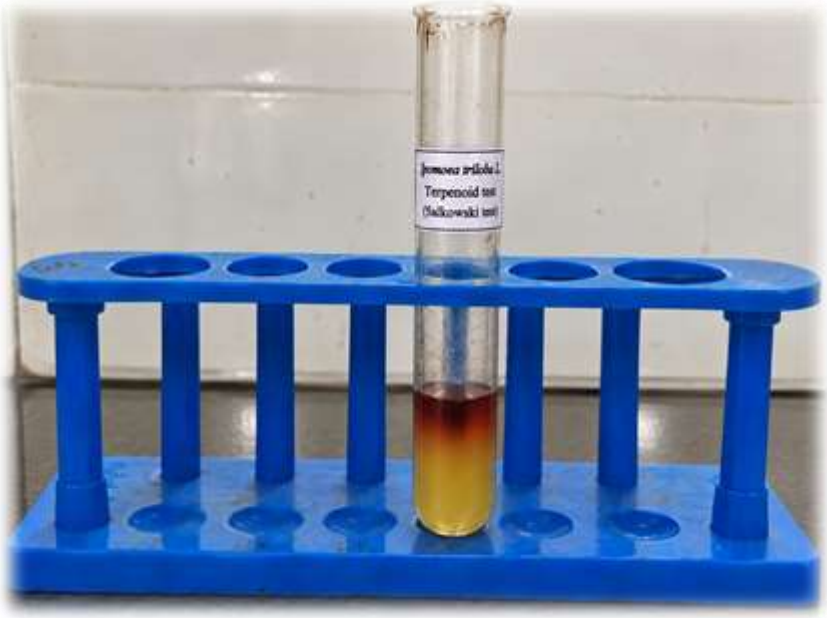


Figure 14. Ferric chloride test labelled for tannins.



Figure 15. Ferric chloride test labelled for phenolic compounds.



5. Conclusion

The methanolic leaf extract of Ipomoea triloba L. collected from roadside areas of the Amravati region showed positive qualitative reactions in the tests reported in this study. The observations provide a preliminary indication that the extract may contain several classes of phytochemicals. Because qualitative colour and precipitation tests are presumptive, the results do not identify individual compounds or establish their amounts. Further work using appropriate analytical methods, including HPLC, GC–MS and FTIR, should be conducted and reported with complete experimental conditions. Antioxidant and antimicrobial activities should also be evaluated using documented methods before biological effects are claimed. This study therefore provides an initial record to support more detailed investigation of I. triloba from the Amravati region.

Acknowledgements

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References

1. Khan, P. H. A., & Siddiqui, A. U. R. (2022/2023). Phytochemical analysis of Ipomoea triloba (L.). BIOINFOLET, 19(4), 444–445. Verify the publication year and bibliographic details against the journal's official record before submission.
2. Maheshwaran, L., Nadarajah, L., Senadeera, S. P. N. N., Ranaweera, C. B., Chandana, A. K., & Pathirana, R. N. (2024). Phytochemical testing methodologies and principles for preliminary screening/qualitative testing. Asian Plant Research Journal, 12(5), 11–38. https://doi.org/10.9734/aprj/2024/v12i5267
3. Sarini, G., & Bopaiah, A. K. (2018). Preliminary screening of active chemical components found in twelve species of Ipomoea L. International Journal of Pharma and Bio Sciences, 9(1), 20–23. https://doi.org/10.22376/ijpbs.2018.9.1.p20-23
4. Shaikh, J. R., & Patil, M. K. (2020). Qualitative tests for preliminary phytochemical screening: An overview. International Journal of Chemical Studies, 8(2), 603–608. https://doi.org/10.22271/chemi.2020.v8.i2i.8834
5. Preparation of Medicinal Plants: Basic Extraction and Fractionation Procedures for Experimental Purposes. (2020). Methods in Molecular Biology. https://pmc.ncbi.nlm.nih.gov/articles/PMC7398001/ (Add the verified author/editor and publication details before submission.)