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FTIR Spectroscopic Analysis of Leaf Extract in Hexane in *Jasminum Azoricum* L.

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ABSTRACT

The present study was aimed to identify the functional groups present in leaf extract in Hexane of *Jasminum azoricum* L., a critically endangered (CR) species, through Fourier Transform Infrared Spectroscopy (FTIR).The FTIR Spectroscopic studies revealed different characteristic peak values with various functional compounds such as alkanes, carboxylic acid, esters, amines, nitro, alkyl halide and aromatic compounds. The FTIR method was performed on a spectrophotometer system, which is used to detect the characteristic peak values and their functional groups.

Keywords: *Jasminum azoricum* L., FTIR, Spectroscopy, Functional groups

I. INTRODUCTION

Jasmine belongs to the angiosperm family Oleaceae is an essential oil bearing plant. The representatives of the family have a worldwide distribution in tropical, sub-tropical and temperate regions [9]. Jasminum is the largest genus of the order Oleales comprises about 300[3] species or approximately 200 species [6].

"Yasmyn" the Arabic word means fragrance from which the Jasmine is derived. Botanist Carl Von Linnaeus named the plants from the word "Yasmin" [10]. They are horticulturally and agriculturally important. Jasminum flowers are considered as spiritual flowers in India. The genus *Jasminum azoricum* L., is a strong growing woody wine which climbs up to 20 or more feet in height and produce a dense cover. The species is assessed as Critically Endangered (CR) for the IUCN European Red List [5].

The use of IR spectroscopy for the analysis of biological samples was first suggested in 1940s, the technique was being successfully explored for the study of biological materials. IR spectroscopy has become an accepted tool for the characterization of biomolecules [12]. FTIR spectroscopy is one of the most widely used methods to identify the chemical constituents and elucidate the compound structures to propose in medicinal purposes [2] [13]. In the present investigation hexane extract of leaves of *J. azoricum* L., were analyzed. With this background the study was aimed to report the main functional components present in leaves.

II. MATERIALS AND METHODS

2.1 Collection of plant materials

The materials were collected from Arpookara (9^0 38'N: 76^0 30' E) of Kottayam district, Kerala, India and was authenticated for the species *Jasminum azoricum* L., and the family Oleaceae. The voucher specimen was prepared and deposited in the herbarium of the Department of Botany, C. M. S. College, Kottayam.

2.2 Preparation of plant extract

The mature leaves were collected from the mother plant; leaves were detached and dried in shade at ambient temperature for a period of three weeks. The well dried samples were powdered separately by using

an electric blender. The powdered plant part (leaves) 1 gm was extracted in 10 ml of Hexane with continuous shaking on mechanical shaker for 24 hrs at room temperature. The extracts were then filtered through Whatmann No: 1 filter paper. The extracts were used for further analysis [14].

2.3 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 $^{-1}$ (Shimadzu, Model No. IR- Prestige 21).

III. RESULTS AND DISCUSSION

The FTIR spectrum was used to identify the functional groups of the active components in the plant sample based on the peak value in the region of Infrared radiation [7]. The leaf extract of *J. azoricum* in hexane gave the following characteristic absorption peaks (Figure-1 & Table-1).

The absorption spectra of *J. azoricum* L., exhibited a peak at 2960.73 represented the presence of alkane (C-H stretch) and carboxylic acid (O-H stretch). The peak at 1739.40 showed the presence of ester (C-O stretch) and aldehyde (C-O stretch). The peak at 1462.04 showed the presence of aromatic (C=C stretch). The peak at 1380.36 represented the presence of nitro (N-O stretch) and alkane (-C-H bending). The peak at 1022.12 represented the presence of amines (C-N stretch), esters (C-O stretch) and alkyl halide (C-F stretch). The peak at 769.59 exhibited the presence of esters (S-OR stretch), amines (N-H stretch), alkyl halide (C-Cl stretch) and alkene (=C-H bending).

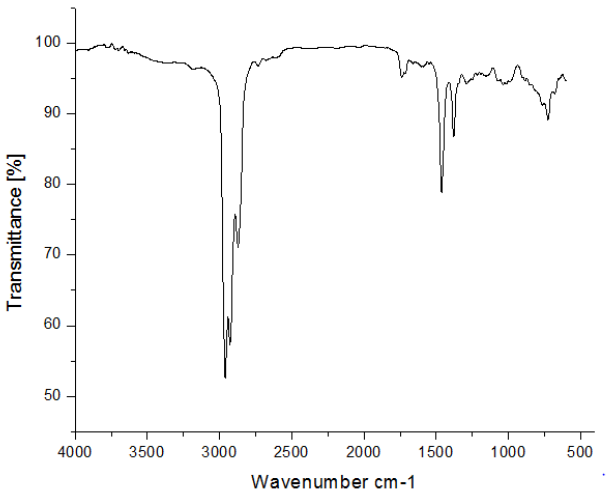

Figure 1: FTIR analysis of *Jasminum azoricum* L., leaves in hexane extract

Table-1: FTIR peak values and functional groups in hexane extract of *Jasminum azoricum* L., leaves.

SL. NO	Wavenumber (cm^{-1})	Frequency ranges (cm^{-1})	Functional Groups
1	2960.73	2500 – 3300	Alkane, carboxylic acid
2	1739.40	1720 – 1750	Ester, aldehyde
3	1462.04	1450 – 1600	Aromatic
4	1380.36	1345 – 1480	Nitro, alkane
5	1022.12	1000 – 1400	Amines, esters, alkyl halide
6	769.59	660 – 1000	Esters, amines, alkyl halide, alkene

The infrared spectrum with a frequency, ranges from 2850-3000 cm-1, 1735-1750 cm $^{-1}$, 1450-1600 cm^{-1}, 1345-1385 cm^{-1}, 1000-1250 cm^{-1} and 700-900 cm^{-1}; the peaks are probably of alkane, esters, aromatic, nitro and amines.

The stretches such as C-H, C=O, C=C, N-O, C-N and S-OR with the nearest range representing the same functional groups reported by Hanson *et al.*, (2016) [8]; Adina *et al.*, (2012) [1], Donald *et al.*, (2001)[4] and IOCD[11].

IV. CONCLUSION

The results of the present study showed the presence of alkanes, amines, aldehydes, carboxylic acids, aromatic, nitro, esters, and alkyl halides in the leaves of *Jasminum azoricum* L., with their phytoconstituents and subjecting it to biological activity will definitely give fruitful results. So it is recommended for further spectroscopic studies to elucidate the structure, identification, bioactivity, toxicity profile, effect on the ecosystem and also agricultural products.

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