

The Fourier Transform Infra-Red Spectroscopical Analysis Of Root Of Hemidesmus Indicus And Dioscorea Bulbifera.

*R. P. Ganorkar ^a, D. D. Kale ^b And Y. S. Tamgadge ^c

^{a,b}Department of Chemistry , Mahatma Fule Arts, Commerce and Sitaramji Choudhari Science Mahavidyalaya, Warud, Dist. Amravati. 444906, (MS) India.

^cDepartment of Physics , Mahatma Fule Arts, Commerce and Sitaramji Choudhari Science Mahavidyalaya, Warud, Dist. Amravati. 444906, (MS) India.

ABSTRACT :

The Fourier Transform Infra-Red (FTIR) Spectroscopy method was performed as the spectroscopical analysis find out the characteristic peak values and functional groups present in the extractive product of the root of Hemidesmus Indicus and Dioscorea Bulbifera in various solvent like acetone, distilled water, ethanol and petroleum ether have been studied. The site was selected in Nagthana, Tal-Warud, Dist-Amravati of Maharashtra State(Area from the border between Madhya Pradesh and Maharashtra).

FTIR spectroscopic analysis revealed the presence of values of different functional groups such as ketones, Aldehydes, carboxylic acids, Ether, Ester, Amines, Alkane, and Amides .

Key words :- Hemidesmus Indicus , Dioscorea Bulbifera, FTIR, Spectroscopy, Functional groups.

INTRODUCTION :-

Plants having a medicinal activity are the important for the bio resources of drugs for conventional system of medicine¹.The study was carried to detect the phytoconstituents, follow by the spectroscopic classification and the antibacterial efficiency of the methanolic extract of Salicornia Brachiata².

Phytochemical and FT-IR spectral analysis of *Carallumageniculata*Grev. Et Myur. An endemic medicinal plant. The result of the present study along with previous studies showed the presence of valuable compounds present in the plant. The study also justified the uses of

the plant in the treatment of various diseases, ornamental and edible values. Prolongation of study on the same plant is required to identify, isolate, differentiate and make clear the structure of bioactive compounds present in it as there is no comprehensive study on this plant³. Fourier Transform Infrared Spectral investigation, Introductory phytochemical and Antimicrobial study of solvents extracts of *Urgineaindica* (Roxb.) Kunth (Liliaceae) and *Cyclea peltata* Arn. ex Wight (Menispermaceae), results were clearly exposed that the plant contained different bioactive compounds such as of Alkaloids, Anthoquinones, Coumarins, Steriods and Flavonoids compounds were rich in the extracts of *Urgineaindica*(Liliaceae) and *Cycleapeltata* (Menispermaceae) are associated with resistance mechanism against many microorganisms. These plants have antimicrobial activity against some gram positive and gram negative bacteria such as, *E.coli*, *Pseudomonas fluroscene*, *Salmonella typhi* *Bacillus subtilis*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, *Streptococcus*, *Yeast candida*, *Aspergillus niger*⁴. The identification of phytoconstituents from the medicinal plants using various techniques such as FTIR, HPTLC and GC-MS analysis⁵.

The FTIR (Fourier Transform Infrared) Spectroscopy is one of the extensively used method to sort out the chemical constituents and has been used as a essential method to recognize the medicines for pharmacopeia in several countries⁶. Phytochemical and FT-IR spectral analysis of *Carallumageniculata* Grev. Et Myur., the result of the nearby study along with previous studies show the presence of valuable compounds present in the plant. The study also justified the uses of the plant in the treatment of various diseases, ornamental and edible values. Extension of study on the same plant is required to identify, isolate, distinguish and make clear the structure of bioactive compounds present in it as there is no comprehensive study on this plant⁷.

The biochemical or metabolic fingerprint of the leaf extract of *N. plumbaginifolia* was generated by FT-IR technique which is very exclusive and therefore useful as a benchmark in quality control of the plant drug in its crude form. By attaining IR spectra from plant samples, it might be possible to become aware of the minor changes of primary and secondary metabolites.⁸

