

# Experimental Study on Soil Stabilization Using Dairy Plastic Waste Sachets

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**Abstract**— Stabilization is a process which improves the physical properties of soil, such as increasing shear strength, bearing capacity, etc. The foundation is very important for any structure Soil & it has to be strongly enough to support the structure. Dairy Plastic waste is become one of the major problems for the world. So, recommended that use of dairy plastic waste for stabilization of soils and using dairy plastic as soil stabilizer would reduce the problem of disposing dairy plastic waste & also reduce facing environmental problems. In the present experimental study on stabilization of soil is done by using dairy plastic waste strips as additive and its tested for various strength parameters.

**Keywords:** Dairy Plastic Waste Strips, Soil Stabilization

## I. INTRODUCTION

Soil stabilisation means the improvement of stability or bearing power of the soil by the use of controlled compaction, proportioning and/or the addition of suitable admixture or stabilisers. The basic principles of soil stabilisation are:

- Evaluating the properties of given soil.
- Deciding the lacking property of soil and choose effective and economical method of soil stabilisation.
- Designing the stabilised soil mix for intended stability and durability values.

Stabilisation are often went to treat a good range of sub-grade materials from expansive clays to granular materials. In wet weather, stabilisation can also be went to provide a working platform for construction operations. These sorts of soil quality improvement are mentioned as soil modification. The determining factors related to soil stabilisation could also be the prevailing moisture content, the top use of the soil structure and ultimately the value benefit provided. Nearly as good soil becomes scarcer and their location becomes harder and expensive, the necessity to enhance quality of soil using soil stabilisation is becoming more important. Soil stabilisation using dairy plastic waste is an alternate method for the development of subgrade soil of pavement. It can significantly enhance the properties of the soil utilized in the development of road infrastructure.

## II. OBJECTIVE OF STUDY

- 1) To study the impact of proposed admixtures i.e. dairy plastic waste strips on the properties of soil throughout laboratory experiments.
- 2) To evaluate performance of the soil when stabilized with proposed admixtures i.e. dairy plastic strips and their stability for pavement construction.
- 3) To provide an alternative solution for disposal for dairy plastic waste.
- 4) To reduce the evil effect caused by dairy plastic waste on environment.

## III. SCOPE OF WORK

The scope of the work includes addition of dairy plastic waste strips to the locally available black cotton soil to enhance the engineering properties. The work presented in this paper aims to investigate the improvement of soil properties such as shear strength, maximum dry density (MDD) and CBR values by adding strips cut from dairy plastic waste. A series of laboratory test were conducted on both plain as well as plastic reinforced soil to compare the improvement of soil properties

## IV. MATERIALS USED

### A. Soil

Soil used in this study is taken from ATME College of engineering, Bannur road Harohalli Mysuru. The soil is collected at certain depth of 2m from the ground level. The distributed soil sample is then transported to the Geotechnical Laboratory.

### B. Dairy Plastic Waste

The strips were prepared from dairy plastic (milk and pouches) that were collected from the nearby surroundings. The dairy plastic were cleaned properly after collection and cut into specified size strips, manually using scissors. The dimensions of dairy plastic waste strips used in this study is 15mm × 15mm. These strips are added in the soil in different proportion by weight. In this study strips used are 0.1%, 0.2% and 0.4% of dry weight of soil.

## V. METHODOLOGY

Dairy plastic waste strips are mixed at different percentage i.e., 0%, 0.1%, 0.2% and 0.4% of dry weight of soil. Basic test on soil was carried out to find out the properties of soil. First to find out the optimum moisture content and maximum dry density Modified Proctor Compaction test and Standard Proctor compaction taste was performed. On basis of OMC and MDD further Direct shear test and California Bearing Ratio (CBR) test was performed to find out the shear strength parameters and bearing capacity of the soil. Mixing of dairy plastic waste strips in soil have been done carefully such that these strips are distributed uniformly in the soil. The mixing is done manually and proper care is taken to prepare a homogeneous mixture.

VI. RESULT AND DISCUSSION

Test result on soil+ various percentage of dairy plastic waste strips

Test Conducted	Percent of dairy plastic strips (15mm*15mm)			
	0%soil	0.1%	0.2%	0.4%
Standard proctor test				
MDD	1.95 g/cm	1.78g/cm <sup>3</sup>	2.05 g/cm <sup>3</sup>	1.88 g/cm <sup>3</sup>
OMC	13.2%	14.55%	12.5%	14.28%
Modified proctor test				
MDD	2.07 g/cm <sup>3</sup>	1.9 g/cm	2.12 g/cm <sup>3</sup>	2.01 g/cm <sup>3</sup>
OMC	12.2%	13.1	10.55%	13.28%
Direct shear test				
C	0.373	0.33	0.46	0.37
φ	10.2°	9°	13.34°	10.2°
CBR test				
2.5mm	3.21%	3.46%	4.2%	3.9%
5mm	2.91%	3.1%	4.01%	3.74%

This table indicate that the comparative analysis of various dairy plastic waste strips proportions added with soil. Hence it is concluded that the 0.2% of dairy plastic waste strips have higher shear strength parameters of soil.

