Abstract

The spectroscopic analysis of *Inonotus rickii*(Pat.) D.A. Reid has been carried out using IR spectroscopy. The analysis gave the spectra generated gives a lot of information about the molecules, especially about the functional groups associated like C≡N, C=O (Amide), C−O in Ethanol extract, C=O (Ketone), N−O, C−N &OH (aromatic) in Ether extract & C≡N, C−O, N=N in water extract.

Key Words: Extract, *Inonotus*, IR, pathogenic & spectroscopic

Introduction:

*Inonotus rickii* (Pat.) D.A. Reid is a pathogenic fungus belongs to Hymenochaetaceae family from Basidiomycetes. It’s also called a wood rotting fungus in common belongs to Hymenochaetales order. There are total 19 species from India and 269 records from World of the *Inonotus* are reported. This is considered as a severe pathogen of roadside trees. Although it’s parasitic but surprisingly its spectroscopic analysis gave a very significant results which maybe applicable for the medicinal purpose.


Basidiocarps annual, sessile, applanate to ungulate, single to imbricate, apparently up to several cm wide and at least 5 cm thick, at first soft and fleshy and then becoming firm and finally crumbly and dusty as chlamydospore formation progresses, upper surface at first tomentose, golden brown, becoming rough and dark rusty brown on older specimens, pore surface pale brown, pores angular, 2-3 per mm, context becoming dark rusty brown, conspicuously concentrically zonate, firm or eventually crumbling into a mass of chlamydospores, up to 6 cm thick, tube layer pale brown, up to 8 mm thick, firm but easily sectioned. Ptychogastric stage developing as a cushion shaped mass of brown tissue, soft and fleshy at first, exuding clear droplets of exudate from the entire surface, moist and velvety to the touch, up to 20 cm wide, 25 cm deep, and 15 cm thick, the entire structure resembling a sessile *Inonotus* basidiocarp but no tube layer ever develops, within a few weeks the fruiting body becomes drier and firmer and broken pieces show the crumbly and dusty texture resulting from chlamydospore formation. Hyphal system monomitic with setal hyphae, contextual generative hyphae thin to moderately thick-walled, almost hyaline to yellowish brown, occasionally branched, pale brownish, simple-, septate, 3.5-5 µm in diameter.

**Substrata:** Dead hardwoods of many kinds like *Delonix regia*, *Pongamia glabra*, *Tamarindus indica*, *Saphodia campanulata* etc. **Distribution:** United States (Florida, Louisiana, and Arizona) and only in the ptychogastric stage. Its true distribution in the Neotropics is unknown. Widespread in the tropics.
Fig. No.01 Inonotus fruitbody

Materials and methods:

Collection & Authentification of the fungal sample:
The sample of crude powder of the anamorph Inonotus was collected from Delonix regia (Boj. Ex Hook.) Raf. Stem in BSI (Botanical Survey Of India), Pune, Maharashtra, India. The study is mainly based on the material of Inonotus fungus was collected from Botanical survey of India at Pune, Maharashtra. The dried materials were examined using an Magnus C× 40 microscope fitted with a drawing tube. The measurement & drawings were made from slide preparations stained with cotton blue, Melzer’s solution. The dried powder has been authenticated by Dr.Kiran Ranadive, A.M. Mahavidyalaya, Hadapsar.

Soxhlet Apparatus:- Among the total quantity of sample, a weighted quantity of 50gm was used for extraction. The extraction was done by using Soxlet apparatus in different solvent systems like ether, ethanol and water.

IR Theory:-

IR spectroscopy is the spectroscopic technique which uses the Infrared light and studies its interaction with the molecules. The spectra generated can give a lot of information about the molecule, especially about the functional groups associated. For a continuous Infrared radiation, the IR instrument has a solid material (maybe metal) which is heated to a high temperature at about 2000K-3000K. The heated material will emit the IR. The other sources are The Nernst glower (uses rare earth oxides) and the Globar source (silicon carbide) The IR is then allowed to separate from the gratings. A chopper is placed inside the instrument which chops the IR at regular intervals and directs them in two directions simultaneously. There are two cuvettes placed.
One is the reference, and the other contains the sample. Thus, chopper makes sure that the IR from the same source and same wavelength passes through both the sample container simultaneously. The chopper rotates at the rate of 10 rotation per second. Every molecule has a unique IR spectra. The IR spectra of any two molecules cannot be same. For example, the IR spectra of chloroethane and chloromethane would be different.