Carica papaya and Acetaminophen have been compare through the Fourier Transform Infrared spectrum, it should be noted that both have transmittance peaks at 3000 to 3500cm⁻¹. It gives just round the corner to support the role of papaya leaves acting as antipyretic, analgesic similar to paracetamol and also its role to pick up the platelet counts for dengue

affected patients⁹. Tribulus terrestris leaf extract have been studied which deals with the investigation of Fourier-transform infrared spectroscopy (FTIR) spectrum, shows the carboxylic acid, alkane, aldehyde, unsaturated ketone, phenol, anhydride and halogen compound¹⁰. FTIR(Fourier Transform Infrared) is Most suitable technique used for such studies which is non-destructive, cost effective, user and environment friendly. *Mentha spicata* L. or garden mint cultivated under normal atmospheric situation. The flowers and remaining non-flowering part were plucked and kept in under shade for 40 days to avoid photochemical changes. Flowers and non-flowering parts were grinded to fine powder and were investigated using FTIR spectroscopic technique. The FTIR spectral lines have shown different distinguishing peaks of functional groups. As a result, alkanes, alkenes, alcohols, phenols, and aromatics etc. have been investigated¹¹.

EXPERIMENTAL:-

Collection of Plant :-

First the site was selected in Nagthana, Tal-Warud, Dist-Amravati of Maharashtra State (Area from the border between Madhya Pradesh and Maharashtra). Before picking the whole plant, the soil was moisten. The plants were collected in first week of February-2018. The sample was washed smoothly by distilled water, cut into small pieces then shed dried at room temperature. Sample was crushed separately in pestle-mortar to isolate fine powder. This powder was treated as sample powder for various analyses.

Preperation of Solvent extract:-

5 g. portion of powdered plant materials were each separately dispersed in 100 ml of each water, ethanol, acetone, petroleum ether. The solution was left to stand at room temperature for 24 hrs and was filtered with whatman No. 1 filter paper. The filtrate was used for the spectroscopical analysis using the following test.

Preparation of sample for Infrared Spectrophotometer [FTIR] analysis :-

The extract was encapsulated separately in KBr pellet, to prepare translucent sample discs. The sample was loaded in FTIR spectroscope with scan range from 600 to 4000 cm⁻¹ (Agilent Technologies Ltd., Model No. Cary 630.).

A) FTIR Spectral Data Interpretation of root *Hemidesmus Indicus*.

1) Acetone Extract:-

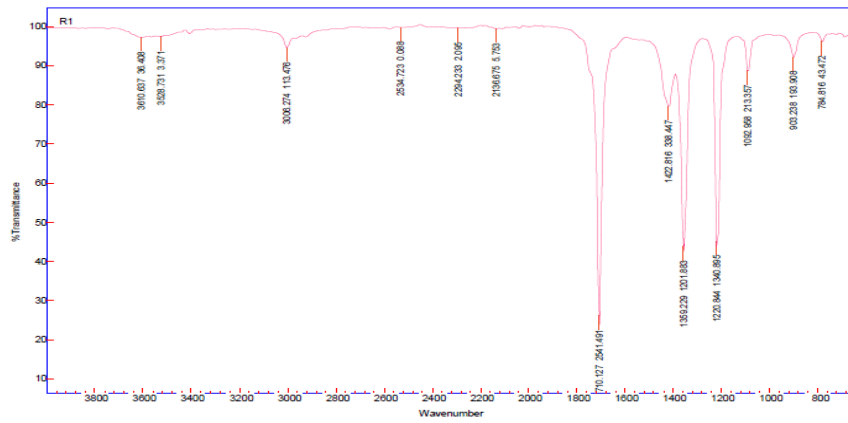
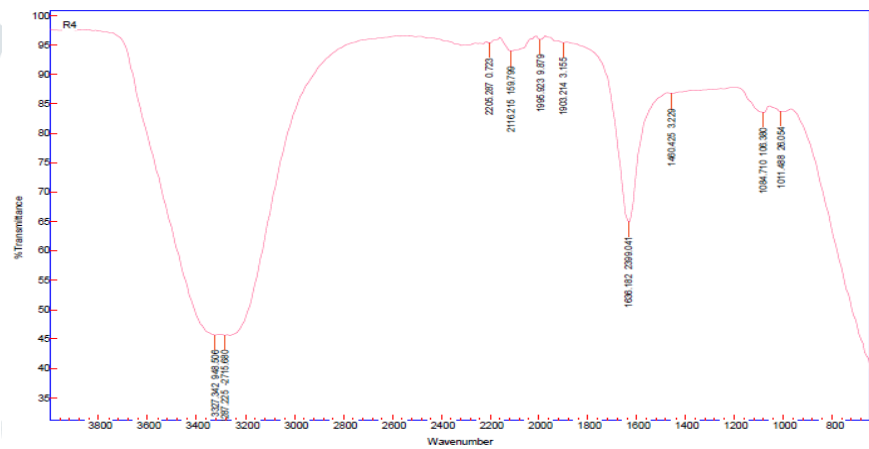


Fig 1-FT-IR spectra of Acetone Extract of root *Hemidesmus Indicus*.



