

## **FLUORIDE UPTAKE BY NATIVE AND MODIFIED CATTLE BONES FROM AQUEOUS MEDIUM BY BATCH ADSORPTION**

**B.A.P.T. Gunathilake<sup>2\*</sup>, M.C.M. Iqbal<sup>1</sup> and V.A. Sumanasinghe<sup>2</sup>**

<sup>1</sup>*Plant Biology laboratory, National Institute of Fundamental Studies, Kandy, Sri Lanka*

<sup>2</sup>*Department of Agricultural Biology, Faculty of Agriculture, University of Peradeniya, Sri Lanka*

*\*timeshg@gmail.com*

Fluoride (F<sup>-</sup>) is found in excess compared to the WHO recommended levels in drinking water in the Kandy district. Health hazards such as dental fluorosis, skeletal fluorosis, crippling fluorosis and metabolic defects in lipids, proteins and vitamins are caused due to excess F<sup>-</sup> in drinking water. Among several defluoridation techniques, adsorption is the most effective and common method. The objective of this study was to investigate the effectiveness of the natural, economically feasible and eco-friendly materials such as plant leaves and cattle bones for removing fluoride ion from drinking water using batch adsorption method. Bio-adsorbent materials were collected and rinsed initially with tap water, and then with deionized water. Cleaned materials were air dried for 48 h and oven dried at 60°C for 48 h. Dried materials were sieved to obtain particle size between 250 – 350 µm. Batch adsorption experiments were conducted. A mass of 0.2 g of different adsorbents was added in 50 mL of 3 mg L<sup>-1</sup> fluoride solution and shaken at 80 rpm in orbital shaker for 3 h. Thereafter, suspension was filtered and final F<sup>-</sup> concentration was determined by fluoride ion-selective electrode. Chemical and physical modifications such as base treatment and bone char preparation were done to enhance the adsorption efficacy. Native bones were heated at 500°C for 3 h in muffle furnace to prepare bone char (BC). Effect of contact time and dosage were determined for chemical modification and effect of pH, kinetic studies, isotherm studies, desorption and adsorbent characterization for BC were carried out. F<sup>-</sup> adsorption on BC was maximum between pH 4-7 and equilibrium time for BC was 12 h. Pseudo second order kinetic model and Langmuir isotherm model described adsorption of F<sup>-</sup> on BC. The highest desorption was given with 0.1 M NaOH. BC enhances the efficacy of defluoridation from aqueous medium and is a cost effective and eco-friendly biosorbent.