

Application of Treated Mixed Fruit Wastes in Soil Stabilization

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Book Circular Economy in the Construction Industry
Edition 1st Edition
First Published 2021
Imprint CRC Press
Pages 9
eBook ISBN 9781003217619

ABSTRACT

A significant amount of fruit wastes is being generated without appropriate environmental control for its processing and disposal. It has contributed to environmental pollution, poor water quality and transfer of diseases. For sustainable and eco-friendly utilization of the fruit wastes generated, this study focuses on assessment of utilizing processed fruit wastes as an alternate material component for soil stabilization. Fruit wastes such as banana peel (BP), orange peel (OP), pineapple peel (PP) and watermelon rind (WR) were obtained, sorted, dried and ground to form fruit waste powder (FWP). Soil sample was acquired and stabilized with FWP in percentages of 5%, 10% and 15% of soil sample. Standard soil tests inclusive of California Bearing Ratio (CBR) and Unconfined Compressive Strength (UCS) were determined according to ASTM standard classifications. Results show that the liquid limit (LL), plastic limit (PL) and plasticity index (PI) all increased with increase in FWP up until 10% and then decreased at 15%. The Optimum Moisture Content (OMC) also increased with increase in FWP while the Maximum Dry Density (MDD) decreased. The CBR and UCS were both maximum at 10% stabilization with increased CBR value of 50%, which is relatively fair and suitable for subgrade soil in road construction. The UCS had a maximum value of 17kN/m². With the increase in CBR and UCS, fruit wastes can be used as soil stabilizer in areas of low traffic load. The use of FWP as partial replacement to conventional stabilizers should further be explored to determine its effectiveness as soil stabilizer.