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Stabilization of Lateritic soil by using Terrazyme: an Overview and Assessment Study

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***Abstract*: In konkan belt we are facing lots of problem in soil. Most of the area in konkan do not have access to all weather roads and hence have a tough time during the monsoon. One of the major reason for the damage of the roads in India is lack of strength possessed by subgrade soil and also it fails to bear the loads imposed on it during or after the construction. The various techniques in which soil stabilization can be done like use of biopolymers, synthetic polymers, tree resins, fiber reinforcement, calcium chloride etc. The present study is aimed at determining the strength behavior of Lateritic soil with terrazyme in percentage wise manner. In this project Lateritic soil with varying index properties have been tested and also the CBR test was performed for stabilization process under soaked and unsoaked condition by taking different dosages of terrazyme. The results indicated that the Safe Bearing Capacity of Lateritic soil can be increased by the optimum content of terrazyme.**

Keywords: CBR, Index properties, Lateritic soil, Soaked, Unsoaked.

I. INTRODUCTION

Every structure must rest upon soil or be made of soil. The process of improving the strength and durability of soil is known as soil stabilization. Soil stabilization is a treatment of soil with the objective of improving its engineering properties or alternating one or more properties of a soil so as to improve its engineering performance. The main aim of stabilization is cost reduction and to efficiently use the locally available material.

The Lateritic soil covers impressively vast zone of Konkan belt. This soil is formed by sedimentation action of parent rock. This type of soil is good for drainage purpose, but if we think about water retention capacity of this soil then we will get poor results. Road construction on soils with poor engineering properties necessitates adoption of Stabilization techniques. This research work investigates the effects of treating a soils having poor geotechnical properties with a terrazyme to determine its suitability for use as road pavement layer material. Bio-enzymes are found to improve the Geotechnical and Engineering properties of road sub grade and thus performance of roads. terrazyme effect on soils depends on types of soil, dosage of bio-enzyme (terrazyme). terrazyme enhance the soil properties and provide higher soil compaction and strength. terrazyme is non-toxic, non-corrosive and inflammable liquid which can be easily mixed with water at the optimum moisture content. terrazyme improves the properties of soil and strength of soil significantly. The chemical bonding of the soil particles is increased by the use of terrazyme. Apart from improving strength of soil this bio enzyme replaces the need of sub base.

II. MATERIALS AND METHODOLOGY

Materials

1. Lateritic soil: Lateritic soil is used in this project is collected from Lavel village, Tal-Khed, Dist. Ratnagiri in Maharashtra state. During collection of soil it had high moisture content about 40-45% due to rainy season. Lateritic soil is a rusty colour, iron and aluminium rich rock like appearing soil that gets formed due to prolonged weathering of the parent rocks mainly in humid and hot tropical areas.

2. Terrazyme: Terrazyme is an inflammable liquid which is brown in colour and is formulated from the vegetable and fruit extract. It is easily mixed with water and for optimal results should be diluted with optimum moisture content of that soil. It reacts with the organic matter in the soil to form cementatious material. This decreases the swelling capacity of the soil particles and reduces permeability by increasing the chemical bonding between the soil particles making a permanent structure. The treated soil becomes water resistant and also increase safe bearing capacity.

Methodology

In this present investigation various laboratory and experimental works have been carried out. We firstly determined all index and engineering properties of lateritic soil such as field density, moisture content, specific gravity, liquid limit, plastic limit. and also the CBR test was performed for stabilization process under soaked and unsoaked condition by taking different dosages of Terrazyme i.e. 0.1%, 0.2%, 0.3% per 4.5kg soil sample respectively.

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III. EXPERIMENTAL WORK & RESULTS

Geotechnical properties of lateritic soil

Table1: Geotechnical properties of soil

Sr. No.	Geotechnical properties	Result	IS code
1.	Field Density	1.758gm/cc	IS2720 (Part VIII),1983
2.	Moisture content	53.6%	IS2720 (Part VIII),1983
3.	Specific Gravity	2.69	IS 2720 (Part III)
4.	Grain size distribution; Sand (%) Silt &Clay (%)	83.4 11	IS 2720 (Part IV),1985
5.	Liquid Limit	54%	IS 2720 (Part V)
6.	Plastic Limit	41.67%	IS 2720 (Part V)
7.	Classification of soil sample	CM	IS 2720 (Part V)
8.	Maximum Dry Density (gm/cc) Optimum Moisture Content (%)	1.446 23	IS2720 (Part VIII),1983
9.	CBR value (without terrazyme) 2.5mm penetration 5mm penetration	6.49% 5.82%	IS2720 (Part II),1973

