# Influence of Cactus Milk and Blood in Natural Soil ConcretefFor Improving Compressive Strength of Concrete

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***Abstract* — Now-days there is a demand of river sand. it is not economical. So, we are using natural soil in concrete, if we using natural soil in concrete means the compressive strength go down for that we are adding the natural admixtures such as cactus milk and waste blood to improve (or) attain the normal strength of concrete.**

***Keywords— Compressive strength, natural soil, blood, Cactus milk, cooking oil, engine oil, non bio degradable ash.***

## I. INTRODUCTION

Sustainability in construction industry is important for the modern development of construction industry. Concrete is the most widely used construction material in the modern world. Concrete incorporates large amount of natural resources as aggregates and cement with water. Sand is the main ingredient of concrete.

As there is more demand for river sand so we have used replaced partially natural soil. Basically river sand gives more compressive strength as compare to natural soil but in this we shown that by using natural soil and natural admixtures also we can increase the compressive strength of concrete. As chemical admixtures are costly and not eco-friendly so we have used natural admixtures like animal blood, cactus milk, sunflower oil, and engine oil.

*Non bio degradable ash*

To sustain the metabolism, the blood vessels transport blood throughout the body via network of arteries, veins and capillaries. The usage of such vascular structures in fingers and palms has been investigated in biometrics literature [2]-[9], with high success. Even in the identical twins and eve between the different fingers of an individual, the finger-vein patterns are believed to be unique. There are two important factors for the preference of finger-vein biometrics. First, high degree of privacy. Second, offering strong ant spoofing capabilities.

## I. METHODOLOGY

This chapter deals with the methodology adopted for the present study.

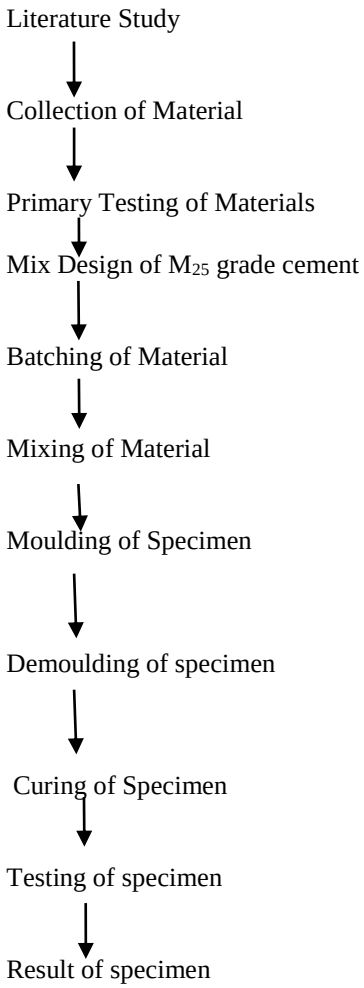



Fig 1: This is the schematic representation of our project

## II. MATERIAL USED AND ITS PROPERTIES

*A) CEMENT*

Ordinary Portland Cement (OPC) is composed of calcium silicates and aluminates and aluminoferrite. It is obtained by blending predetermined proportions limestone clay and other materials in small quantities which is pulverized and heated at high temperature around 1500ºC to produce 'clinker'. The clinker is then ground with small quantities of gypsum to produce a fine powder called Ordinary Portland Cement.

Fig 2:cement

*B) AGGREGATE*

Aggregates are the important constituents in concrete. They give body to the concrete, reduce shrinkage and effect economy. Earlier, aggregates were considered as chemically inert materials but now it has been recognised that some of the aggregates are chemically active and also that certain aggregates exhibit chemical bond at the interface of aggregate and paste. The mere fact that the aggregates occupy 70-80 per cent of the volume of concrete, their impact on various characteristics and properties of concrete is undoubtedly considerable. To know more about the aggregates which constitute major volume in concrete.

Aggregates are divided into two categories from the consideration of size:

- Coarse aggregate
- Fine aggregate

❖ *FINE AGGREGATE*

Aggregates passing through 4.75mm sieve are defined as fine. The smallest size of fine aggregate is 0.06mm. Fine aggregate is added to concrete to assist workability and to bring uniformity in mixture. Usually, the natural sand is used as fine aggregate. Important thing to be considered is that fine aggregate should be free from coagulated lumps.

