ABSTRACT

Pesticides are extensively used in agricultural practices for controlling insects, pests, weeds and plant diseases. There are many benefits of using them in agricultural system but due to extensive applications, these pesticides accumulate in vegetables and crops. The accumulation of these pesticides in vegetables and crops resulting in harmful impacts on ecosystem and human health through food chain. Thus, it is important to investigate the uptake, translocation and bioaccumulation of widely used pesticides in vegetables. In this study, uptake behaviour, translocation and bioaccumulation of four frequently used pesticides including Imidacloprid, Deltamethrin, Cypermethrin and Emamectin Benzoate, in Cabbage (*Brassica oleracea*) were investigated. The concentrations of all four pesticides ranged from 0.02 to 5.0mg/L. The studied parameters were seed germination, biomass and photosynthetic pigments. Petri plate experiment was conducted to determine the effects of pesticides on seed germination. Pot experiment was performed to determine the effects of pesticides on other physiological parameters of cabbage. QuECHERS method of extraction was used for processing the samples. A two-way (ANOVA) was performed to determine the significance between different tested concentrations of pesticides and control. All the statistical results were significant and $p<0.05$. From the results, it was revealed that the germination of seeds decreased with the application of pesticides and this decrease was more obvious at higher concentrations. The same effects were observed in biomass production and photosynthetic pigments. Among the four pesticides, Emamectin benzoate was most easily accumulated in the roots of tested vegetable than in the shoot while the uptake of Imidacloprid by roots was lowest. The root concentration factor values of pesticides was in the sequence of Deltamethrin >Emamectin benzoate>Cypermethrin> Imidacloprid. The translocation of four pesticides from root to shoot was in the sequence of Cypermethrin>Imidacloprid > Emamectin benzoate >Deltamethrin. The difference in the uptake, translocation and bioaccumulation of all these four tested pesticides seems to be correlated with water solubility, molecular weight and chemical composition of all these pesticides. The results of this study will give insight to investigate the harmful impacts of pesticides on human health due to dietary exposure.