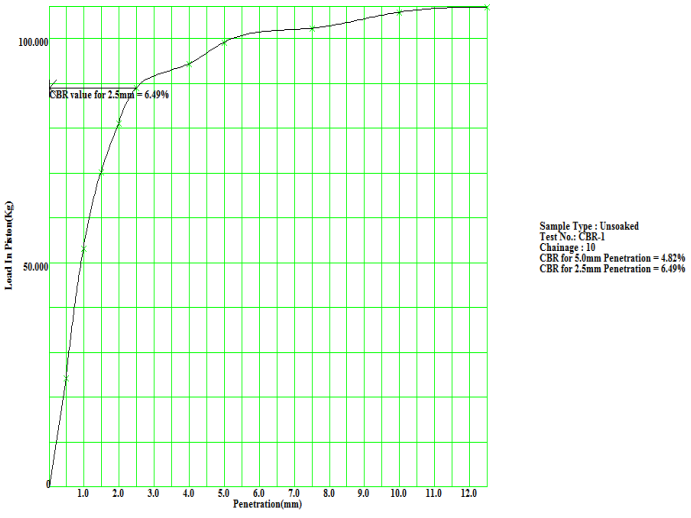

Fig1 Load vs Penetration curves for CBR test

Effect of Terrazyme on California Bearing Ratio results

California bearing ratio test was done for both unsoaked and soaked conditions. Lateritic soil was treated with 3 dosage of terrazyme at optimum moisture content 15%. The test was performed by taking different dosages of terrazyme i.e. 0.1%, 0.2%, 0.3% per 4.5kg soil sample respectively. Table 2 shows the effect of terrazyme on the CBR value of soil sample (Unsoaked). While table 3 shows effect of terrazyme on soil sample (soaked). Figure 2 and 3 shows the results of unsoaked and soaked CBR respectively.

Table2: CBR value for unsoaked condition

Dosages of Teradyne	2.5 mm penetration	5mm penetration
0.1%	17.2%	15.87%
0.2%	13.19%	15.12%
0.3%	9.18%	10.83%

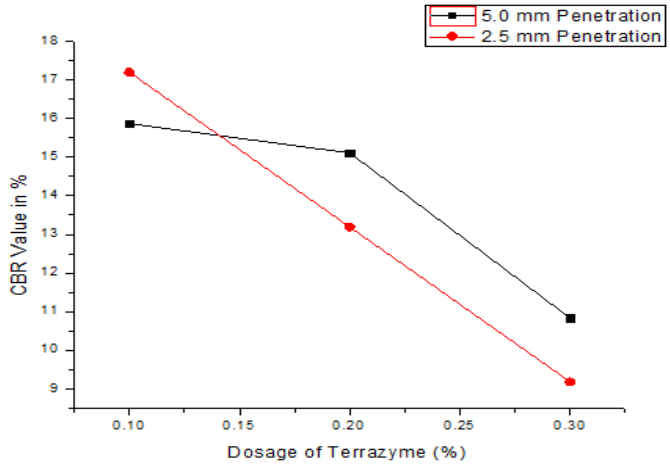

Fig2. Variation chart of CBR value vs Dosage of Terrazyme for Unsoaked condition

Table3: CBR value for soaked condition

Dosages of Terrazyme	2.5 mm penetration	5mm penetration
0.1%	7.65%	7.17%
0.2%	5.17%	6.15%
0.3%	5.11%	5.7%

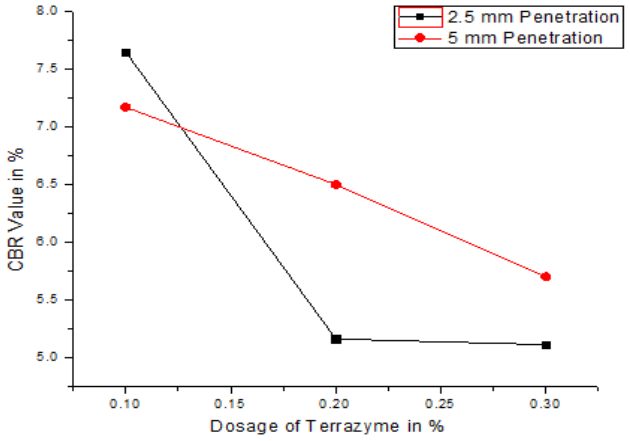

Fig3. Variation chart of CBR value vs Dosage of Terrazyme for soaked condition

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IV. CONCLUSIONS

1. From the results we have found that addition of terrazyme in soil as admixture which imparts properties on soil. Majorly terrazyme plays important role in the bearing capacity of soil.
2. We have found that optimum dosage of terrazyme in soil is 0.1% and which results indicate 60% and 40% of increase in the bearing capacity value in both unsoaked and soaked condition by comparing without addition of terrazyme in soil.
3. Finally we concluded that, due to heavy rain fall in konkan belt pavement surfaces are getting alligator cracks on the surface. Hence by using terrazyme in subbase of pavement which improves the property up to 40-60% in CBR.

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