CHAPTER V

CONCLUSION

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Natural products derived from endophytes bacteria that have a very low molecular mass. And this natural product exhibits a specific structural variation that is used to identify new and major structures for various drugs and agrochemicals. The discovery of bioactive compounds from endophytes and endophytes -associated bacteria led to the isolation of seven compounds, four of which are new bioactive metabolites. Which are used to discover new drugs, adopting new approaches driven chemically and biologically? And antifungal and anti-bacterial were demonstrated by these antimicrobial extracts. Furthermore, by adopting a bio-assay approach, the most chemically important substances have been isolated through various techniques in this research. Among the various techniques used for separation were HPLC spectrophotometer column chromatography and TLC. And NMR FTIR, as well as the MASS spectrophotometer, was also used in this research for structural enrichment of various bioactive metabolites. Their promising antibacterial activity against human pathogens produced by endophytes bacteria isolated from host *Adhatoda beddomei* and their minimal inhibitory concentration (MIC) against human pathogens encourage us to obtain distinctly structured bioactive metabolites and to detect these endophytes. The discovery of various bioactive metabolites against the list of pathogens is already in progress. Our observations and research indicate that endophytic bacteria isolated from *Adhatoda beddomei* have the potential to produce various antimicrobial drugs as many new bioactive metabolites have discovered through this research work. These studies support the increasing field that bioactive substances are produced by endophytic bacteria, and this substance is not only included in the host – endophyte interaction but also reflects a wide range of uses in

pharmaceuticals, agriculture and nutraceutical industry. Current studies have indicated that endophytic bacteria are an important repository of various secondary metabolites. Accordingly, the ability to adapt plants to stressful conditions and the important and valuable role of endophytes bacteria against pathogens (infection by environmental conditions) can also be appreciated, and because they remain an important proven source of pharmaceutical importance as well as secondary metabolites, Broad studies of various endophytes bacteria are expected to become an important component of bacteriology. Furthermore, based on rapidly emerging evidence a significant number of drugs by natural means are actually produced by interaction of endophytes and endophytes with their hosts (Maheshwari, 2006). Maximum researchers' attention is naturally getting concentrated day by day in the field of natural products (Newman et al., 2003). Although it is well known that bioactive metabolites are still providing appropriate information on emerging new medicinal lead molecules, despite the varying competition posed by different methods of new drug discovery. Through this research, it has revealed an intention to continue its specific quest primarily for interactions with the potential of bioactive substances as well as their relationship with host plants based on secondary metabolites produced by endophytes and endophytic. In addition, still, some aspects requirement to be resolved before they can be used for the production of bioactive compounds by fermentation of bacteria. Further studies, still, needed to identify the active compounds produced using methods of analytical chemistry. Stress deformity has always been a major problem in this area of research. After keeping in the refrigerator for some time, it has been observed experimentally that the production capacity of bioactive compounds of strains is generally reduced to a few layers, sometimes to undesirable levels. So even when valuable strains are obtained for large-scale fermentation production, maintaining their desirable characteristics during production is also a huge task.

another challenging problem in this regard is that the efficiency of the endophytic bacterial to produce bioactive compounds is not as high as expected because in many previously work in literature it has been reported that yields are generally very low. These are generally from µg/l to less than mg/l and are therefore not yet appropriate for fermentative production on an industrial level (Zhao et al. 2008). Keeping in mind the aforesaid points, an attempt has been made to increase the production of bioactive metabolites through this research. To achieve these goals, we have made various efforts for adaptation to culture environments. These enhance yields to some range, but generally not very satisfactory as we expected. To solve these problems related to bioactive metabolite production, it is necessary to understand explore the underlying mechanism by which endophytes produce bioactive metabolites. Although some information related to this has also been given (Strobel and Daisy, 2003; Schulz and Boyle, 2005; Suryanarayanan et al., 2009), but this information is insufficient. Since it is well known that both bacteria and plants have very complex biochemical pathways and various secondary metabolites, many pathways continue to be involved in the synthesis and production of various bioactive metabolites. In addition to these difficulties related to bioactive metabolite production we have a little information on enzymes and genes involved, and their regulatory mechanisms. According to several research reports, the relationship between a host plant and its endophytes mutually reflects symbiotic life, but how this relationship affects the production of bioactive metabolites remains to be known in detail. These problems need to be thoroughly investigated and studied before bioactive compounds can be produced on an industrial scale by fermentation of endophytic bacteria.

Further investigation related to this subject is highly important. Because the application of this field on a large scale, the discovery of different strains at both the biochemical and molecular levels can be used for pharmaceutical as well as biotechnological applications.

Although endophytes are found colonizing every plant species, still an enormous community of plants belonging to the ecological area remained unexplored for endophytic microbes and their metabolites. Our studies suggest that insidious plants could be a rich and dependable source of genetic diversity and novel endophytes. Overall, the prediction for a scientific breakthrough in this emerging area seems to be promising. The introduction of many new products from novel bioassay systems and modern biochemical separation science is likely to prove to be a boon for mankind. Which will be used to treat various diseases, without any dull result.