Influence of Pre-treatments on the Compatibility of Maize Cob Cement Mixtures

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Abstract

The effects of pre-treatments: aqueous extraction, addition of 3% calcium chloride ($CaCl_2$) and combination of aqueous extraction and 3% $CaCl_2$ on maximum hydration temperature (T_{max}), setting time (t_{max}) and time ratio indices (t_R) of locally sourced maize cobs mixed with Portland cement were investigated. Aqueous extraction reduced the t_{max}, T_{max} and t_R while chemical treatment and combination of aqueous extraction and chemical treatment reduced t_{max} and t_R but increased T_{max} of the maize cob-cement mixes. Generally, untreated maize cobs were moderately suitable for cement bonded composites production. Pre-treatment with 3% $CaCl_2$ improved the compatibility of maize cobs with cement than either aqueous extraction or combined treatment with aqueous extraction and addition of 3% $CaCl_2$. The results of this work showed that utilisation of maize cob for composite production can serve as avenues for creation of waste to wealth and thus cushion the over-exploitation of timber resources.

Keywords: Maize cobs, Cement composites, Maximum hydration temperature, Setting time, Time ratio index.