Fig 3: natural soil

Grading of natural sand or crushed stone i.e. fine aggregate shall be such that not more than 5% shall exceed 5mm in size, not more than 10% shall IS sieve No.150 not less than 45% or more than 85% shall pass IS sieve No.1.18mm and not less than 25% or more than 60% shall pass IS sieve No. 600 micron.

Fig 4:river sand

❖ *COARSE AGGREGATE*

Coarse aggregate is chemically stable material in concrete presence of coarse aggregate reduces the drying shrinkage and other dimensional changes occurring an account of movement of moisture. Coarse aggregate contributes to impermeability of concrete, provided that is properly graded and the mix is suitably designed.

fig 5: coarse aggregate

*C) WATER*

The pH value of water should be in between 6.0 and 8.0 according to IS 456-2000.

✓ *Effect of Mixing Sea Water in Concrete:*

The sea Water generally contains salinity of about 3.5% in which about 80% is sodium chloride. Many researchers have been conducted to study the corrosion problem of steel Embedded in concrete where sea water is used as mixing water in concrete nevertheless the Indian standard is adamant & do not permit using sea water for mixing or curing in reinforced Concrete constructions, but allows for using of sea water only for PCC work that too under unavoidable circumstances.

✓ *Quality of Water for Curing Concrete Cubes:*

The water that is fit for mixing and curing of water for concrete is also fit for curing of cubes which are cured under water. However the curing water should not to be allowed to remain in stagnant condition in water tanks for long time. As a guideline the water tanks shall be cleaned

twice a week or when ph value of water reaches a value more than 9. The cleaned Water tanks shall be refilled with fresh water every time.

The cleaning of water is necessary to remove algae and fungus materials developed inside the water tanks which otherwise alters the setting and strength gaining properties of Concrete. The low results of such cubes may call for in situ tests resulting in consequential Delay of the project.

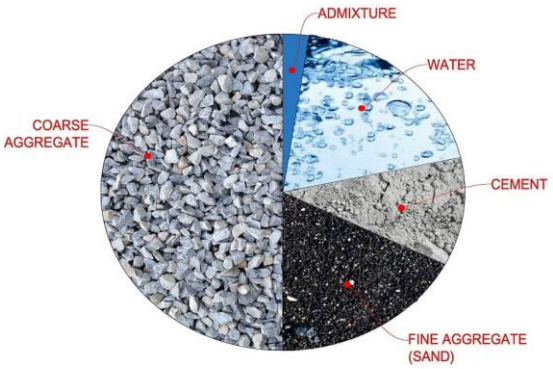



Fig 6: water

## III. NATURAL ADMIXTURE

Natural admixtures are admixture which is obtained from the natural material that would increase the strength. Comparatively with chemical admixture natural admixture is more economical. Natural admixture is the one of the waste product material from the environment. The natural admixtures used in our project are,

i. Blood
ii. Cactus milk
iii. Sunflower oil
iv. Engine oil

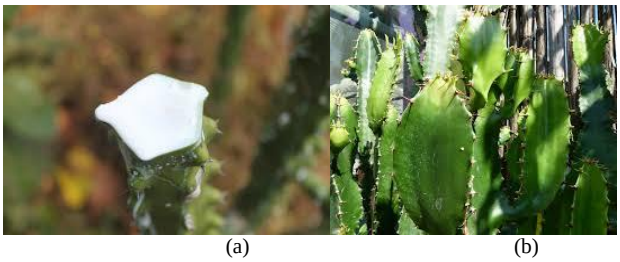
### *i. BLOOD*

Blood is a natural admixture which acts as a good air entraining agent that would increase the strength of the material. The air entraining agent would reduce the porosity, air voids and reduce the gap between the materials.

Fig 7:blood

### *ii. CACTUS MILK*

Cactus milk is a natural admixture. To adding the concrete to improve the workability and also reduce the water content that would increase strength.. The cactus milk has rheological property. The rheological property especially in relation between the manufacturing processes. The pulp exhibits a high PH value 5.3to 7.1 and low acidity 0.01to 0.018and total soluble solids at 10.7 degree to 17 degree. The cactus milk is obtained from xuccina plant from pollachi. The cactus milk has thyrotrophic material. The thyrotrophic material exhibits a decreasing shear stress.



