

An Evaluation of the Influence of Corn Cob Ash on the Strength Parameters of Lateritic Soils

Authors : O. A. Apampa, Y. A. Jimoh

Abstract : The paper reports the investigation of Corn Cob Ash as a chemical stabilizing agent for laterite soils. Corn cob feedstock was obtained from Maya, a rural community in the derived savannah agro-ecological zone of South-Western Nigeria and burnt to ashes of pozzolanic quality. Reddish brown silty clayey sand material characterized as AASHTO A-2-6(3) lateritic material was obtained from a borrow pit in Abeokuta and subjected to strength characterization tests according to BS 1377: 2000. The soil was subsequently mixed with CCA in varying percentages of 0-7.5% at 1.5% intervals. The influence of CCA stabilized soil was determined for the Atterberg limits, compaction characteristics, CBR and the unconfined compression strength. The tests were repeated on laterite cement-soil mixture in order to establish a basis for comparison. The result shows a similarity in the compaction characteristics of soil-cement and soil-CCA. With increasing addition of binder from 1.5% to 7.5%, Maximum Dry Density progressively declined while the OMC steadily increased. For the CBR, the maximum positive impact was observed at 1.5% CCA addition at a value of 85% compared to the control value of 65% for the cement stabilization, but declined steadily thereafter with increasing addition of CCA, while that of soil-cement continued to increase with increasing addition of cement beyond 1.5% though at a relatively slow rate. Similar behavior was observed in the UCS values for the soil-CCA mix, increasing from a control value of 0.4 MN/m² to 1.0 MN/m² at 1.5% CCA and declining thereafter, while that for soil-cement continued to increase with increasing cement addition, but at a slower rate. This paper demonstrates that CCA is effective for chemical stabilization of a typical Nigerian AASHTO A-2-6 lateritic soil at maximum stabilizer content limit of 1.5% and therefore recommends its use as a way of finding further application for agricultural waste products and achievement of environmental sustainability in line with the ideals of the millennium development goals because of the economic and technical feasibility of the processing of the cobs from corn.

Keywords : corn cob ash, pozzolan, cement, laterite, stabilizing agent, cation exchange capacity

Conference Title : ICCBE 2014 : International Conference on Civil and Building Engineering

Conference Location : Cape Town, South Africa

Conference Dates : November 20-21, 2014