VISVESVARAYA TECHNOLOGICAL UNIVERSITY
BELGAUM

GOVERNMENT ENGINEERING COLLEGE, RAICHUR-584134

DEPARTMENT OF CIVIL ENGINEERING

CERTIFICATE

This is to certified that project entitled

"EFFECTS OF ADDITIVES ON PHYSICAL PROPERTIES OF SOIL"

SUBMITTED BY

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EXAMINERS

1) 2)

Abstract

Soil organic carbon is a complex and heterogeneous mixture of materials. These materials vary in their physical size, chemical composition and degree of interaction with soil minerals and extent of decomposition. Soil organic matter (SOM) and specifically soil organic carbon (SOC) are known to play important roles in the maintenance and improvement of many soil properties. Areas like Environmental Engineering and Agro-forestry have keen interest about SOC in concern with its functions and critical levels upon carbon (C) sequestration and its benefits concerning to surface as well as groundwater contamination and plant available water.

Approximately 6% of all greenhouse gas (GHG) emissions come from agricultural activities. These gases are in the form of carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4). However, by employing proper management techniques, agricultural lands can both sequester carbon and reduce CO_2, CH_4, and N_2O emissions, thus reducing their GHG footprint by Cap-and-trade organic carbon. This study is hence taken up to explicit the after effects of carbon sequestration in soil, by simulating the natural process of C-sequestration by using industrial wastes as soil amendments.

This study aims to provide a comprehensive assessment of the current state of knowledge of the functions of SOC and its effect on the physical properties of soil. Particular emphasis of this report is cited on the effect of SOC on soil aggregation, Atterberg limits, runoff-infiltration volume and sediment transport. The study is carried in three different phases based upon the mode of application of SOC to assess the after effects of SOC intrusion on the above said soil properties.

Industrial wastes like Fly ash, Bagasse ash, Press mud and the naturally decaying plant matter called Humus are taken as amendments to increase organic carbon in soil, with an intention of utilizing the waste and building up organic carbon in the soil. and their effects on four classes of soils in study area. Raichur, of Karnataka is chosen as the study area where semi arid climate prevails for most part of the year. Soils like Black cotton (BC) soil, Red Soil, Marshy soil and Mountainous soil found in this region and organic based farming is usually practiced here. Such of the soils are utilized in the study by conducting various experiments like water holding capacity and soil moisture determination, soil permeability test, sieve analysis, runoff-infiltration volume determination, liquid limits, plastic limits, plasticity index and soil erosion tests, with different SOC contents applied in different ways.

The waste application to soils gave quite promising results in improving the soil physical properties and the soil health by enhancing specific parameters in all the three different phases. Out of all the types of wastes applied, humus proved beneficial in many of the cases. Alkaline wastes were beneficial in neutralizing acidic soils which was proved through the drained water quality. Few of the wastes improved the hydraulic conductivity while few improved the water holding capacity. Improvement in the plasticity was even noticed in few of the soils which prove beneficial in resisting the shear force there by making the soil crack resistant. Benefits of SOC include building up of soil fertility, increased water infiltration, improving soil structure, soil biodiversity and filters water to protect ground water table, streams, lakes and rivers from nutrient runoff from agricultural fields, which is justified in this study.