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Euro Green Chemistry 2019- Impact of the application of pesticides on the concentration of some heavy metals on vegetables- Hassan Garba Wafi- Adamawa State University

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Introduction:

Heavy metals change are experimental to initiate both transient and marked disturbances in the chemistry and physiology of plants in vitro and in vivo with its attend ramification to living organism via the food chain. Fundamentally participating in vitro in suggest the arrangement of immediate oxygen species (ROS) or reactive nitrogen species (RNS) in plants, inactivating enzymatic process and provocative the compartmentalization of heavy metals for vital element . The in vivo properties were also observed to introduce spatial disorientation in cell-membrane reliability and architecture. The dynamics of metal ions transport into plants among further pathways rest on the high negative potential of the plasma membrane and additional, to the improved cation-exchange capacity of the cell wall . Due to the negative charge potentials on the soil surface, soluble metals ions are voluntarily attracted and deposited at the surface of the soil particles. The cations deposit at the surface of the soil particles, based on some distribution mechanism are equally displaced by charged metabolite secreted on the plant roots leaving behind available metal-cations for uptake and translocation through the roots. Studies discovered a direct relationship between the corrosion in soil fertility and the refuse in plant growth following the extreme application of plant protection products such as pesticides. Study that involved the function played by pesticides or fertilizers as metal-chelating vehicle in the translocation of metals in plants are rarely investigated. Chiroma et al. (2007) investigate the contact of pesticides on metal increase in two species of spinach plant. The study showing superior uptake in the spinach treated with the pesticides, with the maroon species showing important increase compared to the green spinach species. The study is however, imperfect to the two species of spinach with little importance giving to the chemistry and physiology of the plant as related to the uptake and translocation of the metal-pesticides. Is a known fact that, factors such as soil composition or chemistry were observed to authority soil-metal bioavailability and show the chelating properties of the pesticides with metals. Then after, based on the differences in plant physiology, these factors always influence the uptake and change of substances in plants. Since the uptake of metals by plants vary according to the metal chelating properties with pesticides, the soil pH and varies in plant physiology, further study is therefore promote to examine the authority of pesticides and its dynamic on metal gathering and translocation among deferent plants types.

Materials and methods Sample collection and treatment:

A representative standard plot of garden were arranged and used in this study. We employed the same process described by Chiroma et al. (2007). The garden was consistently demarcated into four beds designated as B1, B2, B3, and B4 beds respectively. The plot in B1and B2 were planted with spinach (Spinacia oleracea), while B3 and B4 were planted with sorrel (Rumex acetosa). The beds were maintain and irrigated using clean tap water under good environmental condition. Three weeks after planting, B2, B4 beds (treated plants) were sprayed with 2, 2-dichlorovinyl dimethyl phosphate, while B1, B3 beds were used as the control beds (untreated plants). The treatment of the plants in B2, B4 beds with the pesticide was frequent weekly for 3 months. After maturity, the plants in the individual beds were harvested, washed correctly and divided into three sample parts, the roots, stem and leaves respectively. The parts were respectively airdried and made into powder follow by oven drying (VECSTAR 2010 UK) to constant weight at 60°C. After the drying, about10 g of the respective powdered samples were weighed into a crucible and made into ash at 450°C. About 2 g of the cooled ashed samples were then digesting using 3:1 ratio of HCl: HNO_3 and watery to 100 ml with distill water. Standard solution of the metals were prepared and the concentrations of the following metals Cd, Pb, and Zn in the digested roots, stem and leaves samples of both the treat and untreated spinach and sorrel were then investigate using atomic combination spectroscopy (VGP 210, Buck Scientific) Data analysis The obtain results were presented as Mean ± Standard Deviation (SD) and analysed using one-way ANOVA on Graph pad prism (version 6.0) software. The levels of consequence was set at $p<0.05$. Results The influence of dichlorvos on heavy metals addition and translocations in the roots, stem and the leaves of both spinach and sorrel plants are presented in Fig. 1-5. As shown in Fig.1a, a major ($p<0.05$) raise in Cd and Pb concentrations were found in the roots of the spinach (10.40±2.08 and 17.50±3.70 when compared to their particular control (7.60+2.34 and 11.00±2.78) However, an irrelevant ($p>0.05$) raise in the levels of Zn (2.40±0.44) were shown.

Conclusion:

With the exception of Zn ion which show small response to pesticides application, Cd and Pb concentration were experiential to be authority by the pesticides, with considerably ($p<0.05$) higher activities recorded in leads levels. The 2, 2-dichlorovinyl dimethyl phosphate was experimental to assist important metal uptake in the spinach compared to the

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sorrel plants. In particular, considerably ($p < 0.05$) higher gathering was observed in the leaves and roots compared to the stem. In the plants organ under examination, the concentration of Cd, Pb and Zn was experiential to be greater in the spinach than in sorrel plants. The variation could be due to the difference in the plant morphology and physiological sensitivity to this metals-pesticide complex. Therefore, it be sufficient to say that further in vitro and in vivo study into the plant structure following the use of the pesticides should be combined with the physiological reaction mechanism of the plants as it affect metal ion uptake and transport.

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