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VALORIZATION OF AGRO-INDUSTRIAL WASTES IN LIGHTWEIGHT AGGREGATES FOR AGRONOMIC USE: PRELIMINARY STUDY

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Abstract

This research was focused on the valorization of agro industrial waste/by products available in the local industry with the kilometer zero (km 0) concept, as a replacement of virgin raw materials (clay) to elaborate lightweight aggregates (LWAs). The alternative raw materials were employed as pore forming agent, in order to reduce sintering temperature and energy consumption of the furnace. The three technical nutrients studied were provided for local food industries: sludge from wastewater treatment plant from brewery industry (SB), meat-bone meal (MBM) and corn cob (CC). These materials were characterized in terms of chemical (XRF and elemental analysis - CHNS) and mineralogical (XRD) composition, as well as their thermal behavior (TGA/DTA/DSC) and LOI.

For the production of LWAs different percentage of waste/by product (0, 5, 10 and 15%) were mixed with three types of clays (white, black and red) in two different clay-based mixtures. With the addition of water were produced approximately spherical pellets and thermal treated at two different temperatures (900 and 1000°C) for 1 hour. Technological parameters such as bulk and absolute density, total porosity, water absorption capacity, pH, electrical conductivity and organic matter content were measured, to determine their potential use in agriculture. XRD and scanning electron microscope (SEM) were performed for the characterization of different samples.

The results indicate the potential for manufacturing high quality lightweight aggregates for agronomic purposes, using relatively simple processing and low sintering temperature that contribute to the reduction of greenhouse gases to the atmosphere.

Key words: agro-industrial wastes, circular economy, growing substrate, lightweight aggregates, waste valorization

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