



Science

ANALYSIS OF PROPERTIES OF CONCRETE USING DRIED BANANA PEEL POWDER AS ADMIXTURE

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Abstract

Ingredients other than cement, water & aggregates that impart a specific quality to either plastic (fresh) mix or the hardened concrete (ASTM C 496) is called concrete admixture. In this paper analysis of properties of concrete using banana peel as admixture is studied and verified the strength of concrete and temperature emitted due to chemical reaction to the normal Portland cement. As banana's peel is rich in natural fiber and it is well known source of potassium. The flexural strength of concrete by using banana peel powder as admixture has increased, but considerable lesser compressive strength has increased. The percentage of transmission temperature and reduction time of temperature has decreased; hence it is clear that the exothermal reaction in concrete has been reduced by using dried banana peel powder as admixture.

Keywords: Grudhrasi; Unique Combination of Ayurvedic Herbal Kwatha; Agnikarma.

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1. Introduction

Banana's peel was one of the massive construction material used as an admixture in historical construction industries. As banana are popular most consumed and worldwide produced fruit, Because of removal of bananas peel, a significant amount of kitchen waste is generated [1][2], which is very rich in fiber content, About 30-35% of total mass of fibers and carbohydrates. Mineral content in a banana peel is primarily consistent of potassium (78.10mg/g) and manganese (76.20mg/g). Other minerals present are sodium, calcium and iron at 24.30, 19.20 & 0.61mg/g respectively. Bananas peels has numerous application, for water purification, [3] to

produce ethanol [4], cellulose, [5] lactase, [6] as fertilizer [7] and in composting. Although banana peel has these meritorious uses, these are considered as vegetable waste.

As average mass of peel of banana is about 25 to 20% of total mass of banana, as 145million tones of Banana is consumed in worldwide hence amount of banana peel will be approximately 40million tones. The main drawback of banana peel is they undergo biodegradation quickly, as banana peel is fresh their co-efficient of friction on a linoleum surface was measured as just 0.07, But when these banana peel dries or bio-degrades its co-efficient of friction gradually increases. The author has experimented by keeping banana peel exposed to sunlight for 5days, which increases surface tension and co-efficient of friction. These peels are used as admixture to experience different results. As banana contains potassium this may help in enhancing reduction of temperature transmission and temperature absorbing properties of concrete.

