Plants and plant products have served mankind as food and medicine since ancient times. However, with the development in science and technology the synthetic drugs took over the herbal drugs. One of the major factors contributing towards adaptation of allopathic drugs was the geographical limits of the desired plants. Besides, crude herbal drugs are usually relatively slow in their action and are required in large quantities.

To overcome a number of side effects manifested by the allopathic system of medicine and the accompanying environmental hazards associated with its production there has been a revival of the herbal cure system. This has led to an upsurge of phytopharmaceutical industries that have embarked upon the production of plant-based herbal drugs products. To fulfill the ever-increasing requirement of such industries that has led to the depletion of various important herbs, in vitro methods are now being exploited for the production of secondary metabolites to ensure continuous supply of the desired product. The technique is fast emerging as a tool for more efficient manipulation for rapid improvement in product yield.

Plant tissue cultures are potentially valuable for studying the biosynthesis of different metabolic processes including secondary metabolites and may also eventually provide an efficient means of commercially important plant products through metabolic engineering and biotransformation.

Heavy metals have proved to be more threatening pollutants. On one hand their uptake and accumulation reduce quantitative and qualitative productivity of plants and on the other hand they cause serious threat to the human life.

Two potential medicinal plants, *Silybum marianum* and *Lepidium sativum* were selected for the present study. *S. marianum* contains silybin a flavolignan, active against liver cirrhosis. *L. sativum* is a rich source of alkaloids, hyoscyamine and lepidine. To maintain a constant supply a systematic approach was undertaken to
micropropagate the selected field grown (mature) plants and study the yield of secondary metabolites.

The thesis thus embodies the results of investigations carried out on *S. marianum* and *L. sativum*. It consists of five sections: Introduction, Materials and Methods. Results (presented plant-wise and documented with tables and figures) and Discussion. After the discussion, the work has been summarized under the heading of Summary followed by a comprehensive bibliography. To substantiate the results a total of 69 plates have been included at the end.

(SABA)