2) Distilled Water extract :-

Fig 2-FT-IR spectra of Distilled Water Extract of root *Hemidesmus Indicus*.

3) Ethanol extract:-

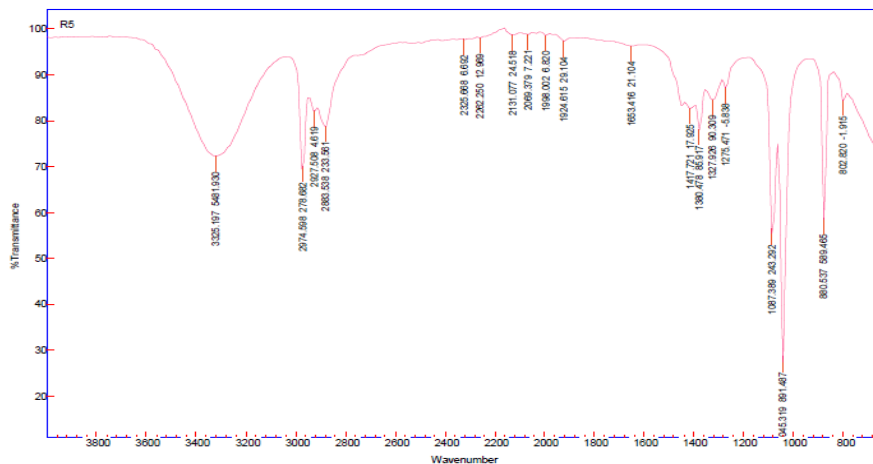


Fig 3-FT-IR spectra of Ethanol Extract of root *Hemidesmus Indicus*.

4) Petroleum Ether Extract:-

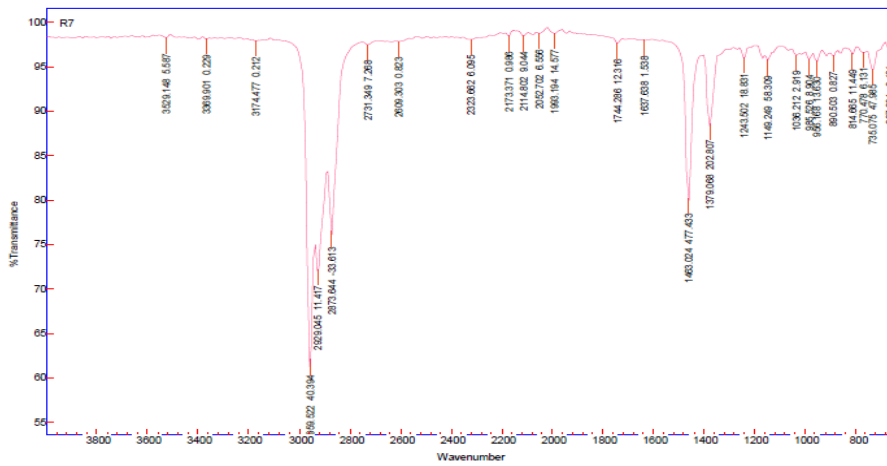


Fig 4-FT-IR spectra of Petroleum Ether Extract of root Hemidesmus Indicus.

B) FTIR Spectral Data Interpretation of root Hemidesmus Indicus.

1) Acetone Extract:-

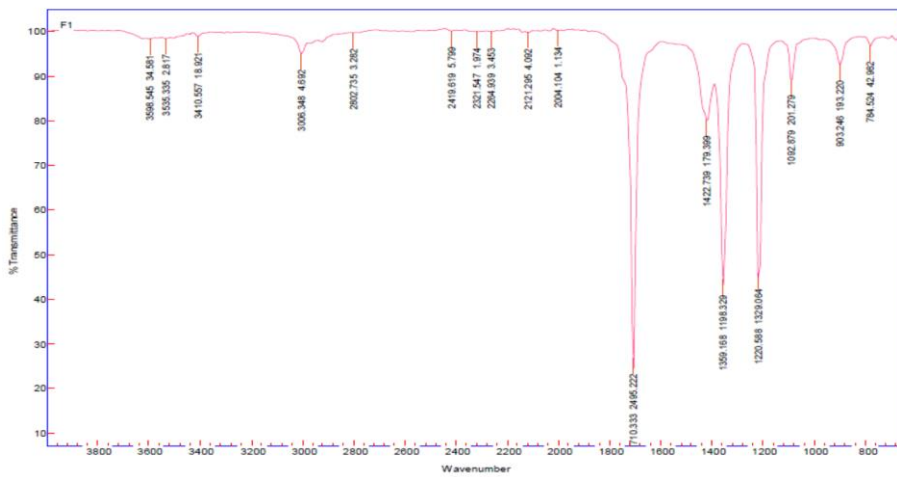


Fig 1-FT-IR spectra of Acetone Extract of Dioscorea Bulbifera.

