Abstract of the thesis

PHYTOCHEMICAL CHARACTERISATION OF *Taverniera cuneifolia* (Roth) Arn.

A THESIS SUBMITTED

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Abstract

Phytochemical characterisation is a crucial field in medical plant sciences that goes beyond just identifying chemicals. It involves exploring the complex areas of extracting, systematically screening, and quantifying bioactive molecules. This comprehensive study examines the field of botanical investigation, with a specific emphasis on *Taverniera cuneifolia* (*T. cuneifolia*) as a promising substitute for the well-established *Glycyrrhiza glabra* (licorice). G. glabra is rich in bioactivities like antiviral, anticancer, anti-ulcer, anti-diabetic, anti-inflammatory, anti-oxidant, anti-thrombic, anti-malarial, anti-fungal, anti-bacterial, estrogenic, immuno-stimulant, anti-allergenic and expectorant, promoting expectoration, an agent that promotes expectoration activities. These properties have been mentioned for *T. cuneifolia* by Thaker in wherein it has been mentioned to be used as an expectorant, blood purifier, anti- inflammatory, wound healing, antiulcer and for treating spleen tumors, the data given by Thaker was reaffirmed by Nagar in 2005. Prior research conducted by Thaker (1910), Zore et al. (2008), and Mangalorkar (2013) did not meet the necessary standards of standardisation and validation. Quality assurance in pharmaceuticals requires the use of advanced techniques such as thin-layer chromatography, column chromatography, and high-performance liquid chromatography (HPLC). We have conducted a thorough investigation into *T. cuneifolia* as a potential alternative to *Glycyrrhiza glabra*. Our research focused on standardising and validating its active phyto-constituents. Through this study, we have made significant progress in filling the knowledge gap regarding the herbal applications of *T. cuneifolia*.

Chapter II - Literature Review: A comprehensive review of the several facets of *T. cuneifolia* is undertaken, closely entwined with the cultural aspects of ethnobotanical traditions. The chapter explores the several biological activities of this plant, which go beyond its pharmacological effects. These activities include expectorant and anti-inflammatory properties, as well as its important position in traditional medicine. The acknowledgment of India's rich ethnobotanical tradition highlights the extensive historical depth.

Chapter III - Materials & Methods: The methods section precisely outlines the methodical process of collecting *T. cuneifolia* samples, carefully selected from several biogeographical zones in Gujarat. The research rigorously standardises and verifies phyto-constituents using advanced analytical techniques such as High-Performance Thin-Layer Chromatography (HPTLC), High-Performance Liquid Chromatography (HPLC), and Liquid Chromatography-Mass Spectrometry Quadrupole Time-of-Flight (LC-MS/MSQToF). The process is executed

with meticulous accuracy, ensuring that each step is carefully adjusted to unveil the complexity of phytochemical structure of *T. cuneifolia*.

Chapter IV - Results and Discussion:

Germplasm Selection: The meticulous procedure of germplasm selection takes place in consideration of soil conditions and macro-micronutrient levels. HPTLC fingerprinting serves as a reliable method to ensure the high quality of *T. cuneifolia* obtained from various places in Gujarat. The intricacies of soil chemistry are examined, establishing a basis for comprehending the comprehensive growth conditions necessary.

Sugar and Amino Acid Analysis: The work uses modern HPTLC technology to explore the domains of sugar and amino acids. The detailed examination of seasonal variations reveals a complex pattern of sucrose dominance in *T. cuneifolia*, which is even more remarkable than the well regarded *G. glabra*. The amino acid study offers a detailed understanding of the physiological reactions of *T. cuneifolia*, highlighting its possible involvement in secondary metabolites.

Phyto-constituents Validation: The analytical process begins with the verification of glycyrrhizin in the roots of *T. cuneifolia*. The research recognises the existence of *G. glabra* but emphasises the importance of lower concentrations in comparison. An innovative and simultaneous HPLC approach is presented, offering a more comprehensive understanding of the chemical composition of the plant. The investigation extends beyond specific substances to reach a comprehensive grasp of the phytochemical profile.

Column Chromatography: The research delves into the complexities of column chromatography, analysing non-polar and polar fractions in detail. The LCMS and GCMS tests reveal the wide range of amino acids, lipids, and other components that enhance the essence of *T. cuneifolia*, bringing it to life. The process of purification is well documented, offering a clear path for future examinations of individual components.

Conclusion: This academic journey concludes with the affirmation that *T. cuneifolia* is a practical and auspicious substitute for licorice, supported by a wealth of standardisation and validation procedures. This work goes beyond simple inquiry to provide a definite connection between ancient knowledge and current scientific investigation, bridging the gap between legacy and contemporary botanical discovery. *T. cuneifolia* emerges as a strong competitor in

the field of herbal medicine due to its combination of ethnobotanical diversity, rigorous research methods, and detailed molecular analysis.