

**FUNCTIONAL GROUP ANALYSIS OF VARIOUS EXTRACTS OF *Aerva lanata* (L.)  
BY FTIR SPECTRUM**

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**Summary**

Infra red spectra of various extract (Aqueous, Ethanol and Aqueous ethanol) of medicinal plant *Aerva lanata* were recorded. The vibrational assignments, intensities and wave number ( $\text{cm}^{-1}$ ) of dominant peak were obtained from absorption spectra. Probable assignments of the bands were made with respect to the components present in various extracts. By these analysis, functional groups such as aminoacids, amides, amines, carboxylic acid, carbonyl compounds, organic hydrocarbons, halogens are present in all the three extracts. By this results indicate that the aqueous, ethanol and aqueous ethanol extract of this plant having high therapeutic value. In future, it is used to treat against various diseases.

**Key words** : Infra red spectra, *Aerva lanata*, functional groups, therapeutic value.

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### Introduction

Plants have been used in traditional medicine for several thousand years. Medicinal plants as a group comprise approximately 8000 species and account for about 50% of all the higher flowering plant species in India. The knowledge of medicinal plants has been accumulated in the course of many centuries based on different medicinal systems such as Ayurveda, Unani and Siddha. In a large number of countries human population depends on medicinal plants for treating various illnesses as well as a source for livelihood. The main advantage of using medicinal plants does not produce side effects when compared with synthetic drugs, because medicinal plants contain high content of antioxidant compounds present in high content in plants. It has shown protective effects against diseases without reducing their therapeutic efficacy. The objective of this study was to identify various chemical groups present in various extracts of *A. lanata*. *Aerva lanata* is one of the medicinal plants useful for curing diabetes. It has anthelmintic, demulcent and is helpful in lithiasis, cough, sore throat and wounds<sup>1</sup>. The plant has been reported to possess anti-inflammatory<sup>2</sup> and nephroprotective in rats<sup>3</sup>.

In this study, to evaluate the functional group analysis of *Aerva lanata* in different extracts.

### Materials and methods

#### Plant collection

Fresh plant parts were collected from Coimbatore, Tamil Nadu, India. The plant was authenticated by Dr. G.V.S Moorthy, Botanical Survey of India, TNAU Campus, Coimbatore. The voucher No. BSI/SC/5/23/10-11/Tech/22. Fresh plant material was washed under running tap water, air dried, and then homogenized to fine powder and stored in airtight bottles.

#### Extraction

100g of dried plant powder was extracted in 500ml of aqueous, ethanol and aqueous ethanol (1:1) for 24 hr in occasional shaker at room temperature. The supernatant was collected and evaporated to make the final volume one-fifth of the original volume. It was stored at 4°C in airtight bottles for further studies.

#### FTIR spectrum analysis

Aqueous, ethanol and aqueous ethanol extract of *A. lanata* were ground into fine powder by using agate mortar and the FT-IR spectrometer in the region 4000-400 cm<sup>-1</sup> by employing standard KBr pellet technique.

Results and Discussion

The FT-IR spectra of Aqueous, Ethanol and Aqueous ethanol extract of *A.lanata* are shown in figure 1,2 and 3.

