Calcium ion Adsorption Capacities of Potential Water Purifying Materials- Red Brick and Biochar of Glyricidia (*Glyricidia sepium*), Gadumba (*Trema orientalis*), Ipil Ipil (*Leucaena leucocephala*)

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This is a preliminary study on several locally available potential water purifying materials for their Ca^{2+} adsorption capacity. According to literature, researchers have found a number of locally available clay and biochar materials with high metal adsorption. However, these studies do not provide satisfactory information about the life span and the adsorption and retaining capacities of the filter beds as it gets gradually saturated. The main objective of this study is to further examine and modify already explored materials for the development of a cheap, simple, effective and renewable domestic water filter for the dry zone of Sri Lanka.

In this study red brick and biochar of Glyricidia (*Glyricidia sepium*), Gadumba (*Trema orientalis*), Ipil Ipil (*Leucaena leucocephala*) were considered which are commonly found in the dry zone. Plant materials were burned (~400 ºC) to produce biochar in a closed vessel on fire for 2 hours. Particles in the range of 2-5.6 mm were selected for analysis. A laboratory scale filter unit was prepared with a glass column (diameter 1.8 cm) and the sample materials were packed individually and examined for Ca^{2+} adsorption by leaching a Ca^{2+} solution (400 ppm) through the column until saturation. After saturation Ca^{2+} was desorbed from the column with de-ionized water. Effluents were analyzed for Ca^{2+} by using flame photometer.

Calcium ion adsorption capacity of each material was calculated per unit bulk volume of the material. Red brick showed the highest Ca^{2+} adsorption capacity of 0.44 mg cm^{-3}. Biochar of Glyricidia, Gadumba and Ipil Ipil showed Ca^{2+} adsorption capacities of 0.26, 0.26 and 0.18 mg cm^{-3}, respectively. Retaining capacity of Ca^{2+} was also calculated as the difference of adsorbed and desorbed Ca^{2+} amount per unit volume. Red brick showed the highest Ca^{2+} retaining capacity of 0.26 mg cm^{-3}. Biochar of Gadumba showed a Ca^{2+} retaining capacity of 0.04 mg cm^{-3} while Glyricidia and Ipil Ipil have not shown any significant retaining of Ca^{2+}. Optimization of the filter bed conditions and using them in a practical set up are intended to be carried out.

Keywords: "Ca^{2+} adsorption; biochar; red brick; water filter"

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