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Nitrogen Laser Excitation Fluorescence Spectral Study Is The Perfect Tool For Detection Of Health Status Of Plants.

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Abstract: Laser induced fluorescence spectra and synchronous luminescence spectra of leaves of plants belonging to various families. The nitrogen laser induced fluorescence spectra of different leaves at five positions of abaxial and adaxial surfaces have been recorded and compared. The fluorescence spectra show variation from family to family. The spectra show characteristics features of the position of leaves. The synchronous luminescence spectra show much variation in the structure of peaks depending upon the family to which the plants belong. The luminescence specta show very distinct features so that the families of the plants may be identified. We hope that the medicinal and non medicinal plants also may be identified from the detailed fluorescence spectral study.

Introduction

In the present work we use the fluorescence spectra of plant leaves for the study of plant classification and health, It is also proposed that the LIF spectral study in helps in finding out different plants of various categories such as medicinal and non medicinal plants.

Present Work

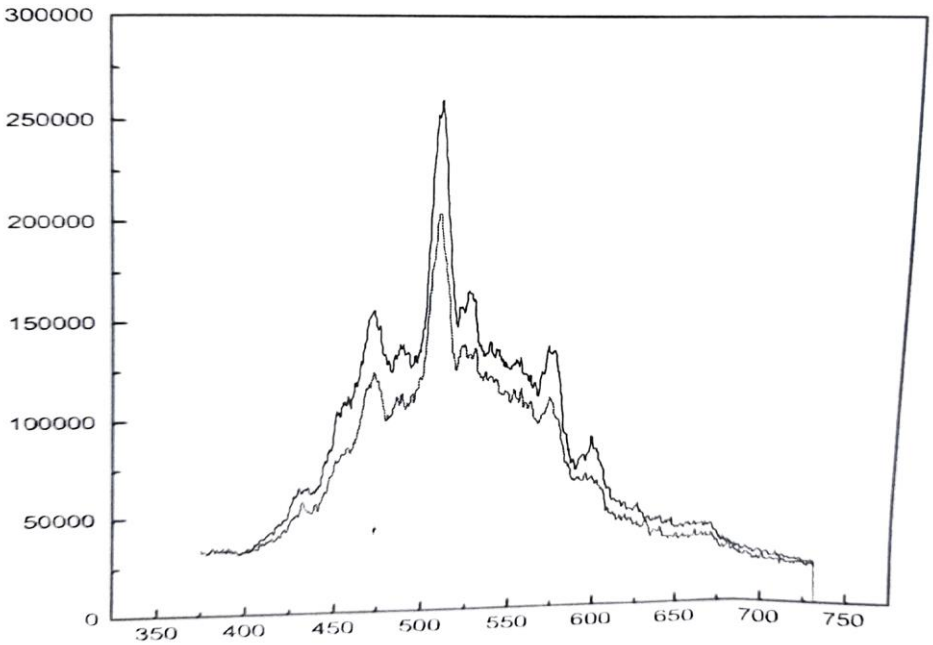
Here we use Nirogen laser as an excitation source and wavelength of 280 nm. and record fluorescence spectra of different plant leaves. We record LIF spectra at five positons on adxial and abxial surfaces and compared with each other. Further, we record a fluorescence spectrum of the plant leaf of various categories such as medicinal and non medicinal plants, different plant families.

And also healthy and stressed plants. Typical set of laser induced fluorescence spectra are shown in the figure.

