TOXICITY OF CERTAIN HEAVY METALS

BY

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Approval Sheet

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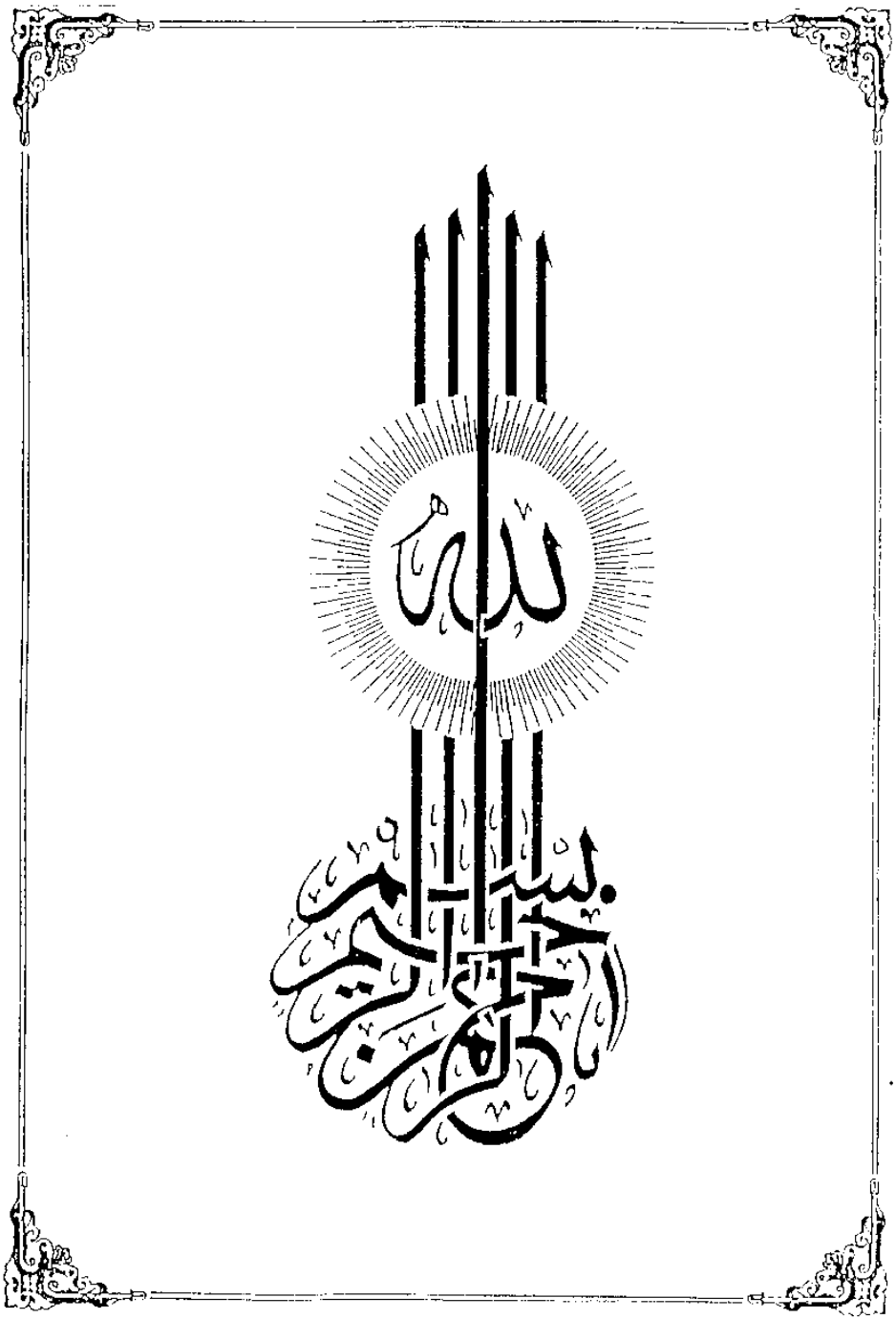

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ABSTRACT

The objectives of this study were to, assess and evaluate the status of Cd and Pb in water, soil and different crops in waste water irrigated area of Bahr El-Baqar. Also to study the uptake, translocation and accumulation of these heavy metals in different plant parts of different crop plants and their effect on amino acid metabolism in addition to their genotoxic effects. The content of Cd and Pb largely varied in different crops and were highest in roots than in shoots, least in grains and pods and increased with the duration of irrigation with waste water. Cadmium adversely affected bean and spinach plants at lower concentrations in the nutrient media than Pb and spinach growth was more affected than beans specially at latter stages of growth. The accumulation of both metals was higher in bean roots and spinach shoots. Data indicate that plants whose roots can act as a barrier for heavy metal translocation tolerate higher concentrations of heavy metals in the nutrient media. Both plants accumulated such high concentrations of both Cd and Pb before growth was adversely affected. These concentrations reached 196, 76 and 60 ppm Cd and 780, 72 and 48 ppm Pb in roots, stems and leaves of beans respectively and 45 and 28 ppm Cd and 221 and 128 ppm Pb in roots and shoots in spinach.

The amino acid content (THR, SER, GLU, ALA, VAL, ILE, LEU, TYR, PHE, HIS, LYS, CYE, MeTH) and also true protein content of bean pods progressively decreased by increasing Cd or Pb concentrations. Aspartic acid, arginine and non-

protein nitrogen, on the other hand, increased as Cd and Pb increased in the nutrient media. Data indicated that both heavy metals adversely affected protein synthesis in plant.

Genotoxic effect of Cd and Pb in *Vicia faba* was studied by examining the chromosome behaviour in the root tip and pollen mother cells as affected by increasing Cd and Pb concentrations in the nutrient media. Generally, the percentage of various aberrations increased with increasing Cd and Pb levels in mitotic and meiotic systems progressively. More work is needed to evaluate the mutagenic effect of these heavy metals at various concentrations.

Key words : Cadmium, lead, Vicia faba, bean, Spinacia oleracea, spinach, uptake, accumulation, translocation, toxicity.

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