



Abstract

The pesticide accumulation in vegetables have serious effects on human health and ecosystems through food chains: therefore, it is of great importance to study the biomass production, uptake, translocation and bio concentration of pesticides in vegetable tissues. In the present study, seed germination percentage, biomass production, photosynthetic pigments, uptake, translocation, bio concentration factors and risk assessment of four different pesticides, Imidacloprid, Cypermethrin, Deltamethrin and Emamactin benzoate were investigated in spinach plant. The research is carried out by using QuEChERS method of quick, easy, cheap, effective, and rugged and safe. Petri plate experiment was conducted under laboratory, providing dark conditions (25°C) for 3 days and photoperiod of 16 hours followed by a dark period of 8 hours. 60% humidity and 30°C temperature to check the seed germination. Pot experiment is conducted in green house under 30°C temperature and the humidity was 60%. HPLC analysis was done to check the uptake and translocation of various pesticides in plant. Risk assessment is carried out through Hazard characterization method by using aHQ and cHQ. The results showed that seed germination percentage was reduced significantly by pesticide applications at early stages of exposure. All the tested pesticides reduced biomass production at higher concentrations of pesticides, however, increase in biomass was observed at lower concentration of pesticides. It showed that lower concentration of pesticides had some stimulatory effect on growth of spinach as compared to that of control. Similar effect was observed for photosynthetic pigments i.e. decreased at higher concentration while increased photosynthetic pigments was observed at lower concentration of pesticides. Root uptake of pesticides followed the order of deltamethrin > cypermethrin > emamactin > imidacloprid. Translocation factor followed the order of imidacloprid > deltamethrin > emamactin > cypermethrin. While bio concentration factor followed the order of imidacloprid > deltamethrin > cypermethrin > emamactin was observed. Risk assessment was carried out to check the potential health impacts of pesticides through short term aHQ and long term cHQ. If HQ > 1 then it showed potential health risk. Out of four tested pesticides, Emamactin benzoate showed long term potential health risk because its HQ was 3.4. While, all other pesticides showed no risk because their HQ is < 1.