In IR spectroscopy, we check for the transmittance of the IR. If there is any bond vibrating at the frequency equal to the frequency of the IR, then the IR would be absorbed. Thus, the transmittance would significantly decrease for that particular frequency. Very bond will absorb at a unique frequency (or wavenumber) of the IR. The single bonds such as C-H, C-N, etc. show stretching vibrations. Thus, they absorb at high frequency or wavenumber. They absorb the IR at nearly 3600–2700 (1/cm). Similarly, owing to the strength of the pi bonds, the triple bonds will absorb the IR just below the 2700 (1/cm). The absorption of IR by double-bonded atoms, such as C=O, C=N, and exceptionally N-H bending is observed in the range of 2000–1500 (1/cm). Below this region, Fingerprint region is present. This region can give precise information about the functional group, and it includes bending vibrations.

Fig. No. 2 Graphs of IR:-Ethanol Inonotus
Fig. No. 3 Graphs of IR:- Ether *Innonotus*

Fig. No. 4 Graphs of IR:- Water *Innonotus*
Result of IR graphs in different solvent systems:

A) Ethanol *Inonotus* –
The solid state IR (KBr, cm\(^{-1}\)) spectrum of ethanol *Inonotus* revealed the C≡N at 2353.23 cm\(^{-1}\), C=O (Amide) at 1658.8 cm\(^{-1}\), C-O at 1280.78 cm\(^{-1}\), CH-stretching at 2856.7 cm\(^{-1}\), OH (Aromatic) at 3371.68 cm\(^{-1}\) & N=N at 1458.23 cm\(^{-1}\).

B) Ether *Inonotus* –
The solid state IR (KBr, cm\(^{-1}\)) spectrum of ether *Inonotus* revealed the C≡N at 2360.95 cm\(^{-1}\), C=O(Ketone) at 1717.85 cm\(^{-1}\), N-O at 1388.79 cm\(^{-1}\), C-O at 1041.60 cm\(^{-1}\), CH stretch at 2947.47 cm\(^{-1}\), OH (aromatic) stretch at 3302.2 cm\(^{-1}\), C-N at 1172.76 cm\(^{-1}\) and N=N at 1543.10 cm\(^{-1}\).

C) Water *Inonotus*-
The solid state IR (KBr, cm\(^{-1}\)) spectrum of water*Inonotus* revealed the C≡N at 2353.23 cm\(^{-1}\), C=O(Amide) at 1658.8 cm\(^{-1}\), C-O at 1280.78 cm\(^{-1}\), CH-stretch at 2856.7 cm\(^{-1}\), OH(aromatic) at 3371.68 cm\(^{-1}\) and N=N at 1458.23 cm\(^{-1}\).

Table No.: 01 IR conclusion’s:-

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<tr>
<th>Sample Name</th>
<th>C≡N</th>
<th>C=O</th>
<th>N-O</th>
<th>C-O</th>
<th>CH-stretch</th>
<th>OH (Aromatic)</th>
<th>C-H</th>
<th>N=N</th>
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<tbody>
<tr>
<td>Water <em>Inonotus</em></td>
<td>2353.23</td>
<td>1604.83</td>
<td>1388.79</td>
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<tr>
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<td>1712.85</td>
<td>1465.95</td>
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<td>2947.47</td>
<td>3302.2</td>
<td>1172.76</td>
<td>1543.10</td>
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<tr>
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<td>1658.8</td>
<td>-</td>
<td>1280.78</td>
<td>2856.7</td>
<td>3371.68</td>
<td>-</td>
<td>1458.23</td>
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