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# IR Spectroscopic Analysis of Critically Endangered Jasminum Species

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**Abstract:- The present study was aimed to analyze the Acetone extract of leaves of *Jasminum azoricum* L., through Fourier Transform Infra-Red (FTIR) spectroscopic method. FTIR spectroscopic studies revealed different characteristic peak values with various functional compounds such as amines, alcohols, amides, aldehyde, carboxylic acid, alkane, sulfate, aromatic, phosphoramide, alkyl halide, ether, sulfonyl chloride, nitro, thiocarbonyl, ketone, lactams, alkenes, and esters. The results generated the FTIR spectrum profile for the critically endangered *Jasminum azoricum* L.**

***Keywords***:- *Jasminum Azoricum L., FTIR, Spectroscopy, Functional Compounds*

## 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 [8]. Jasminum is the largest genus of the order Oleales comprises about 300[3] species or approximately 200 species [5].

"Yasmyn" the Arabic word means fragrance from which the Jasmine is derived. Botanist Carl Von Linnaeus named the plants from the word "Yasmin" [9]. 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 produces a dense cover. The species is assessed as Critically Endangered (CR) for the IUCN European Red List [4].

The use of IR spectroscopy for the analysis of biological samples was first suggested in the 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 [11]. 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] [12]. In the present investigation acetone extract of leaves of *J. azoricum* L., were analyzed [13]. With this background, the study was aimed to report the main functional components present in leaves.

## II. MATERIALS AND METHODS

### *A. Collection of Plant Materials*

The materials were collected from Arpookara (90 38‟N: 760 30‟ E) of Kottayam district, Kerala, India and were 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.

### *B. 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 Acetone with continuous shaking on a mechanical shaker for 24 hrs at room temperature. The extracts were then filtered through Whatman No: 1 filter paper. The extracts were used for further analysis [14].

### *C. 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 a 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 [6]. The leaf extract of *J. azoricum* in acetone gave the following characteristic absorption peaks (Figure-1 & Table-1).

The absorption spectra of *Jasminum azoricum* L. exhibited a peak at 3414 represented the presence of amines (N–H stretch), alcohols (O–H stretch) and amides (N–H stretch). A peak at 2843.71 represented the presence of aldehyde (C–H stretch) and carboxylic acid (O-H stretch). A peak at 2924.08 exhibited the presence of alkane (C–H stretch) and carboxylic acid (O–H stretch). The peak at 1653.04 showed the presence of alkene (C=C stretch) and amides (C=O stretch). The peak at 1445.13 showed the presence of sulfate (S=O stretch), alkane (C-H stretch) and aromatic (C=C stretch). The peak at 1222.83 represented the presence of phosphoramide (P=O stretch), amines (C-N stretch), ester (C-O stretch), carboxylic acid (C-O, stretch), alkyl halide (C-F stretch) and ether (C-O stretch). The peak at 1365.60 exhibited the presence of sulfonyl

chloride (S=O stretch), nitro (N=O stretch) and alkyl halide (C-F stretch). The peak at 1078.20 exhibited the presence of alcohol (C-O stretch), thiocarbonyl (C=S stretch), ether (C-O stretch), ester (C-O stretch), and alkyl halide (C-F stretch). A peak at 1708.93 showed the presence of ketone (C=O stretch), carboxylic acid (C=O stretch), carbonyl (C=O stretch) and lactams (C=O stretch). A peak at 1509.10 showed the presence of aromatic (C=C stretch).

