Effectiveness of Organic Fertilizer Produced from Tannery Buffing Waste

S.A.D. Namantha[1], J.M.P. Jayasinghe[1], D.K.D.D. Jayasena[1] and T.A.T. Nimesh[2]

[1]Department of Animal Science, Uva Wellassa University, Badulla, Sri Lanka
[2]Ceylon Leather Products PLC, Mattakkuliya, Colombo, Sri Lanka

Buffing dust is Chromium containing solid waste generated during the leather processing which is considered to be a hazardous material and therefore, a proper treatment before discarding to environment is vital. Dechroming process eliminates the potential toxic Chromium (Cr^{+6}) to non-toxic form (Cr^{+3}) through chemical hydrolysis. Therefore, this study was carried out to develop an organic fertilizer from the buffing dust and study the effectiveness on Radish (*Raphanus sativus* L.) growth. Trials were conducted at Ceylon Leather Products PLC and in an experimental field located at Kaduwela, Colombo. Collected samples of buffing dust (3 kg) were subjected to chemical hydrolysis consisted of four steps and conditions for each step were optimized as follows, (20 g per 10 L sodium hydroxide and 400 g per 10 L urea for 0.5 h at 40 °C, 500 g per 10 L sulfuric acid solution for 1 h at 40 °C, 400 g per 10 L CaC_2 suspension for 2 h at 30 °C and 500 g per 10 L sulfuric acid solution for 1 h at 30 °C). The final product was characterized by peptide and free amino acids and Cr^{+3} level was estimated using Atomic Absorption Spectrophotometry as 365.1 ppm. Field trials were conducted against Radish (*Raphanus sativus* L.) with four treatments of developed fertilizer (15, 30, 45 and 60 g,) and positive and negative controls under Completely Randomized Design. Vegetative growth (number of leaves, plant height and leaf length) were measured in weekly interval. Results revealed that 60 g fertilizer mixture showed significantly ($p<0.05$) higher vegetative growth; number of leaves (7.0 ± 1.4), plant height (18.8 ± 4.3 cm) and leaf length (9.8 ± 2.4 cm) compared to other treatments and control groups. Results concluded that buffing waste can be simply converted to an organic fertilizer and effectively used to enhance the plant's vegetative growth which might finally reduce the possible environmental hazards due to improper discards of Cr tannery waste.

Keywords: Buffing waste, Chromium, Organic fertilizer, Radish (*Raphanus sativus* L.),