VII. GRAPHICAL REPRESENTATION

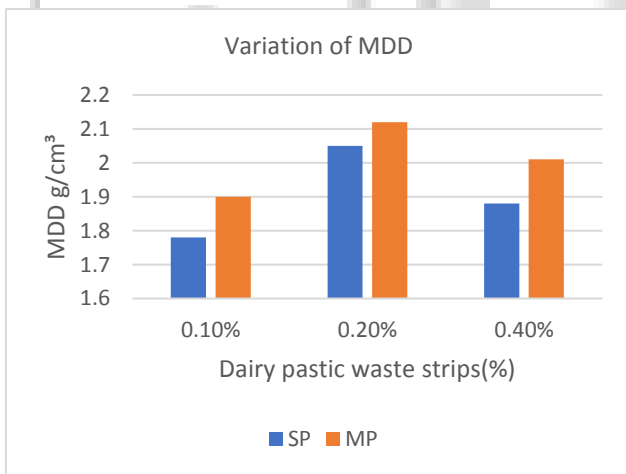


Fig. 7.1: Variation of MDD

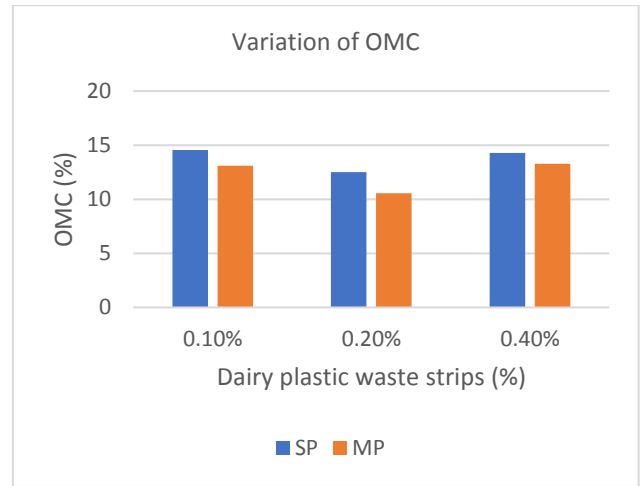


Fig. 7.2: Variation of OMC

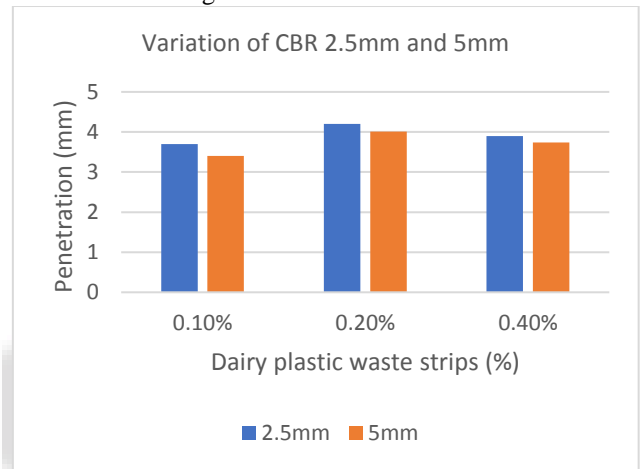


Fig. 7.3: Variation of CBR 2.5mm and 5mm

VIII. CONCLUSION

From the experimental work carried out following conclusion can be made regarding the aspect of strength improvement of soil due to mixing of dairy plastic waste strips as a mean of soil reinforcement.

From Standard proctor compaction test and Modified proctor compaction test results shows that the increase in dry density of a soil can generally be equated to increase in strength of soil, it gives lower permeability and better volume. It is concluded that the MDD is higher in 0.2 % dairy plastic waste strips. There is a reverse trend observed with respect to OMC.

Direct shear test shows that the soil that has greater strength will have more cohesion and friction between particles and it is shown by equation  $\tau = C + \sigma \tan \phi$  from graph for 0.2% dairy plastic waste strips have more cohesion and angle friction compare to 0.1% and 0.4%. Hence, we conclude that soil which has 0.2% dairy plastic waste strips have more 'τ' compared to 0.1 and 0.4%.

From variation of CBR graph it is concluded that the value of CBR for 0.2% of dairy plastic waste strips is higher compared to 0.1 and 0.4% dairy plastic waste strips, hence bearing strength is higher in the soil which contains 0.2% dairy plastic waste strips.

Dairy Plastic waste used as a soil stabilizer which make construction economical and also helpful for disposal of dairy plastic waste.

Thus, it is conclude that using 0.2% dairy plastic waste strips as soil stabilizer, it is effective to improve the various strength property of soil and it is used for pavement subgrade and other field of civil engineering as per needs.

#### IX. FUTURE SCOPE

In future a number of variations can be done and iterated to find the different set of results. The same tests can be carried out with varying proportions and varying sizes. The orientation of the strips provided can also be altered (longitudinally or laterally or both or random distribution). The test may also be iterated with waste or different size of strips filled with sand as a replacement of stone columns for stabilization. Further studies can be done for improvement under different conditions of orientations and for different types of soil with dairy plastics of different sizes. This technique can be effectively applied in construction of embankments proving it to be multipurpose because it not only strengthens but also preserves the environment.

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#### REFERENCES

- [1] Arpan Sen, Rishabh Kashyap "Soil stabilization using dairy plastic waste materials", (2012).
- [2] C. M. Sathya Priya, S. Archana, A.Bichu Albert, A.D. Deeraj "Stabilization of clayey soil using polypropylene fiber", (Apr - 2017).
- [3] Vijay Kumar Singh, S V Dinesh Babu Bommireddy, Dr.B.R.Phanikumar," Innovative Techniques in Road and Rail Construction on Expansive Soils", International Journal of Civil Engineering (SSRG-IJCE), Volume3 Issue7, 2016.
- [4] Divya Patle, Mamta Burike, Sayli D. Madavi, Suvarna Raut "Soil stabilization using dairy plastic waste Soil stabilization using dairy plastic waste", (2017).
- [5] Jasmin Varghese Kalliyath, Jithin Thomas Joy, Jeny Merin Paul, Antony Mathew Vadakkal "Soil Stabilization using dairy Plastic waste", (June 2016).