

Track – HR (Healthcare Research & Related Technologies)

Extended Abstract

Mass production of N-alkylamides in the stirred tank reactor by in vitro cultivation of adventitious roots of *Spilanthes paniculata*

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The N-alkylamides are a prominent group of naturally occurring secondary metabolites in which different decarboxylated amino acids and unsaturated fatty acids are joined through peptide linkage¹. These metabolites are popularly known to possess antimalarial, anthelmintic, anaesthetic, insecticidal, anti-inflammatory and immune-modulating properties^{2,3}. *Spilanthes paniculata* (Asteraceae) is a natural source of various medicinally important N-alkylamides. The root extract of the plant has been reported to have larvicidal activity against malarial and filarial vectors. In vitro tissue culture methods have been widely explored for the production of *Spilanthes* biomass and its active metabolites. Adventitious root suspension culture is a promising alternate method to generate the biomass and metabolites at large scale. In the present study, the plant's adventitious root culture was established at shake flask level by using modified Murashige and Skoog (MS 1962) medium and further scaled-up in a stirred tank bioreactor (3 litre capacity), fitted with marine type impellers in the same medium composition. Aeration at 0.1 vvm (volume of air per volume of liquid per minute) was optimum for biomass growth. The growth kinetics studies showed that maximum biomass production and metabolite accumulation occurs on 15th days of inoculation. Chemical characterization of adventitious root culture was performed. The root biomass was dried and ground to a fine powder and the extracts were prepared using organic solvents. The extracts were analysed and characterized for the presence of N-alkylamides through High performance liquid chromatography (HPLC) and Mass spectrometry (MS).

The results of the study are concluded that -

- An efficient and reproducible protocol was established for the adventitious root culture at the shake flask and bioreactor level
- A suitable process of extraction using organic solvents and quantification of spilanthol through HPLC was established and optimized
- HPLC and MS analysis showed the presence of spilanthol in the in vitro grown adventitious roots of *S. paniculata*, quantified and characterized, respectively
- HPLC and MS analysis also showed exclusive presence of two other medicinally essential metabolites in the in vitro adventitious roots namely - **N-Isobutyl-(2E,4Z,8Z,10E)-dodecatetraenamide** and **Ethane; N-ethylcyclohexa-1,5-diene-1-carboxamide**

The in vitro method of producing the metabolites provides an alternate way to reduce the overharvesting of the medicinal plant from their natural habitat.

Keywords: Adventitious root, Anti-malarial, HPLC, Mass spectrometry, *Spilanthes paniculata*

References -

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