

Phytochemical Analysis of *Meizotropis pellita* by FTIR and UV- VIS Spectrophotometer

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Abstract

Objective: The present study investigates the characterization of the bioactive constituents showing antimicrobial activity present in leaf extract of *Meizotropis pellita* using UV-VIS and FTIR spectroscopy. **Method:** The methanolic extract of the leaves of *Meizotropis pellita* prepared by cold maceration method and analysed under ultraviolet and visible light. The scanning of the crude extract was done at the range from 190-800 nm through Varian Cary -100 UV Visible spectrophotometer system and the characteristic peaks were detected. FTIR studies was done on a Jasco-4100 system, ranging 4000-400 cm^{-1} which revealed the characteristic peak values showing the absorption and functional groups present in leaf extract. **Findings:** The UV-VIS profile showed the peaks at 660, 340, 270, 235 and 210 nm with the absorption 0.085, 1.250, 2.605, 4.455 and 3.639. The result of FTIR spectra confirms the presence of alcohol, aldehydes carboxylic acid, aromatic and halogen compounds. So the present study provide evidences that leaves of *Meizotropis pellita* contain bioactive constituents which could be of interest for the development of new drug.

Keywords: Bioactive Constituents, FTIR spectrum, *Meizotropis pellita*, UV-VIS Spectrum

1. Introduction

Plants with medicinal properties are gaining a lot of importance due to their role in various health concerns of human population in different nations. There is an exponential growth in the need of the plant based drugs in international market because of high effectiveness, easily available, economic, evidently negligible toxicity as side effects and proving to be a good substitute for allopathic medicines¹. These phyto originated products, either in the form of isolated and purified compounds or in standardized extract from the plant, provide tremendous possibilities for developing new drug². The various bioactive phytochemical constituents available in plants include alkaloids saponins glycosides, flavonoids, phenol, coumarins, terpenes and carboxylic acids. These phytochemicals provide unique antimicrobial properties to plants. So, the phytochemical analysis of the various constituents will be instrumental in determining the active agents responsible for antimicrobial activity. Spectroscopic (UV-Vis

& FTIR) methods are very rapid and cost effective than other conventional methods, so both can be used together or separate in this manner to detect the bioactive constituents³⁻⁵. UV-VIS Spectroscopy has been used primarily to compute the functional groups present, polynuclear compounds and extent of conjugation by comparing with standards⁶. The light used in UV-VIS spectroscopy region is in the visible range or some neighboring ranges. The absorption in this range is fully affected by the color or tint of the chemicals. Electronic transitions of the molecules occur in the UV-VIS ranges of the spectrum.

Fourier Transform Infrared Spectroscopy (FTIR) is a high resolution analytical technique to identify the bioactive chemical constituent and to reveal the structure of the compounds^{8,9}. In Fourier Transform Infrared Spectroscopy molecules shows absorption in a characteristic range of frequency. The organic compounds mainly absorbed in the range of 4000-400 cm^{-1} which play a key role in the study of these compounds¹⁰.

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Meizotropis pellita belongs to Fabaceae family and is an angiosperm. This plant is produced annually and is a shrub having stout. Several shoots arises from woody perennial rootstock which are 0.75 inch diameter and erects upto 6-7 feet. It is commonly known as Patwa and is basically found in Patwadanger (Nainital District). It is an endangered plant and a lot of initiatives are in progress for the conservation of this plant¹¹. The leaves of *Meizotropis pellita* are reported to have antimicrobial properties¹². With these available facts, the present research was performed to produce the FTIR and UV-Visible spectrum of *Meizotropis pellita* leaf extract.

2. Materials and Methods

2.1 Plant Material

The fresh leaves of *Meizotropis pellita* (endangered plant) was collected from Patwadanger, Nainital in the end of july. The leaves were washed with running water and then with distilled water. The plant material was dried in shade dried for a couple of days and then dried in incubator at 37° C for 2-3 days. The dried leaves then crushed in mechanical grinder till it becomes a fine powder and then it was stored in air tight container at room temperature.

2.2 Preparation of Plant Extract

The methanolic extract of the plant material were prepared by using cold maceration method¹³. 100 gm of plant material were weighed in sterile bottle, the weighed plant material was then extracted with the solvent separately in tightly covered bottles and left for 2 days at room temperature. The resultant suspensions were then filtered into sterile beakers and the filtrate was refiltered using whatman filter paper no. 1 into sterile sample bottles. The extract was then concentrated and evaporated on a rotary evaporator and stored in refrigerator for further use.

