

# Review Paper on Improvisation of Typical Soil under the Influence of Terrazyme and Waste Plastic Cement Bag Strips

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**Abstract**— for pavement development necessity of stable soils in sub-grade and sub-base layers. But due to unavailability of stable soil some technique are needed to improve the Geo-technical properties of unstable soil and which should low in cost, eco-friendly and ideal for construction of allweather roads. Terrazyme and Waste plastic cement bag strips proves to be the best features for this problems. This paper deals with a collection of factual knowledge about the terrazyme and waste plastic cement bag strips including its working mechanism and effect of index properties and CBR value of the typical soil. Benefit and disadvantages of using terrazyme and Waste plastic cement bag strips are also mentioned in this review paper.

**Keywords:** Stabilization, Soil, Boi-Enzyme, Terrazyme, Cement Plastic bag Strips, Strength Characteristics, CBR Test, Cost Effective

## I. INTRODUCTION

In many part of India lack of stable soil the unstable soil cannot be disposed and must be used to make it capable enough by stabilization before construction of pavement on this surface. There are many ways in which soil stabilization can be done like lime stabilization, Cement stabilization, Bitumen stabilization, mechanical stabilization, chemical stabilization, polymer stabilization and biopolymer stabilization. The terrazyme and waste plastic cement bag strips is also one of them. Many researcher used these materials separately for stabilization. It is considered that a research can be taken up by using both materials to analyse the effect on geotechnical properties of and CBR value of typical soil

## II. PLATIC BAG STRIPS

India is a fast growing country, for fulfilling demand of their needs infrastructure development is very necessary. By the increase in construction industry demand of cement is accelerated. Cement is packed in plastic bags. India produces about 27000 metric tons of cement every year.

For packing this huge amount of cement plastic bags are used. On an average 54 crore of plastic bags are generated every year. As we know plastic waste is very much harmful for our environment. So we need to solve this problem. We can use this waste as an alternate source of soil stabilizer. This cement bags can be shredded into small length of strips. These strips of bags can be used as reinforcement in the soil sub-grade. This will increase the load bearing capacity of soil. Also helps in improving the other geotechnical properties of soil such as permeability and increase the optimum moisture contain. For using plastic bags strips cement bags can be collected from RMC plants and from construction site.

## III. TERRAZYME AS ADDITIVE

Terrazyme is a natural, non-toxic, inflammable and non-corrosive liquid. It is obtained from vegetable extract and sugar molasses by the process of fermentation. It helps in improving engineering properties of soil. It also facilitates better workability of soil and increases stability by the catalytic reaction. It is manufactured by Nature Plus (under ISO 9002 procedure). World Bank conducted a test on a multiple stabilizers across the world in Paraguay, in which bio enzyme stood first. Based on which 1400 km roads are specified in Paraguay. It is also accredited by Indian researchers. Nowadays it is used in our country states like Goa, Karnataka, Tamil Nadu for the stabilization of sub-grade soil.

### A. Mechanism of Terrazyme

Soil particles are surrounded by a negatively charged layer which makes the particles to combine with positively charged particle to neutralize. It has been found that absorbed water layer on soil contain sufficient positive metallic ions like Na, K, Al, and Mg etc. This positively charged particles form bond with clay particles and water molecules. Due to this water layer is surround the soil particles. For full compaction we need to decrease or eliminate this water layer. Due to this phenomenon water eliminated and soil particles come closer and attains greater compaction with less compactive effort. The chemical reaction between the terrazyme and the soil particles can be shown by the below figure.

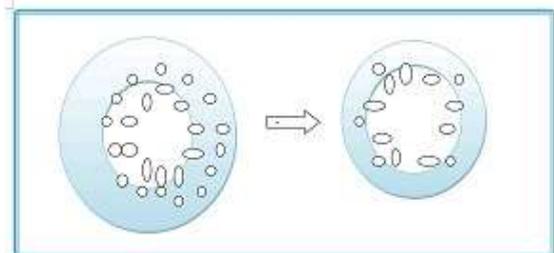


Fig. 1: Mechanism of Terrazyme

### B. Preparation of Terrazyme Solution

- Dose of terrazyme depends upon the type of soil with clay content and geotechnical properties of soil. Generally the amount of terrazyme for the silty clay soil is taken as 200ml for per 2 to 3 m<sup>3</sup> of soil. The procedure for application of terrazyme on soil sub-grade are as:
- Optimum dose of terrazyme is calculated according to the condition of the soil subgrade soil.
- This amount of terrazyme is mixed with water in water tank.
- The surface on which terrazyme has to be applied is sacrify and pulverized.

- After pulverization terrazyme solution is sprayed over it and mixed with soil metal thoroughly.
- For better result it can be left for 3 to 7 days for curing.
- After this rolling is done to achieve the optimum moisture content in the soil.

