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THE USE OF *Melastoma malabathricum (L.)* AS BIO-MONITOR TO DETERMINE THE CONCENTRATIONS AND DISTRIBUTIONS OF NON-RADIONUCLIDES AND RADIONUCLIDES AT MANJUNG DISTRICT

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ABSTRACT

Plants that can be found abundantly and tend to accumulate high amount of non-radionuclides and radionuclides can be used as bio-monitors. The aim of this study is to determine the concentration of non-radionuclides and radionuclides in *Melastoma malabathricum (L.)* as bio-monitor and to determine the uptake of plant. The sample were collected at Manjung district and some part of Perak Tengah areas. In this study, twenty four (24) samples of *Melastoma malabathricum (L.)* and their surface soil were collected in three directions (North (N), North-East (NE) and South-East (SE)) within 40 km of Teluk Rubiah, Manjung with 5 km intervals. The same size of plants were collected and different parts of plant (root, stem and leaf) were analysed to determine the uptake and accumulation of non-radionuclides (Cr, Fe, Cu, Zn, Se, Pb, As, Cd and Hg) and radionuclides (^{40}K, Th and U) using Energy Dispersive X-ray Fluorescence (EDXRF) Spectroscopy. This technique is a cost-effective and no chemical was used since the plants taken up and accumulated non-radioactive elements and radionuclides, commonly known as soil-to-plant transfer factor (TF) which to assess the pollution as well as enrichments factor (EF) and contamination factor (CF). Based on pollution assessment, Se, Pb and As are the most elements that have TF >1, high enrichment factors and most contaminated elements than the other elements. For soil, non-radionuclides and radionuclides content and I_{geo} were carried out to determine the soil concentration pattern and as compared to the pollution assessment, similar elements show the same result with plants. Radiological risk (radium equivalent activity, absorbed dose rate, annual effective dose and external hazard index) also carried out to determine the risk due to background radiation from activity concentration of radionuclides. Some radionuclides elements can be neglected as their values were lower than permissible limits and below than unity to indicate there are low radiological risk towards the areas. Possible sources of pollutants can be predicted via multivariate analysis including cluster analysis (CA) and principle component analysis (PCA) and the results show that different sources which possibly elevating pollutant concentrations in soil contributes from natural sources, agricultural activities, metal factories, soil dust and coal fired power plant. Overall, *Melastoma malabathricum (L.)* can be used as bio-monitor for soil pollution in this study area.

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CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND OF STUDY

Currently, various plants species that can be found in the contaminated areas have been determined as a passive bio-monitors where the plants occurs naturally in the soil contains rich of minerals are monitored and their ability to accumulate more than normal concentrations without affect their growth and development (Baker and Brooks, 1989; Xiong, 1997). The Malaysia's climate has uniform temperature, high humidity and heavy rainfall and with all features in Malaysia, many species of plant can be found abundantly in all type of ground. Therefore, in the present study a plant species commonly found in the study area, *Melastoma malabathricum (L.)* has been used to study its potentials uptake and accumulation of non-radionuclides and radionuclides pollutants in the interested areas. A similar research were carried out by Fati (2011) found that the species of plants, *Chromolaena odorata*, *Lantana camara* and *Solanum torvum* have high ability to accumulate various non-radionuclides including arsenic (As) and lead (Pb) on contaminated soil from Sansu tailings dam of AngloGold Ashanti Ghana Limited in Obuasi, Ghana.

Nowadays, pollution is such a big issue to be discussed in order to prevent this phenomenal to become worst. Pollutant presence in the air, water and soil may come from natural and others sources mainly because of man-made activities such as motor vehicles, domestic activities, industries as well as agriculture practices (Antoaneta et al., 2010). Industries that produce chemical and metal smelting such as Zn, Fe, Pb and Cu are the most important sources of these pollutants (Pantelica et al., 2008; Suciu et al., 2008). Coal combustion from coal fired power plant (CFPP) may emit non-radionuclides and radionuclides in a significant amount which is potentially toxic towards human living surrounding it. Major pollutants such as particulates, carbon, sulphur and nitrogen oxides are produced during coal combustion process may be released associated with particles or as vapor (Karamanis et al., 2009). During emission, fly ash may be released to the atmosphere and wind blows to the wide area and finally will be deposited on the soil. The