2.3 Phytochemical Screening

The methanolic extract of *Meizotropis pellita* was subjected to phytochemical screening for the presence of various compounds like flavonoids, alkaloids, saponins, tannins and steroids^{14,15}.

2.4 Spectroscopic Analysis

UV-VIS Spectra: The Ultraviolet-Visible spectroscopy of methanolic extract of the plant was done at the 190 to 800

nm. The UV-visible showed the absorption at 660, 340, 270, 235 and 210 nm with the absorption 0.085, 1.250, 2.605, 4.455 and 3.639 respectively. (Table 1 & Figure 1)

Table 1. Peak values in UV-VIS spectrum of methanolic extract of *Meizotropis pellita*

S.No.	Wave length (nm)	Absorption Peak
1	660	0.085
2	340	1.250
3	270	2.605
4	235	4.455
5	210	3.639

2.5 FT-IR Analysis

The FT-IR studies was done to determine the functional groups which are present in methanolic extract of leaves of *Meizotropis pellita*. The results obtained in the infrared region enable the identification of the chemical constituents and elucidation of the structures of compounds. (Table 2 and Figure 2)

Table 2. FT-IR Peak Values of Methanolic Extract of *Meizotropis pellita*

S/No.	Peak Values	Interpretation
1	3017.09	Alcohol
2	2946.7	Alkanes
3	2868.59	Carboxylic acid
4	2837.74	Carboxylic Acid
5	2390.33	Unknown
6	2361.41	Unknown
7	2336.34	Unknown
8	2291.98	Unknown
9	1846.51	Acid halide
10	1646.91	Alkenes
11	1505.17	Unknown`
12	1454.06	Aromatics
13	1434.78	Aromatics
14	1411.64	Unknown
15	1361.5	Unknown
16	1180.22	Halogen
17	1114.65	Halogen
18	1086.69	Aliphatic amines
19	1026.91	Unknown
20	954.591	Ethers
21	741.496	Aromatic Compound

22	540.935	Alkyl Halide
23	493.688	Alkyl halide
24	484.045	Unknown

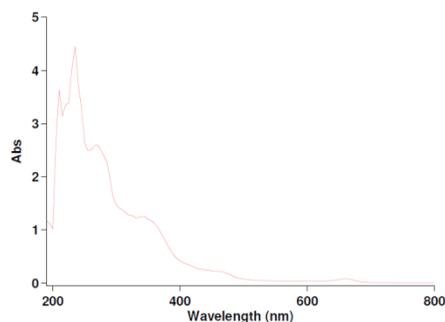


Figure 1. UV-Vis Spectra of methanolic extract of *Meizotropis pellita*.

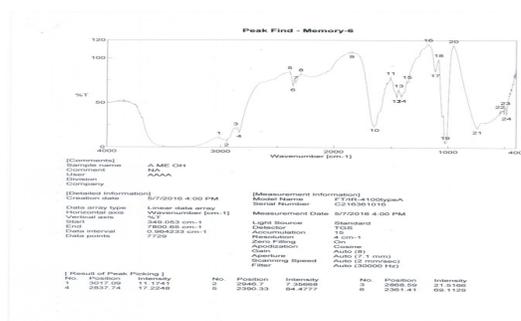


Figure 2. FT-IR Spectra of methanolic extract of *Meizotropis pellita*.

3. Discussion and Conclusion

The present research was done for the spectroscopic characterization of the methanolic extract of *Meizotropis pellita*. The various phytochemicals including flavonoids, alkaloids, carbohydrates and protein were found to be present during qualitative analysis of the extract of *M. pellita*. The presence of these phytochemicals was also supported by the spectroscopic studies showing the characteristic peaks obtained in Ultraviolet and Visible region. The presence of phenolic, alcohols and aromatic compounds was also indicated by FTIR spectrum. The existence of hydroxyl group as indicated by IR spectrum and Ultraviolet and visible spectrum of leaf extracts has absorption in the range of at 340 and 270 nm. The value of absorption obtained at these wavelengths indicates the presence of flavonoids and its derivatives. Further more work is required to determine the structure of alkaloids and flavonoid compound by use of various more

advanced analytical techniques such as Mass and NMR spectrophotometer.

4. References

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