#### C. Use of Terrazyme in Indian Projects

- Terrazyme is a versatile bio-enzyme which is used by many international and national construction agencies. In India it is widely used by following agencies.
- Public Works Department, Maharashtra
- Pradhanmantri Gramin Sadak Yojana program to construct all weather road.

#### D. Advantage of Terrazyme

- Terrazyme is an ideal product for construction of all-weather roads in rural area without any topping.
- The maintenance cost of treated soil road is 7% less than the normal road.
- The road has undergone all rainy season without any topping and has replace the conventional granular sub-base layer and water bound macadam layers.
- Terrazyme increases the CBR value of soil, so this leads to reduction in thickness of pavement.
- It has good bonding qualities with soil and lowers the construction cost of road. Roads were constructed in Chennai, Goa, Karnataka and they are performing well.

#### E. Disadvantage of Terrazyme

- Availability of Terrazyme is not easily in india and has to be Orderd from the some specified Company.
- Skilled labour is required for application of terrazyme On Pavemement Construction.
- Terrazyme react only with the clay particles
- Terrazyme based stablization are little expensive if used on less clay content soil.

#### F. Effect of Terrazyme

##### 1) Atterberg limits (Consistency Limits)

Consistency represent relative ease with which a soil can be deformed. Consistency of clay is Depending on percentage of water Content, four stage of consistency are used to describe the state of a clay soil such as solid state, semi solid state, plastic state and liquid state. The boundary between any two states is called consistency limit they are also known as atterberg limits.

It can be seen that the typical soil is treated with optimum doses of terrazyme consistency index is improved as Compared to untreated soil.

##### 2) Compaction

Compaction is a process by which the soil particles are artificially rearranged and packed together into a closer state of contact by mechanical or chemical means in order to reduce the the volume of air voids of the soil and increases its dry density. Many geotechnical researches are carried out in recent times on chemical based and Waste Plastic bag improvisation of soil, which has poor engineering properties. Researches using terrazyme and waste plastic Cement bag Strips separately for stablization, the results are increasing. It is considered that a research can be taken up by using both

terrazyme and waste plastic cement bags to analyses the effect on engineering properties of soil.

It is seen from the laboratories result after mixing at Optimum doses of both terrazyme and Waste plastic cement bag strips the OMC decreases and MDD increases for the given soil at minimum Compactive effort.

##### 3) California Bearing Ratio (CBR)

This method is based on the strength parameter of subgrade soil and subsequent payment material. California bearing ratio is defined as the ratio of force per unit area required to penetrate is soil mass with standard circular Piston to that required for the corresponding penetration of standard material. This test is usually needed to determine the submitted strength of the soil improvements. Many geotechnical researches are carried out in recent times on chemical based and Waste Plastic bag improvisation of soil, which has poor load bearing Capacity. Researches using terrazyme and waste plastic Cement bag Strips separately for stablization. The results are increasing. It is considered that a research can be taken up by using both terrazyme and waste plastic cement bags to analyses the effect on Strength Characteristics of soil.

It is seen from the laboratories result after mixing at Optimum doses of both terrazyme and Waste plastic cement bag strips. The CBR Value is increasing as Compared to Virgin Soil.

#### G. Permeability of Soil

Permeability is a property of a soil by virtue of which it allow the flow of fluid through it. It is also termed as hydraulic conductivity. Permeability of coarse grained soil is comparatively more than that of fine grained soil. There are various factor affecting the permeability Such as particle size, specific surface area, void ratio and fluid properties.

It is seen that from test result after mixing of both terrazyme and waste plastic cement bag strips Permeability is significantly decreases for given soil because terrazyme reduces the void ratio of soil.

#### H. Doses of Terrazyme

Terrazyme doses is depends upon type of soil and its clay content. For Typical soil Optimum doses is found to be 200 ml / 2 Cubic meter

## IV. CONCLUSION

- Terrazyme is eco- friendly and does not any harm to the users
- Terrazyme and waste plastic cement bag strips are mixed with Typical Soil the Optimum moisture Content is decreases and Consistency limit is increases.
- It is also increases the CBR value and Maximum dry density of soil.
- Terrazyme decrease the voids between the Soil particles and it makes the soil water resistive by decreasing the permeability of the Soil.
- Terrazyme enhance soil properties depending upon the curing period.

#### V. FUTURE SCOPE OF WORK

- Further studies can be done on the use of terrazyme for solving the problem created due to rutting and stripping of the pavement and for use in maintenance of village roads, silty soil and collapsible soil
- Terrazyme enhance soil properties depending upon the curing period. So it can be investigated for effect on curing period for 3 days, 7 days and 14 days. Further investigation can be done on the resisting water permeability of soil by using terrazyme.
- Study can be carried out to find the suitable technique to maximize use of plastic cement bags in soil stabilization.
- Terrazyme also mixed with other soil stabilizer such as cement, lime, ceramic powder, bitumen and chemicals.
- Terrazyme is also use for construction of gravity dam

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