

Title : Antiproliferative Effects of Extracts from In Vitro-Cultured *Sphagnum cuspidatum* Müll. Hal. on A549 Human Lung Cancer Cells

Author(s) :

1. Nutnicha Wongto	Student ID : 650510220
2.	Student ID :
3.	Student ID :

Major : Biology

Advisor(s) :

1. Assistant Professor Dr. Narin Printrakul
- 2.
- 3.

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ABSTRACT

This research aimed to investigate plant extracts with potential medical benefits, with a focus on identifying bioactive compounds with anti-lung cancer activity. The study also sought to explore alternative sources for the development of bioactive compounds for future human applications, particularly in response to increasing limitations in natural resources. In addition, the research highlights the potential and value of bryophytes as important sources of bioactive substances with diverse applications. The findings of this study may help reduce the use of certain drugs that cause severe side effects in cancer patients and promote safer therapeutic approaches. In this study, the moss *Sphagnum cuspidatum* was cultured using plant tissue culture techniques prior to crude extraction. The chemical composition of the extract was analyzed using LC-MS and the presence of selected standard compounds with reported anticancer activity was confirmed by HPLC. Furthermore, total phenolic content and total flavonoid content were determined as indicators of the antioxidant potential of the extract. To evaluate biological activity, the effects of crude extracts and standard compounds on the proliferation of A549 lung cancer cells and normal HEK293 cells were assessed using the MTT assay.

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The antioxidant activity of the extract was also evaluated using the DPPH assay to determine the IC₅₀ value and to analyze its correlation with cellular assay results. The results demonstrated that the extract from *S. cuspidatum* effectively inhibited the proliferation of lung cancer cells at a satisfactory level. These findings highlight the potential of this extract as a source of bioactive compounds for medical applications and provide a promising new direction for future research in the development of lung cancer treatments.

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