UNIVERSITI TEKNOLOGI MARA

RISK ASSESSMENT OF HEAVY METAL CONTAMINATION IN PADDY PLANTS WITH GROWTH STAGE AND GRAINS AT SUNGAI BESAR, SELANGOR.

NUR RASYIDAH BINTI ABBAS

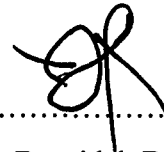Project submitted in fulfilment of the requirements
for the degree of

Bachelor (Hons.) Of Environmental Health And
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Declaration by Student

Project entitled "Risk Assessment of Heavy Metals Contamination in Paddy Plants with Growth Stage and Grains at Sungai Besar, Selangor" is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions. The project was done under the guidance of Mr. Nasaruddin Bin Abd Rahman as Project Supervisor. It has been submitted to the Faculty of Health Sciences in partial fulfillment of the requirement for the Degree of Bachelor in Environmental Health and Safety (Hons).

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ABSTRACT

Risk Assessment of Heavy Metals Contamination in Paddy Plants with Growth Stage and Grains at Sungai Besar, Selangor.

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The heavy metals pollution is one of the problems that emerge due to excessive uses of agrochemicals to meet the higher demands of food production for human consumption. The present study aim to analyse the uptake of heavy metals in paddy plants (*Oryza sativa*) with growth stage and grains from paddy field at Sungai Besar, Selangor. Those heavy metals get accumulated in paddy plant throughout growing process which consists of vegetative, reproduction, and ripening stage. The levels of nonessential toxic heavy metals (Cd, Cr, and Pb) and the micronutrients (Cu, Mn, and Zn) were determined by Flame Atomic Absorption Spectophotometry in the paddy at different growth stage and rice grain samples. Concentration of heavy metals in edible parts (rice grains) was compared with allowable levels stipulated by Malaysian Food Act (1983) and WHO/FAO in other to assess the health risk to consumer. The order levels of heavy metals in plants throughout the growing stage was Zn>Mn>Pb>Cr>Cd indicating that the accumulation of micronutrients was more than that of nonessential toxic heavy metals. Meanwhile, the ranking order of occurrence of the heavy metals accumulation in rice was Zn>Pb>Cd>Mn. The mean concentrations (mg/kg) of metals in grain samples were 29.01 ± 16.87, 21.89 ± 3.12, 0.665 ± 0.074 and 0.303 ± 0.845, respectively. Metal concentrations in the grains studied were found lower than the permissible limits except for Pb. The elevated levels of Pb in the plants could possibly be attributed to anthropogenic sources. In spite of that, Cu and Cr in grain samples were below FAAS detection limit. Statistical differences were performed by Tukey's multiple comparison test by using SPSS Version 20.0. There were no significant differences ($P>0.05$) observed between the metal concentrations in the paddy plants with growth stage and grains. Though, the present study found that paddy plants at vegetative stage accumulate more heavy metals than the other stage. The Health Risk Index (HRI) and Health Index (HI) were calculated to assess potential risks through rice consumption. HRI values >1 were found in Cd and Pb are the key components contributing to the potential health risk. The higher HI values of adults rice consuming (24.78) suggest their adverse health effects in the near future.

Keyword: Paddy (*Oryza sativa*), heavy metal, growth stage, health risk assessment