Chapter 10

Phytochemical screening and TLC analysis of whole plant of *Malachra capitata* (L.) L. (Malvaceae)

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Abstract: Whole plant of *Malachra capitata* was selected for qualitative phytochemical analysis using hydroethanolic extract. Present analysis revealed the presence of tannins, flavonoids, phenolic compounds, reducing sugars, and alkaloids, while saponins, terpenoids, steroids, and carbonyl compounds were absent. Thin-layer chromatography (TLC) analysis using different mobile phases showed distinct Rf values, indicating the presence of various bioactive compounds. These findings provide valuable insights into the phytochemical profile of *M. capitata*, which may have implications for their potential medicinal properties and applications.

Keywords: Malvaceae, secondary metabolites, TLC

INTRODUCTION

Malachra capitata, a perennial under shrub of the Malvaceae family, native to Tropical and Subtropical America, thrives in seasonally dry tropical biomes (Gopi et al., 2012; Figure 1). In traditional Indian medicine, its roots are utilized to treat epilepsy (Deodhar, 2016). Despite its medicinal use, there is a scarcity of reports on its secondary metabolites. To address this gap, we conducted a phytochemical

analysis of the whole plant using hydroethanolic extract and TLC profiling. Present study underscores the potential of *M. capitata* as a source of diverse therapeutic agents for drug development, paving the way for further research and exploration.

METHODOLOGY

The whole plant of *M. capitata* was collected from Rajnagar, Kendrapara district of Odisha, India. Hydroethanolic solvent was used for phytochemical analysis (Figure 2). Detection of secondary metabolites were conducted using standard methods (Kumar et al., 2013a; Devi et al., 2023; Marndi et al., 2024; Jena et al., 2024). TLC plates were prepared on 6 cm glass slides using silica gel powder (SILICA GEL G, CAS 112926-00-8, Spectrochem Pvt. Ltd.). Slides were washed with clinical laboratory detergent and dried. Clean and dried slides were wiped with ethyl acetate for removing surface adherents. 3 g of silica was taken in 20 ml of distilled water and slurry was prepared by constantly stirring, and finally was poured over the slides and slides were left undisturbed till the drying of silica layer (Kumar et al., 2013b). Then the slides were activated at 50° C for 15-20 minutes before running the TLC. Methanol: chloroform (50%), ethyl acetate: chloroform (1:9) and ethyl acetate: water: acetic acid (8:1:1) were used as mobile phases. Then spots were marked, recorded the RF (Retention Factor) values and visualized under UV chamber (Kumar and Jena, 2014).

RESULTS AND DISCUSSION

The phytochemical analysis of *M. capitata* whole plant revealed the presence of tannins, flavonoids, phenolic compounds, reducing sugars, and alkaloids in the hydroethanolic extract (Figure 3). Conversely, saponins, terpenoids, steroids, and carbonyl compounds were found to be absent. Thin-layer chromatography (TLC) analysis showed distinct Rf values, with two spots observed in the chloroform: methanol (1:1) mobile phase and single spots in the ethyl acetate: chloroform (1:9)

and ethyl acetate: distilled water: acetic acid (8:1:1) mobile phases, indicating the presence of various bioactive compounds.

Table 1: Phytochemical analysis of whole plant of *Malachra capitata*

Bioactive compounds	Hydroethanolic extract
Tannin	+ve
Saponin	-ve
Flavonoids	+ve
Terpenoids	-ve
Phenolic compounds	+ve
Reducing sugar	+ve
Steroids	-ve
Alkaloids	+ve
Carbonyl compounds	-ve

(+ve: Present; -ve: Absent)

Table 2: TLC analysis of whole plant of *Malachra capitata*

Mobile phase	Extracts	Rf value of spots		
		S_1	S_2	S_3
Chloroform: methanol (1:1)	Hydroethanolic	0.06	0.52	-
Ethyl acetate: chloroform (1:9)	Hydroethanolic	0.95	-	-
Ethyl acetate: distilled water: acetic acid (8:1:1)	Hydroethanolic	0.94	-	-



Figure 1: Whole plant of *M. capitata*



Figure 2: Hydro-ethanolic extract of *M. capitata* (whole plant) for experimental works

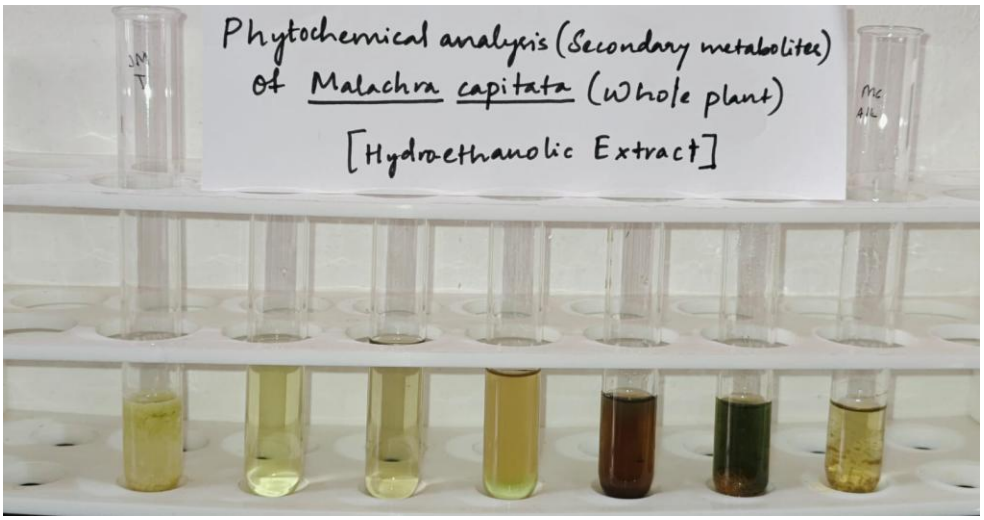


Figure 3: Phytochemical analysis of the whole plant of *M. capitata*

CONCLUSION

Present study provides valuable insights into the phytochemical composition of *Malachra capitata* whole plant, highlighting the presence of bioactive compounds with potential medicinal properties. The findings of this study can serve as a

foundation for further research on the therapeutic applications and pharmacological effects of this herb

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