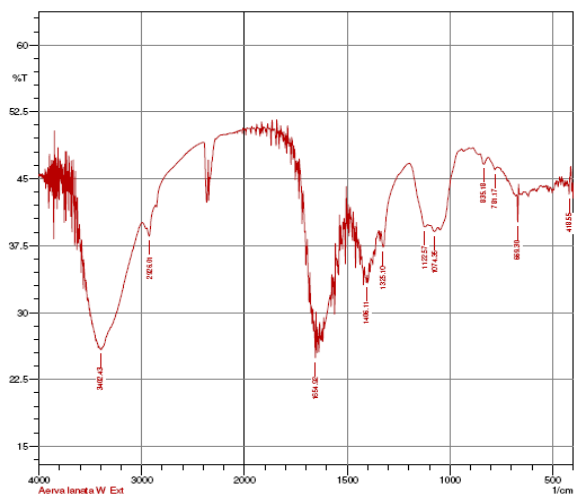


Fig 1: Aqueous extract of *A.lanata*

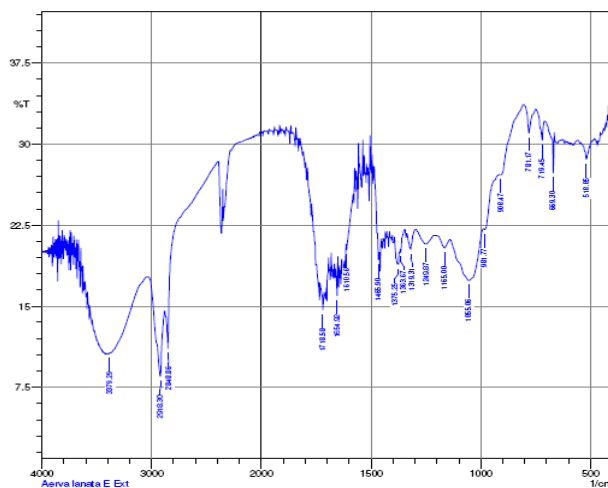


Fig 2: Ethanolic extract of *A.lanata*

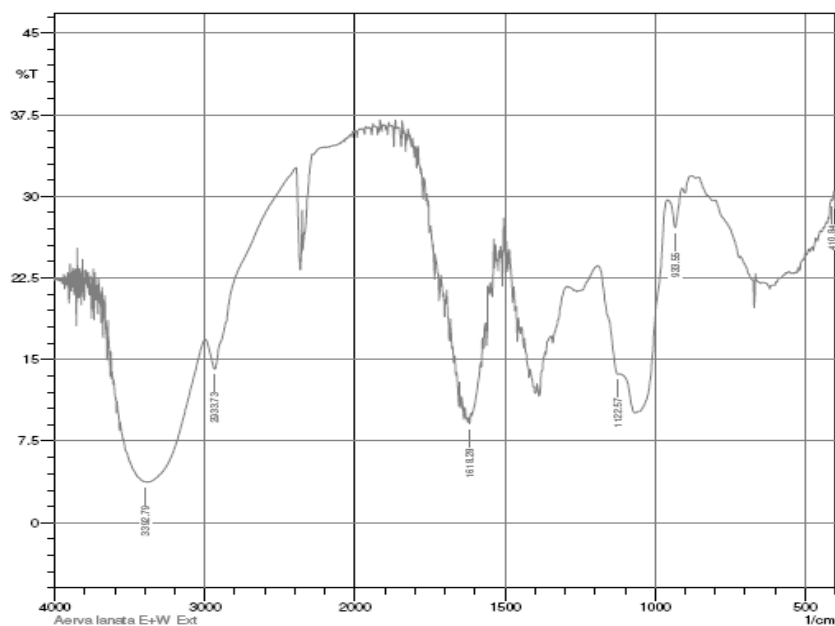


Fig 3: Aqueous ethanolic extract of *A.lanata*

The more intense bands occurring at  $2918\text{ cm}^{-1}$ ,  $2848\text{ cm}^{-1}$ ,  $2853\text{ cm}^{-1}$ ,  $1654\text{ cm}^{-1}$ ,  $1421\text{ cm}^{-1}$ ,  $1249\text{ cm}^{-1}$  corresponding to O-H/N-H/C-H, C=O and C-Cl/C-S stretching/bending vibrations respectively indicate the presence of amino acids, alkenes, nitrates, ethers, organic halogen compounds and carbohydrates in *A.lanata* (L). Brominate compound shows an infra red region  $500\text{-}750\text{ cm}^{-1}$ <sup>9</sup>.

The very strong absorption band observed around  $3373 - 3422\text{ cm}^{-1}$  may be due to the presence of bonded N-H/C-H/O-H stretching of amines and amides<sup>4</sup>. The very strong absorption at  $3402.43\text{ cm}^{-1}$  in aqueous extract,  $3379.29\text{ cm}^{-1}$  in ethanol extract and  $3392.79\text{ cm}^{-1}$  in aqueous ethanol extract. The very strong absorption band observed in  $1600 - 1660\text{ cm}^{-1}$  region indicate the presence of amino acids. The very strong absorption in  $1654\text{ cm}^{-1}$  in aqueous extract,  $1610\text{ cm}^{-1}$  and  $1654\text{ cm}^{-1}$  in ethanol extract,  $1618\text{ cm}^{-1}$  in aqueous ethanol extract. This result give the evidence that all the three extract of *A.lanata* indicates the high content of protein<sup>5</sup>.