2) Distilled Water Extract:-

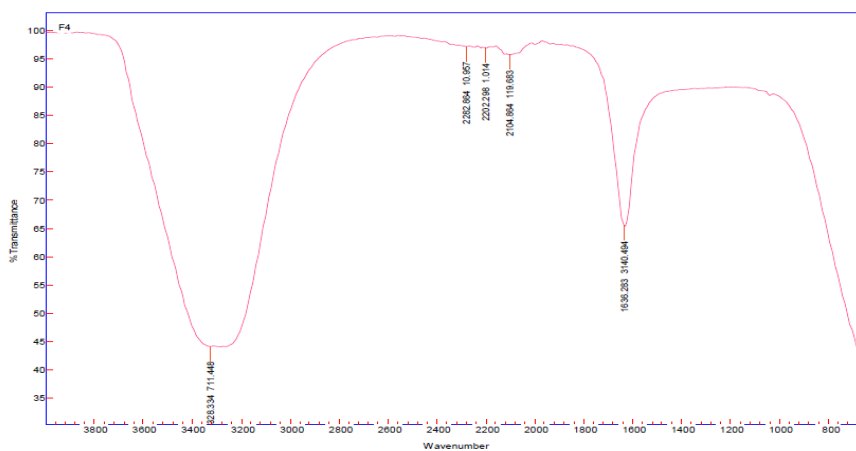


Fig 2-FT-IR spectra of Distilled Water Extract of Dioscorea Bulbifera

3) Ethanol Extract:-

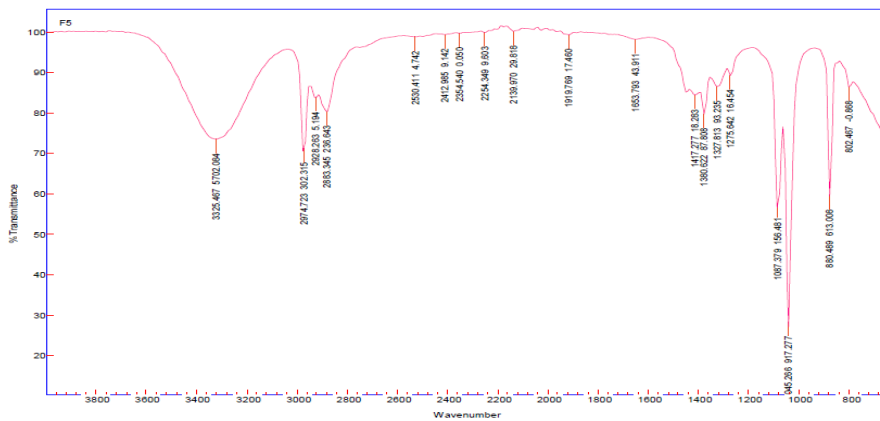


Fig 3-FT-IR spectra of Ethanol Extract of Dioscorea Bulbifera.

4)Petroleum Ether Extract:-

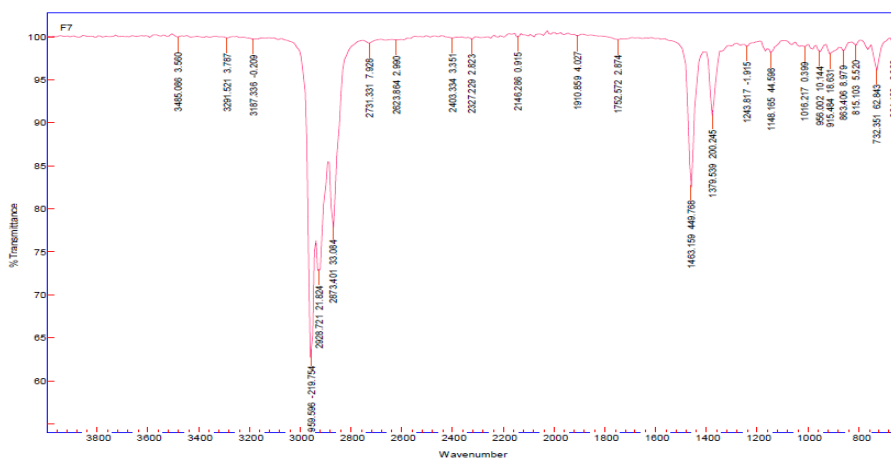


Fig 4-FT-IR spectra of Petroleum Ether Extract of Dioscorea Bulbifera.

