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Characterisation of Alpha Amylase from Cowpea (*Vigna unguiculata* (L.) WALP.) Grown in Contaminated Soil from Kachia Local Goverment Area Kaduna State Nigeria

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Abstract

The study was conducted to assess heavy metal concentrations and alpha amylaseactivity in the contaminated soil used for military activities in Kachia, Kaduna Stateand plants grown on the soil. Soil and cowpea plant samples obtained from pollutedand unpolluted (control) soil were digested and analysed for iron (Fe), zinc (Zn),copper (Cu), and lead (Pb) using Atomic Absorption Spectrometer (AAS). Alphaamylase activity and total sugar were also determined using conventional method.Correlation analysis was also done among heavy metals in the soil and the leaves.Michaelis constants (Km) and maximal rates of substrate hydrolysis (Vmax) were determined from Lineweaver-Burke plot. Considerable amount of Pb and Fe 109 and 49.5 $^{mg}/_{ml}$ were found to accumulate in all the plants grown on contaminated soil, while other elements assessed were obtained in trace amounts. The order ofbioaccumulation of heavy metals were Pb >Fe >Cu > Zn. The result of thecorrelation analysis for Cu, Pb and Fe showed positive relationships among the heavy metals in both contaminated and uncontaminated soils while Zn showed negative correlation. The activity of the enzyme 30.0μmole/min was found to behigher in seeds when compared with other samples. The enzyme optimum pHshowed mixed activity due to isoenzymes. The optimum temperature 600Cproduced activity of 10μmole/min. Magnesium chloride (MgCl2) increase the activity 36.67μmole/min of enzyme more when compared with the other divalentcations. $^{Vmax}/_{Km}$ ratios indicate how the enzyme behaves at low substrate concentration. Total sugar content was higher in seed when compared to other samples. The results imply that plants growing in the vicinity of land used for military activities may pose some negative effect on the alpha amylase activity and may affect the food chain. Therefore, there is urgent need for remediation strategies and management of the contaminated soils.

Keywords: Copper, lead, zinc

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