The observed very strong absorption band between  $3200\text{-}3400\text{ cm}^{-1}$  indicates the presence polymeric hydroxyl derivatives. Vibration of  $\text{NH}_3$  shows the presence of primary amine<sup>6</sup>. The C-H asymmetrical stretching methylene group near  $2926\text{ cm}^{-1}$ . The bands observed at near  $2848\text{ cm}^{-1}$  represent C-H symmetric stretching of methylene groups in aliphatic compounds<sup>6,7</sup>.

The band occurring  $2848\text{ cm}^{-1}$  in ethanol extract indicates the presence of ether (C-H stretching). This bond does not appear in aqueous and aqueous ethanol extract.

In this presence investigation, all the three extracts containing carbonyl functional groups. In aqueous extract the band appear at  $2926\text{ cm}^{-1}$  (C-H stretching),  $1654\text{ cm}^{-1}$  (C=O stretching),  $1325\text{ cm}^{-1}$  (C-CO-C stretching). In ethanol extract bands are appear at  $2918\text{ cm}^{-1}$  (C-H stretching),  $1654$ ,  $1718\text{ cm}^{-1}$  (C=O stretching),  $1165$ ,  $1249\text{ cm}^{-1}$  (C-CO-C stretching). In aqueous ethanol extract  $2933\text{ cm}^{-1}$  (C-H stretching),  $1122$  (C-CO-C stretching). Here there is no absorption band in C=O stretching.

Carboxylic acids are absorbed at the region  $2500\text{-}3300\text{ cm}^{-1}$ . All the three extracts, ethanol of *A.lanata* contains high absorbance at  $2848\text{ cm}^{-1}$ ,  $2918\text{ cm}^{-1}$  (OH stretching) and  $1718\text{ cm}^{-1}$  (C=O stretching). In aqueous extract, the bands are appearing at  $2926\text{ cm}^{-1}$  and  $3402\text{ cm}^{-1}$  (OH stretching). This is similar to that of *Eclipta alba*<sup>8</sup>.

There is no absorbance in between the region  $2220\text{-}2260\text{ cm}^{-1}$  indicates that no cyanide groups in all three extracts. By this results exhibit all the three extract of *A.lanata* does not contain any toxic substances.

The absorption bands, the wave number ( $\text{cm}^{-1}$ ) of dominant peak obtained from absorption spectra are presented in table 1.

Table 1: Wave number (cm<sup>-1</sup>) of dominant peak obtained from absorption spectra

Function groups	<i>Aerva lanata</i>		
	Aqueous extract	Ethanol extract	Aqueous ethanol extract
<b>Amino acids</b> (C-O stretching)	1654	1610 1654	1618
<b>Hydroxy compounds</b> (OH stretching)	3402	3379	3392
<b>Ethers</b> (C-H stretching)	---	2848	--
<b>Carbonyl compounds</b> (C-H stretching) (C=O stretching)	2926 1654	2918 1654 1718	2933 --
(C-CO-C stretching)	1075 1122 1325	1165 1249	1122
<b>Carboxylic acid</b> (OH stretching)	2926 3402	2848 2918 3379	2933 3392
(C=O stretching)	--	1718	---
<b>Aldehyde</b> (C-H bending)	781.17 835.18	781.17 908.47	933.5
(C-CHO bending)	1074 1122 1325	1055 1165 1249 1319 1363 1375	1122
<b>Ketone</b> (C-H stretching)	2926	2918	2933
C-CO-C stretching	1075 1122 1325	1165 1249 1319	1122
<b>Amide</b> (N-H stretching)	2926	2918	2933

Function groups	Aqueous extract	Ethanol extract	Aqueous ethanol extract
<b>Halogen compounds</b>			
Fluoride	1074 1122 1325	1055 1165 1249 1319 1363 1375	1122
Chloride	418 669 781	518 669 719 781	410
Bromide	669 781	518 669 719 781	-- --
Iodide	---	518.85	--

From table 1, it is seen that the main chemical constituent of *Aerva lanata* is carboxylic acid, which serve as a main pharmaceutical product in curing ulcers, jaundice, head ache, stomatitis, hemicarnia, fever, pain in liver, wounds in cattle, treatment of edema and rheumatic joint pains. Also all the three extracts are rich in amides and amino acids, the main group of protein synthesis and also it contain polysaccharides, organic halogens and nitrates play thus role of disinfectant.

### Conclusion

The presence of characteristic function groups Carboxylic acids, amines, amides, sulphur derivatives, polysaccharides, organic hydrocarbons, halogens are responsible for various medicinal properties of *Aerva lanata*. So it contain high therapeutic content

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