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APPLICATION OF BASIC OXYGEN FURNACE (BOFS) IN AGRICULTURE: A STUDY ON THE ECONOMIC VIABILITY AND EFFECTS ON THE SOIL

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Abstract

Slags are the main by-products from steelmaking cycle, which are currently recycled inside the steel industry as well as in other sectors with significant environmental and economic benefits. As in Italy slags application is not yet allowed in agriculture, the paper aims at evaluating the technical and economic feasibility of a slag treatment plant, to obtain a product to be sold in the fertilizer market as soil amendment. A preliminary assessment of the fate of some trace metals (Cr, V, Sb and Se) contained into the Basic Oxygen Furnace (BOF)slag, was performed, to analyze the effects on cultivated soils, particularly in neutral/sub-alkaline ones. A soil infiltration column test was performed, assessing the effect of three slag doses (0, 6 and 20 mg kg⁻¹ of soil) on two sub-alkaline soils (a clay loam and a sandy loam). A simplified Life Cycle Cost analysis and an estimation of some financial indicators were developed considering the convenience of the investment when the slag is stored internally or externally from the steelworks. The results of the column tests showed an increase of P availability and Ca content, while trace metals (e.g. Chromium and Vanadium) were not leached and mostly remained in the topsoil. This can represent a limit for using slags in the long term. The economic analysis revealed that the convenience on such investment strongly depends on the cost of disposal and on the prices of the slag as fertilizer, and, according to the sensitivity analysis, the profitability is sensitive to the used discount rate.

Key words: column test, converter slag, economic feasibility, fertilizer, payback period

Received: July, 2016; *Revised final:* July, 2017; *Accepted:* October, 2017; *Published in final edited form:* June 2019

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