(a) (b)

Fig 8: (a) &(b) are cactus milk

### *iii. COOKING OIL*

Sunflower is a waste product from the house hold and restaurant. It has good workability. This waste product can be utilizes by adding admixtures to improve the compressive strength. It has good durability when compared to other natural admixtures. That admixture would increase the compressive strength. The edible part of sunflower that would increase the strength of the material. The correlate part of the material contains more durability condition when exposed to atmospheric condition.


Fig 9: cooking oil

### *iv. ENGINE OIL*

There is a current trend all over the world to investigate the utilization of processed and unprocessed by-products and domestic wastes as raw materials in concrete, as components of concrete binder, as aggregates, a portion of aggregate, or ingredients in manufactured aggregates. Some wastes can be used as chemical admixtures and additives, which can alter the fresh and hardened properties of concrete. However, successful use of industrial byproducts or wastes in concrete depends mainly on the requisite properties of the end product. Several by-products or wastes have been reported in literature to be used in concrete and construction industry; such as recycled concrete aggregate, pozzolans, fly ash, blast furnace slag, silica fume, rice husk ash, waste-derived fuels, organic fiber materials, etc. It is estimated that

less than 45% of the used-engine oil is being collected worldwide while the remaining 55% is thrown by the end user in the environment.

The discharge of used oil can become a serious problem or a valuable resource depending upon how it is managed. Simply reflect on the fact that one oil change contains four quarts of foils, which when improperly disposed of sufficient to ruin one million gallons of fresh water, which in turn adversely impacting human life, fish and plant life. So, in this context, the proper management of used oil is essential to eliminate or minimize potential environmental impacts.

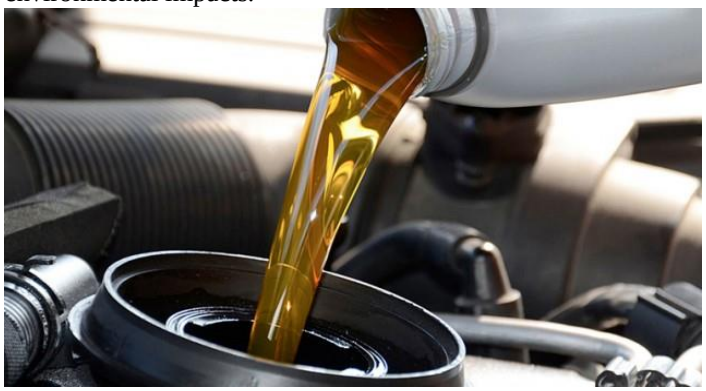


Fig 10: engine oil

## IV. TESTING RESULTS

| GRADE | NORMAL (C+S+C.A) | ADMIXTURE | COMPRESSIVE STRENGTH | | |
|---|---|---|---|---|---|
| | | | 7 DAYS | 14 DAYS | 21 DAYS |
| $M_{25}$ | 24 | Blood (25%) | **30.22** | **35** | **42.22** |
| | | Milk (25%) | **28.53** | **32.00** | **38.00** |
| | | Sunflower (25%) | **14.20** | **16.00** | **20.00** |
| | | Engine oil (25%) | **3.55** | **7.30** | **14.50** |

The testing result implies that compressive strength of concrete is obtained by adding blood, cactus milk, cooking oil and engine oil. This is suitable for attaining good compressive strength.

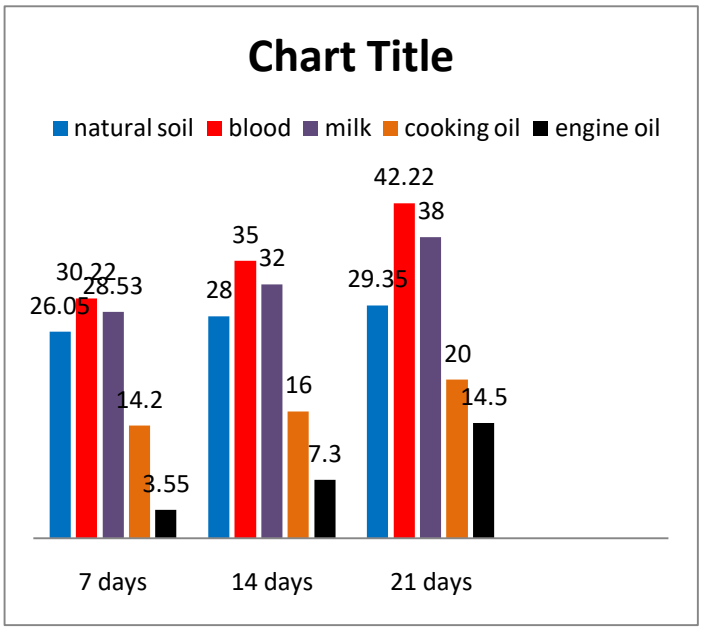



Fig 11: comparison of natural concrete with admixtures. (Blood, cactus milk, cooking oil, engine oil)