RESULTS AND DISCUSSION

A) FTIR Spectral Data Interpretation of root Hemidesmus Indicus.

1)Acetone Extract:-

Acetone extract of root of Hemidesmus Indicus exhibited a characteristics band at 903cm^{-1} (=C-H) for Alkene, at 1220cm^{-1} (C-O) for Acid, at 1359cm^{-1} (C-N) for Amine & (N-O) for Nitro, at 1422cm^{-1} (C=C) for Aromatic & (-C-H) for Alkane,at 1710cm^{-1} (C=O) for Carbonyl & (C=O) for Acid & Ketone (Acyclic).

2) Distilled Water Extract:-

Distilled Water extract of root of Hemidesmus Indicus exhibited a characteristics band at 1084cm^{-1} (C-F) for Alkyl Halide & (C-O) for Ether & Ester, at 1636cm^{-1} ,(C=C) for Alkene, at 2116cm^{-1} (-C C-) for Alkyne, at 3287cm^{-1} (O-H) for Alcohol & (O-H) for Acid & (N-H) for Amide

3) Ethanol Extract:-

Ethanol extract of root of *Hemidesmus Indicus* exhibited a characteristics band at 880cm^{-1} (=C-H) for Alkene, at 1087cm^{-1} (C-O) for Ether & (C-F) for Alkyl Halide, at 1380cm^{-1} (C-F) for Alkyl Halide, at 2974cm^{-1} (O-H) for Alcohol, at 3325cm^{-1} (N-H) for Amine.

4) Petroleum Ether Extract:-

Petroleum ether extract of root of *Hemidesmus Indicus* exhibited a characteristics band at 1243cm^{-1} (C-O) for Ether, at 1379cm^{-1} (-C-H) for Alkane, at 1463cm^{-1} (C=H) for Aromatic, at 2873cm^{-1} (C-H) for Alkane & (O-H) for Acid, at 2959cm^{-1} (C-H) for Alkane.

B) FTIR Spectral Data Interpretation of *Dioscorea Bulbifera*.

1) Acetone Extract:-

Acetone extract of fruit of *Dioscorea Bulbifera* exhibited a characteristics band at 1220cm^{-1} (C-F) for Alkyl Halide, (C-O) for Ether, at 1359cm^{-1} (-C-F) for Alkane, at 1422cm^{-1} (-C-H) for Alkane, at 1710cm^{-1} (C=O) for Carbonyl.
of fruit

2) Distilled Water Extract:-

Distilled Water extract of *Dioscorea Bulbifera* exhibited characteristics band at 1636cm^{-1} (C=C) for Alkene, 2014cm^{-1} (-C \equiv C) for Alkyne, 3328cm^{-1} (O-H) for Alcohol & (N-H) for Amine.

3) Ethanol Extract:-

Ethanol extract of *Dioscorea Bulbifera* exhibited characteristics band at 880cm^{-1} (=C-H) for Alkene, at 1045cm^{-1} (C-O) for Ether & Ester & (C-F) for Alkyl Halide, at 1380cm^{-1} (-C-H) for Alkene, at 2974cm^{-1} (O-H) for Acid, at 3325cm^{-1} (O-H) for Alcohol.

4) Petroleum Ether Extract:-

Petroleum Ether extract of *Dioscorea Bulbifera* exhibited characteristics band at 732cm^{-1} (C-Cl) for Alkyl Halide, 1148cm^{-1} (C-O) for Ether & Ester, 1463cm^{-1} (-C-H) for Alkane & (C=C) for Aromatic, at 2873cm^{-1} (C-H) for Alkene & (O-H) for Acid, at 2959cm^{-1} (C-H) for Alkene.

CONCLUSION:-

The occurrence of distinguishing functional group ketones, Aldehydes, carboxylic acids, Ester, Amines, Alkane, and Amides are to blame for various medicinal property of Root Of *Hemidesmus Indicus* And *Dioscorea Bulbifera*, The above functional groups are present in the

nucleus of the drug like Ibuprofen, Paracetamol, Gatifloxin, Amoxilin etc. Phytopharmaceuticals also called as herbal drugs, which are playing a most important role in the treatment of diseases for which there have been no drugs in the western world in the recent times.

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