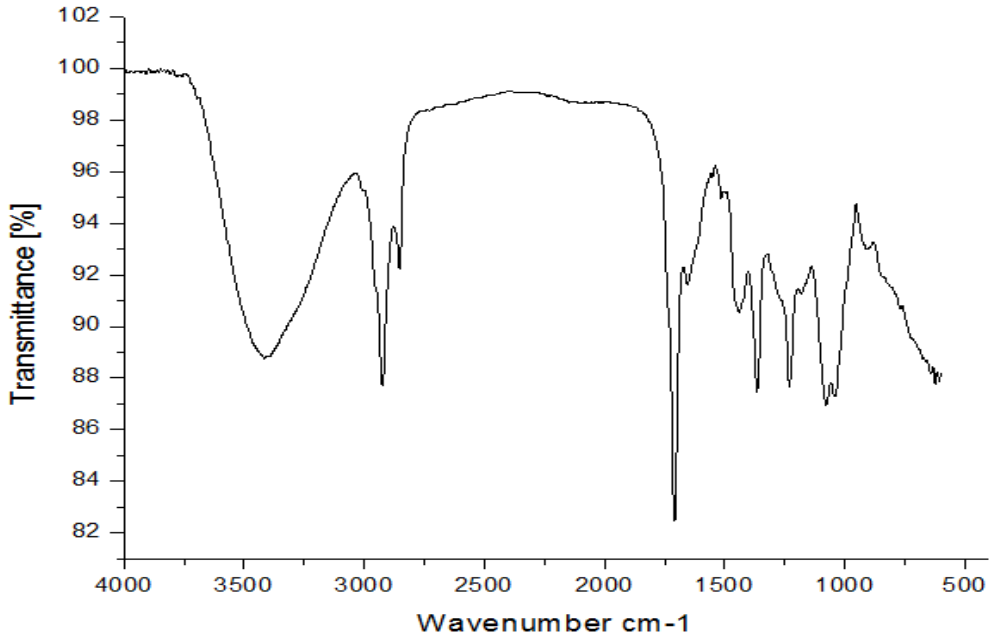


Fig 1:- FTIR Analysis of *Jasminum Azoricum* L., Leaves in Acetone Extract

| SL. NO | Wave number ($cm^{-1}$) | Frequency ranges ($cm^{-1}$) | Functional Groups |
|---|---|---|---|
| 1 | 3414 | 3100 – 3550 | Amines, alcohol, amide |
| 2 | 2843.71 | 2700 – 3500 | Aldehyde, carboxylic acid |
| 3 | 2924.08 | 2500 – 3300 | Alkane,carboxylic acid |
| 4 | 1653.04 | 1620 - 1695 | Alkene, amides |
| 5 | 1445.13 | 1350 - 1600 | Sulphate, alkane, aromatic |
| 6 | 1222.83 | 950 – 1300 | Phosphoramide, amines, esters, Carboxylic acid, alkyl halide, ether |
| 7 | 1365.60 | 1000-1400 | Sulfonyl chloride, nitro, alkyl halide |
| 8 | 1078.20 | 1000-1400 | Alcohol, thiocarbonyl, ether, ester, alkyl halide |
| 9 | 1708.93 | 1670-1750 | Ketones, Carboxylic acid, carbonyl, lactams |
| 10 | 1509.10 | 1450-1600 | Aromatic |

Table 1:- FTIR Peak Values and Functional Groups in Acetone Extract of *Jasminum Azoricum* L., Leaves

The infrared spectrum with a frequency, ranges from 3400-3500 $cm^{-1}$, 2700-2900 $cm^{-1}$, 2850-3000 $cm^{-1}$, 1620-1680 $cm^{-1}$, 1350-1450 $cm^{-1}$, 1200-1275 $cm^{-1}$, 1365 ± 5 $cm^{-1}$, 1050-1150 $cm^{-1}$ and 1700-1725 $cm^{-1}$; the peaks are probably of amines, aldehyde, alkane, alkene, sulphate, phosphoramide, sulfonyl chloride, alcohol and ketone.

The stretches such as N-H, C-H, C=C, S=O, P=O, C-O and C=O stretch with the nearest range representing the same functional groups reported by Adina *et al*., (2012)[1], Hanson, *et al*., (2016) [7], and IOCD [10].

## IV. CONCLUSION

The results of the present study showed the presence of alkanes,alcohol, amide, alkene, sulphate, phosphoramide, ether, ketone, lactams, 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 activitywill definitely give fruitful results. So it is recommended for further spectroscopic studies to elucidate the structure, identification, bioactivity, toxicity profile, the effect on the ecosystem and also agricultural products.

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