(a)Testing result on blood (b)Testing result on cactus milk

(c)Testing result on cooking oil (d)Testing result on engine oil

## V. CONCLUSION

Based on the results obtained from the experimental investigation the following conclusions are made,

It is concluded that sufficient workability was attained for $M_{25}$ grade of concrete at 0.5 water cement ratio. We are using $M_{25}$grade of concrete. This is suitable for normal construction work. The availability of river sand is a major problem in construction work in now- days. So, we are replacing it by means of top layer of natural soil. But, these natural soil that do not have a binding property. So we are adding natural admixtures to increase the compressive strength. It is an important ingredient in the construction materials. There are 2 variety of cement are available such as

OPC and PPC. In PPC cement there is more fly ash content are available. So, to reduce the fly ash content we are using OPC.

In OPC cement we are using 43grade of cement. It is used in normal construction work. Non bio degradable ash is waste product from plastic waste like GRO CERY bags, plastic bags, water battle. We are replacing it for 10% replacement of cement. Water cement ratio would determine the workability conditions of the concrete. So, we are choosing an optimum W/C ratio. We are partially replacing by blood, cactus milk, sunflower oil and engine oil. The chemical admixture available in market is highly economical

So we are replacing it, by means of natural admixture like blood, sunflower oil, cactus milk, engine oil. The air entertaining agent is cost effective. So, we are replacing by blood which is low cost. By testing it we get a good compressive strength of 42.22N/mm$^{2.}$ So it is highly preferable to use as a admixtures.

The workability is cost effective. So, we are replacing by cactus milk which is low cost. By testing it we get a good compressive strength of 38N/mm$^{2.}$ So it is highly preferable to use as an admixtures. The workability, durability is cost effective. So, we are replacing by sunflower oil which is low cost. By testing it we get a low compressive strength of 20N/mm$^{2.}$ But, it is waste product in many foreign countries. So, it is economical to as a admixtures.

The workability, durability and increases the initial setting time. So, we are replacing by engine oil which is low cost. By testing it we get a poor compressive strength of 14.5N/mm$^{2.}$ So, it is not preferable to add as an admixture even though it is economical. The chemical admixtures are heavy cost. So, we are replacing it my means of natural admixtures. The natural admixtures are available is easily. When, compared to the chemical admixtures. Natural admixtures such as blood, cactus milk attain a good compressive strength of 42.22N/mm$^2$ and 38N/mm$^2$. But our natural admixtures such as sunflower oil, engine oil do not attain a good compressive strength. But, it is preferable to economical.

