

## PREFACE

Endophytes are groups of microorganisms that are found in various parts of plant tissue without causing any symptoms of the disease. Most endophytes try to live life by a symbiotic relationship with the host plant. Plant endophytic bacteria, like their host plants, have a large and special capacity to produce a variety of bioactive metabolites at large levels, through which it protects its host from various pathogens and herbivores. And at the same time, it also protects its host from various diseases and natural calamities. Once the number of host-endophyte bacteria becomes unbalanced, the disease results in the bacteria's host plant or the host's plant defense mechanism acts to kill pathogenic endophytic bacteria. Whether the interaction between bacteria and host is in a balanced state or in an imbalanced state, depending on the number and generality of partners. and the defenses of the host, the activity and toxicity of bacteria and the external invasion of the host depends on each other. And being influenced by various environmental factors, as well as the correct nutritional status and developmental stages of the partners. Therefore, there is a correlation of commensalism and mutualism between the various reactions invoked in protecting the plant and the demand for the right nutrient of the endophyte. The different roles of natural products in the discovery of new and different bioactive metabolites can be demonstrated by a theoretical analysis of the number and activities of bioactive agents. Which works to tell the correct state of bioactive metabolites.

At least 200,000 natural metabolites with various bioactive and biochemical properties have yet to be discovered, which are being used as a traditional medicine in the treatment

of various diseases. The discovery of various natural bioactive metabolites involves isolation production characterization and structural elucidation steps. Keeping in mind all these steps, a right and active natural drug can be discovered.

Due to the different structural diversity complexity of bioactive metabolites and the different bioactivities of different and pure compounds, scientists are taking great interest in this field, which leads to the discovery of new and advanced bioactive natural products. Biologically active secondary metabolites from marine-derived bacteria have also proven to be of great importance. The finding of new species of endophytic bacteria and the search for new antibacterial substances should continue. The main reason for selecting host plants is the traditional utility of these plants, which use the endophytic bacteria found in different parts of those plants to produce various bioactive metabolites. The refraction of bacterial extracts gives a form of pure bioactive metabolites that enhances its activity.

The following research has reviewed some of the results of antibacterial testing of raw extracts and purified substances obtained from various types of endophytic bacteria. source plant from which they were obtained and in recent years a lots of efforts have been made to identify and characterize the molecules from natural sources which exhibited a great range of clinical and pharmacological properties in different disease (bacterial and fungal infection) conditions, This feature thus made an urgent view for an extensive research on the molecules extracted from plants and their associated microorganisms. In our studies *Adhathoda beddomei* (adosa) plant was chosen as a research material which is an Indian traditional medicinal plant. *Adhatoda Beddomae* (Adusa) belongs to the Acanthaceae family. In which 04 genera and 02 species are found mainly in the tropical and subtropical region of the world. Only two species *Adhatoda Justicia* and *Adhatoda Beddomae* show economic importance.

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## **Thesis organization**

The present thesis includes the introduction and literature review, experimental work and their possible results which are divided into following six chapters.

Chapter 1: In this chapter, we have shared some information about medicinal plant *{Adhatoda Beddomae (Adusa)}* and its various applications as well as its types. And an attempt has also been made to give information about some morphological characters of this plant.

Chapter 2: Through this chapter, we also talked about secondary bioactive metabolites such as what are secondary bioactive metabolites, what are these types, what are the medicinal applications in different fields, and ever since intelligence came to know about it since then, how much was its production and how much production is going on today, give a little information about it is added.

Chapter 3: This Chapter includes the materials and the details of the experimental procedures like on which base, an important medicinal plant was selected, and how the endophytes bacteria were isolated from it. And information about bioactive metabolites production from endophytes bacteria is also given and Process of the Zone of Inhibition and Minimum Inhibitory Concentration (MIC) of Bioactive Metabolites against Human/Plants Pathogenic Bacteria and Fungus is given.

This chapter also includes the different characterizing techniques (NMR, MASS, FT-IR, HPLC and UV-Spectrophotometer) and their functioning in very brief. The details of the experimental procedures of various applications of bioactive metabolites and different media optimization for the enhancement of the bioactive metabolites are discussed in brief.

Chapter 4: By this chapter, we have given information about the production of isolated endophytes bacteria and bioactive metabolites and various techniques used in its separation as well as structural elucidation of bioactive metabolites.

In this chapter itself, we have talked about enhancing the production of bioactive metabolites through various carbon, nitrogen and its different concentration as well as temperature, pH and incubation periods.

And it is through this chapter that we have talked about the Zone of Inhibition and Minimum Inhibitory Concentration (MIC) of different bioactive metabolites against various human/plant pathogenic bacteria and fungi.

Chapter 5 & 6: In this present chapter, through the conclusion, we have talked about the result of this whole research, what was gained from this research and from various topics of this research. And at the same time using citation properly, references have also been included.

In the last, the major outcomes of every chapter are summarized which is followed by the future recommendation of the current research work. Thereafter, the references which have been cited in the entire thesis are presented.