



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

The higher plants are widely distributed all over the world has enormous varieties of secondary metabolites was hunted by living being particularly for food and pharmaceutical needs, to utilize unconditionally for health benefits. This implies that phytochemicals play a significant role in the entire biological entity. In a worldwide, despite synthetic drugs, population is approaching towards natural remedies, due to its no side effect efficacy. Recently, most of the prescribed drugs were industrialized using several plant materials. Owing to the strength of bioactive metabolites in different fields, investigations on improving the production of some phytochemicals are increasing in recent decades through various techniques and technologies.

Mostly, synthesis of bioactive metabolites is highly unique to the plant kingdom, rather than any other micro-organisms and animals. In the next decennia, the investigations on secondary metabolites from different plant species are increasing due to the renewed interest in the use of medicinal plants and its products. These products serves as an alternative to synthetically produced pharmaceuticals for the prevention and treatment of ailments and diseases. Therefore, to overcome annihilation of the entire plant family, there is an absolute necessity to approach a trustful biotechnological tool known as plant tissue culture technology is an alternative methodology especially to retrieve consistent and continuous production of secondary plant product rather sacrificing whole plant system. Moreover, change in the chemical profile occurs due to various climatical factors and environmental fluxes could be avoided through cell culture technology.

Spilanthes paniculata is a flowering herbaceous genus belonging to the family Asteraceae, a highly valuable plant species. Apart from the genus *Spilanthes*, other plant species falls in the family Asteraceae has taken the credit of ethanopharmacological importance in the field of biomedicine owing

to its medicinal properties. This perennial medicinal plant *S. paniculata* is highly recorded for its folklore remedies. These attributes are due to the presence of organoleptic *N*-alkylamides are polyunsaturated fatty acids strewn in the entire biological kingdom considered to be the most superior novel drug as it possesses vast medicinal properties. But, majority of research works are carried out from the plant growing in the field in terms of phytochemical analysis and evaluation of its biological activity. Besides, only few works are reported scientifically through plant cell cultures on identification of alkylamides. Hence, the development of in vitro cultures plays an important role in the conservation of vital plant material *S. paniculata* by optimizing appropriate culture conditions for the constant production of alkylamide, spilanthol. The present thesis work examines the production of secondary metabolites and improvement of bioactive chemicals for its quality and quantity through a plant biotechnological tool, plant cell and organ culture. The phytochemical investigation on isolation was preceded through in vitro cell cultures and further, improvement of spilanthol production from elite cell lines was determined through multivariate statistical tool. Extensively, the identified alkylamides paved a new path to develop a potential anti-plasmodial drug against malarial parasites.

The current thesis is partitioned into five chapters, where,

Chapter 1: Reveals the introduction and review of literature reported till date with respect to plant tissue cultures, analysis of bioactive phytochemicals from field grown plants as well as *invitro* cell lines and also regarding the studies on biological assays.

Chapter 2: Describes about materials procured from renowned companies and all the methodologies adopted for the present work.

Chapter 3: The results obtained by implementing various protocols are investigated and presented. The tables and graphs are included within the text whereas relevant figures are compiled in the form of plates positioned at the end of thesis.

Chapter 4: Discussed regarding the insight of results described in the previous chapter 3 by referring and comparing with previous reported works.

Chapter 5: Finally, the entire conclusion was withdrawn from the detailed work studied in this thesis work and its future prospects. Further, it was preceded by list of bibliography and appendix comprised of taxonomical classifications of the plant *Spilanthes paniculata*. Lastly, thesis was also enclosed in terms of research output with lists of conference proceedings.