

**UNIVERSITI TEKNOLOGI MARA**

**THE CYTOTOXIC EFFECT OF RED AND BROWN  
MALAYSIAN SEAWEEDS AGAINST LIVER  
CANCER CELL LINE (HepG2)**

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## ABSTRACT

Marine macroalgae are important ecologically and commercially sources in many regions of the world especially Asian countries. The marine macroalgae especially seaweeds have been one of the richest and most promising sources of bioactive metabolites in pharmaceutical application. Due to the toxicity of existing chemotherapeutic drugs, there is an urge to find an alternative source of chemotherapeutic agents. In this study, three marine endophytic fungi isolated from selected seaweeds (*Gracilaria arcuata* Zanardini, *Gracilaria coronapifolia* J. Agard and *Padina minor* Yamada) were investigated. The marine endophytic fungi isolated from these selected seaweeds were grown on two types of media which PDA supplemented with 1% and 3% artificial sea salt. The cytotoxicity of the marine endophytic fungi (MV, CN and PA<sub>7</sub>) was evaluated by using MTT assay on liver cancer cell line (HepG2). The lowest IC<sub>50</sub> values were observed at 24 hours of incubation time. Three out of six extracts showed very active cytotoxic activity MV 3%; 0.10±0.00 µgml<sup>-1</sup>, CN 3%; 2.45±1.77 µgml<sup>-1</sup>, CN 1%; 4.00±2.83 µgml<sup>-1</sup> and another three showed active cytotoxic activity MV 1%; 10.50±0.71 µgml<sup>-1</sup>, PA<sub>7</sub> 1%; 12.00±2.83 µgml<sup>-1</sup>, PA<sub>7</sub> 3%; 11.00±1.41 µgml<sup>-1</sup>. MV 3% (10.50±0.71 µgml<sup>-1</sup>) exhibited the most pronounced extract. Among the extracts, MV 3% showed significant difference with MV 1%, PA<sub>7</sub> 1% and PA<sub>7</sub> 3% (p<0.05). In facts, among six tested extracts, the IC<sub>50</sub> obtained for MV 3% extract was lower as compared to the IC<sub>50</sub> of 5-FU at different incubation time (48 hours; 0.38 µgml<sup>-1</sup>, 72 hours; 0.25 µgml<sup>-1</sup> and 96 hours; 0.38 µgml<sup>-1</sup>). Among the extracts, significance difference were only observed between MV 1% and MV 3% (p<0.05) extracts. In this present study, 1% of artificial sea salt was sufficient to exhibit cytotoxic effect except for marine endophytic fungi extract (MV 3%). Therefore, these tested marine endophytic fungi extracts might have potential as an alternative source against HepG2 cells and worth to be further studied as anticancer agents.

**Keywords:** Seaweeds, marine endophytes, cytotoxicity, MTT assay, HepG2

# CHAPTER 1

## INTRODUCTION

### 1.0 Background of study

Cancer is a disease initiated by the uncontrollable growth and spread of cancerous cells. Cancerous cells can affect almost all the body parts as they often invade the adjacent cells (McConnell, 2007). Cancer is the leading cause of deaths which accounted about 7.8 million deaths in 2008 (Jemal et al., 2011). The mortality rate of cancers accounted 13% for all death recorded around the world and among all cancer reported, liver cancer is the six most common cancers occurs and third common cause of cancer death around the world (Chong et al., 2012; Meyer, 2013).

Chemotherapy is the common therapy used in cancer treatment. It can be used alone or combination with surgery or radiation therapy (Chidambaram et al., 2011). Although the chemotherapy is quite effective to kill the cancerous cells but there is non-selectivity of chemotherapy drugs activity towards specific cells (Hu et al., 2011). Non-selective properties of the chemotherapy drugs cause many side effects during or after the treatments. Therefore search for new attended drugs are urgently required. A decade ago, natural products have attracted scientists in search of novel drug due to their enormous structural diversity and complexity (Abad et al., 2011)