[Workshop 1] Development of phyto-technology for decreasing heavy metal in food

**Pattern of heavy metal content at different growth stages of three leafy vegetables**

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**Abstract**

Field experiment was conducted to compare and investigate the concentrations of heavy metals at different growth stages of the commonly grown leafy vegetables on an experimental field near the net house of Soil Science Division, Joydebpur, Gazipur, Bangladesh during November 2008-January 2009. Seeds of spinach (*Spinacia oleracea*), red amaranth (*Amaranthus tricolor*) and amaranth (*Amaranthus oleraceus*) were sown on 14 November, 2008. Plant and soil samples were collected at four different growth stages such as 20, 30, 40, and 50 days after sowing (DAS). The concentrations of lead (Pb), cadmium (Cd), nickel (Ni), cobalt (Co), and chromium (Cr) in plant increases with the age of the plant and the increases were however not linear. The rate or slope of metal concentrations increases at different growth stages, 20 DAS to 30 DAS is comparatively lower than that of 30 DAS to 40 DAS, except Cr. Heavy metal uptake gradually increases at the early growing stages and falls during later stages of growth. The significant differences ($P < 0.01$) were observed between the mean metal content in the three vegetables samples. The higher level of Pb and Co concentrations in amaranth compared to spinach and red amaranth. Spinach exhibited higher levels of Cd and Cr than the other vegetables. However, the three vegetable crops did not differ significantly in their ability to take up Ni from the soil. The order of the levels of heavy metals obtained from different vegetables were Cd<Co<Pb<Ni<Cr. Metal concentration determined from plant samples of this study decreased in the order of spinach>red amaranth>amaranth.

The variation of average total concentrations of each metal in the soil collected from different growth stages of three vegetables plots was non-significant. The highest correlation between soil-plant found corresponds to Cd, while the lower correlation between soil-plant found corresponds to Ni. The accumulation concentrations of metal in vegetables studied were lower than the maximum level allowed in India. But the concentration of Cd and Cr in our study is higher than the allowable levels of Cd and Cr as set by the World Health Organization (WHO).