Experimental Set up

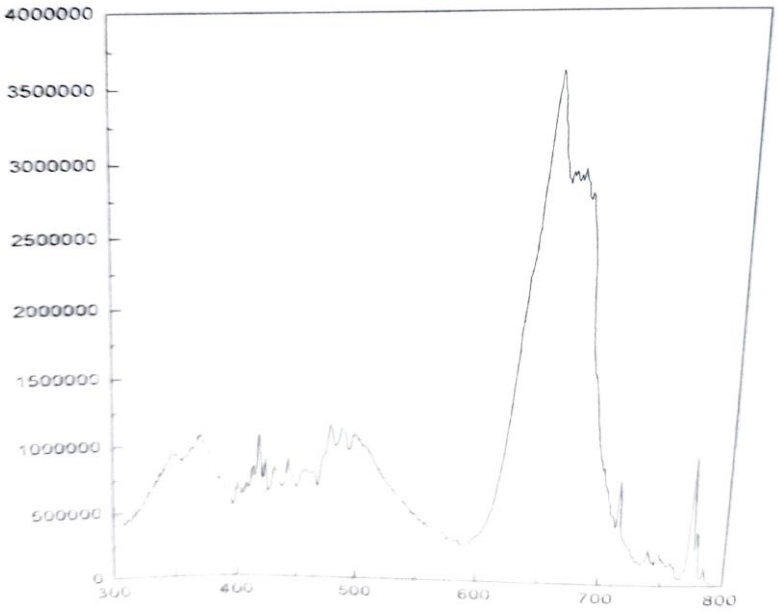
Experimental arrangement for recording the fluorescence spectra of plant leaf consist of nitrogen laser, sample holder, prism monochromater, photo multiplier tube with its power supply and storage oscilloscope. The block diagram of the experimental arrangement used for the measurement of the fluorescence spectra is shown in the fig.1. Nitrogen laser is used as source of excitation.The sample holder fixes the sample under investigation in a particular position so as to get the spectra. Prism is used as a dispersing element in the monochromater. Position of the prism selects the wavelength reaching to the

photomultiplier tube which records the fluorescence signal. This amplified signal is measured with the storage oscilloscope to get the information about the intensity at that wavelength and the temporal behavior of the fluorescence spectra The signal at other wavelengths can be obtained by rotating the prism. In this way complete fluorescence spectra can be obtained by rotating the prism and recording the signal.



.7 : Fluorescence spectrum of the leaf of Bryophyllum calycinum.

fig (a)



: Synchronous Luminescence Spectrum of leaf of Bryophyllum calycinum.

fig. (b)

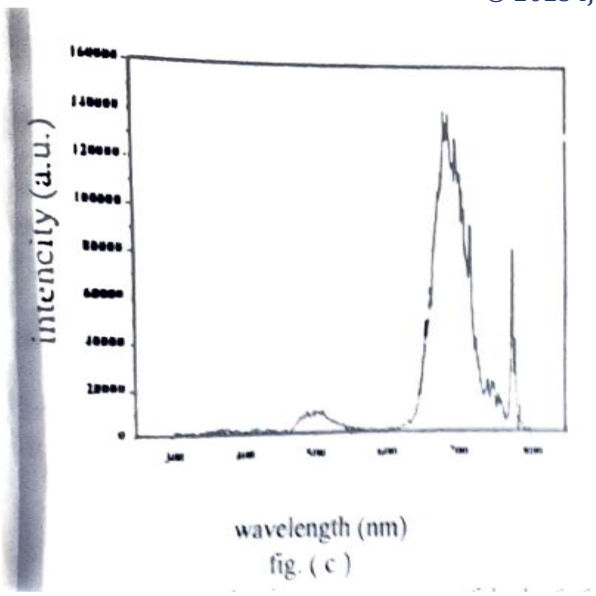


fig. (c)

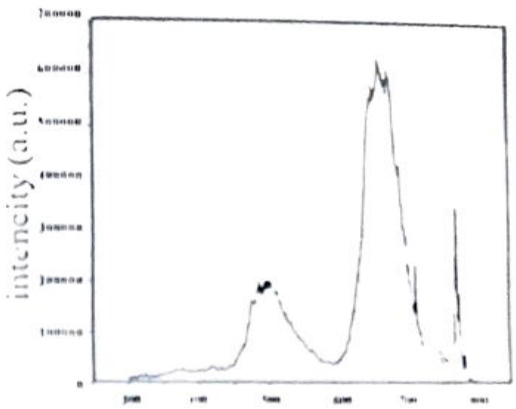


fig. (d)

Result and Discussion

Nitrogen laser as an excitation source, fluorescence and synchronous luminescence spectra is recorded. The fluorescence spectrum of the leaf of Bryophyllium calycinum fig (a) shows relatively intense fluorescence spectrum. The synchronous luminescence spectrum is in fig. (b) given by the plant of this family has very broad emission band between 330 nm to 520 nm. The plant of this family has very broad peak showing small structures. Whereas the fluorescence spectrum of the leaf belonging to the family Moraceae fig (¢) show very less intensity and contains a single broad peak near S00 nm. The fluorescence spectrum of the leaf belonging to the family Liliaceae fig (d) shows high intensity broad peak near 500 nm. In synchronous luminescence specta we get more resolved structure.

We summarized the spectrum data analysis of the fluorescence spectral study may help in studying the plant classification and health status of plants.

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