## REFERENCES

1. A. Durán-Herrera, C.A. Juárez, P. Valdez, D.P. Bentz, “Evaluation of sustainable of Cement & Concrete Composites, Vol.33, 2011, pp.39–45
2. BS 1881: Part 122, 1983. Testing Concrete—Method for Determination of Water Absorption. British Standards Institution, London.
3. BIS-2386-1963 (Part I&III), “Method of test for Aggregate for concrete”, Bureau of Indian Standards, New Delhi.BIS: 383-1970, “Specification for coarse and fine aggregates from the natural sources for concrete”, Bureau of Indian Standards, New Delhi.
4. BIS: 10262-2009, “Concrete mix proportioning-Guidelines”, Bureau of Indian standards, New Delhi.
5. BIS 516-1959, “Method of Tests for Strength of Concrete”, Bureau of Indian standards, New Delhi.
6. BIS: 1199-1959, “Methods of sampling and analysis of concrete”, Bureau of Indian standards, New Delhi.
7. IS: 9103-1999, “Specification for concrete admixtures”, Bureau of Indian standards, New Delhi.
8. RafatSiddique, “Performance characteristics of Cement and Concrete Research, Vol.34, 2004, pp.487–493
9. Stintzing, F.C., Schieber, A. and Carle, R. 1999a. Amino acids composition and betaxanthin formation in fruits from *Opuntia ficus–indica*. Planta Médica 65: 632-635.
10. Stintzing, F.C., Schieber, A. and Carle, R. 1999b. Cactus pear: A source of pigments and nutritionally important components. Annals of the 22nd IFU Symposium, Paris. pp. 349-365.
11. Stintzing, F.C., Schieber, A. and Carle, R. 2000. Cactus pear: A promising component to functional food. Obst-Gemüse-und Kartoffeverarbeitung 1: 40-47.
12. Stintzing, F.C., Schieber, A. and Carle, R. 2001. Phytochemical and nutritional significance of cactus pear. Eur. Food Res. Technol. 212: 396-407.
13. Stintzing, F.C., Schieber, A. and Carle, R. 2002. Identification of betalins from yellow beet (*Betavulgaris* L.) and cactus pear (*Opuntia ficus–indica* (L.) Miller.) by high performance liquid chromatography electro–spray ionization mass spectrometry. J. Agric. Food Chem. 50: 2302-2307. Winton, A.L. 1958. Analysis of Foods. 3rd printing. John Wiley and Sons Inc., New York.
14. Barbagallo, R. N.; Pappalardo, P. and Tornatore, G. (1998). Chemical and sensory evaluation of prickly pears concentrated puree. Industrie Alimentari, 37(371): 745-749.
15. Barbera, G. (1995). History, Economic and Agro-ecological importance. pp.1-11. In: Agro-ecology, cultivation and uses of cactus pear. Ed. by Barbera, G.; Inglese, P. and Pimienta-Barrios, E. FAO Plant Production and Protection Paper Nº 132.
16. Claisse, P. A., Elsayad, H. I. and Shabaan, I. G., (1997), "Absorption and Sorptivity of Cover Concrete", Journal of Materials in Civil Engineering, pp. 105-110.
17. 9- SERGI, G. (1986). "Corrosion of steel in concrete: Cement matrix variables", Ph.D.Thesis, Aston University, England, UK, 395 pp.
18. 10- Parrott, L.J., (1992), "Variations of Water Absorption Rate and Porosity with Depth from an Exposed Concrete Surface: Effects of Exposure Conditions and Cement Type", Cement and Concrete Research, Vol. 22, pp. 1077-1088.
19. 11- Rahman, A. A. and Glasser, F. P. (1989), “Comparative studies of the carbonation of hydrated cements’, Advances in Cement Research, Vol. 2, No. 6, pp. 49-54.
20. 12- Ramachandran, A. I. (1969), “Application of different thermal analysis in cement chemistry”, Pub. Chemical Publishing Company, London.
21. 13- Du, L. and Folliard, K. J.(2005), "Mechanisms of air entrainment concrete", Cement and Concrete Research, Vol. 35, pp. 11463-1471.
22. Hossain SMJ, Alam MR, Sultana N, Amin MR (2004) Milk Production from Indigenous Black Bengal Goat in Bangladesh. J. Biol. Sci., 4(3): 262-265.
23. Prasad H, Tewari HA, Sengar OPS (2005). Milk yield and composition of the beetal breed and their crosses with Jamunapari, Barbari and Black Bengal breeds of goat. Small Rumin. Res. 58 (2): 195-199.
24. Utilization of milk whey in building Yildirim H and Altun B 2012 Usage of molasses in concrete as a water reducing and retarding admixture Jumadurdiyev A, Hulusi Ozkul M, Saglam A R and Parlak N 2005 The utilization of beet molasses as a retarding and water-reducing admixture for concrete *Cem. Conc. Res.* **35** 874-882.
25. Ahmad M, Ahmed S, Hassan FU, Arshad M, Khan MA. Base catalysed transesterification of sunflower oil biodiesel. Afr J Biotechnol 2010;9(50):8630
26. Kirton, A.H., Frazerhurst, L.F., Woods, E.G. & Chrystall, B.B. (1981) Effect of electricalstunning method and cardiac arrest on bleeding efficiency, residual blood and blood splash in lambs. Meat Science, 5, 347-353.
27. Macfarlane, W.V. (1975) Distribution and Dynamics of Body Fluids in Sheep. The Blood of Sheep: Composition and Function edited by M.H. Blunt. Springer-Verlag. Worldwide. Masri, B.A. (2007) Animal Welfare in Islam. Revised edition. The Islamic Foundation Leicester.
28. Zhang Y, Dube MA, Mclean DD, Kates M. Biodiesel production from waste cooking oil. Process design and technological assessment. Bioresour Technol 2003;89:1-16.