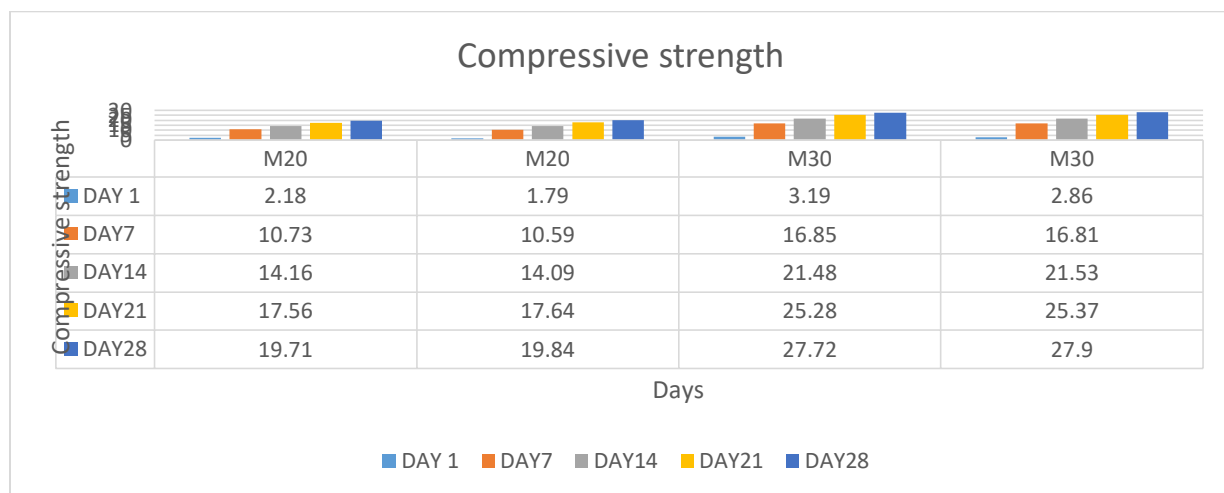
2. Methodology

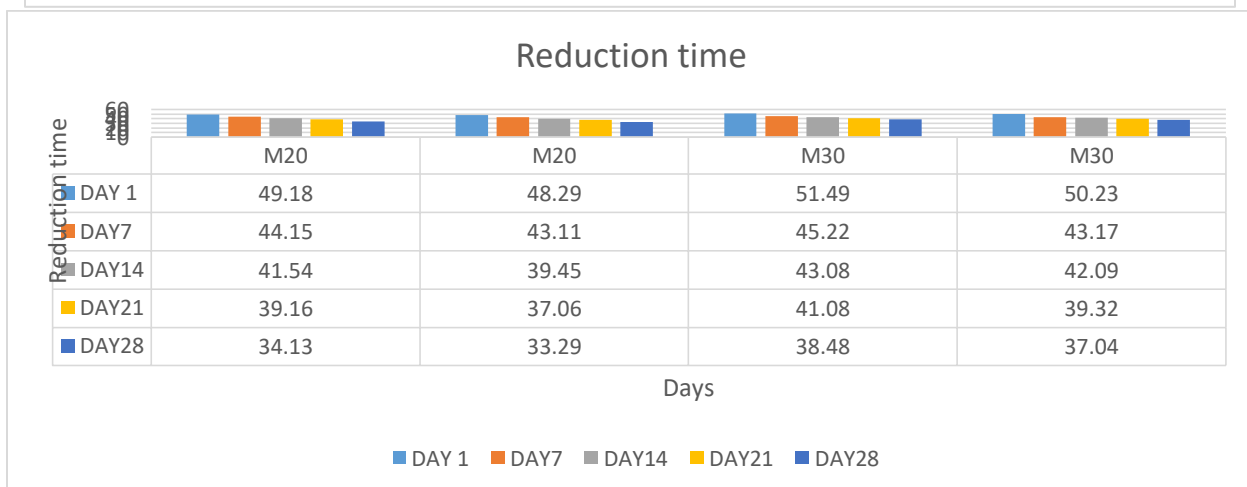
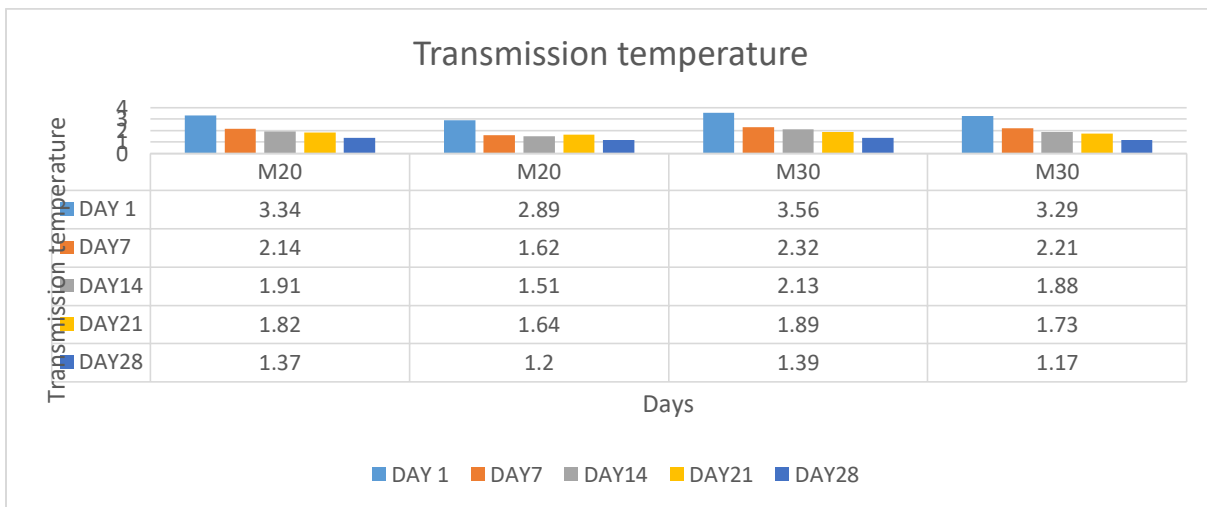
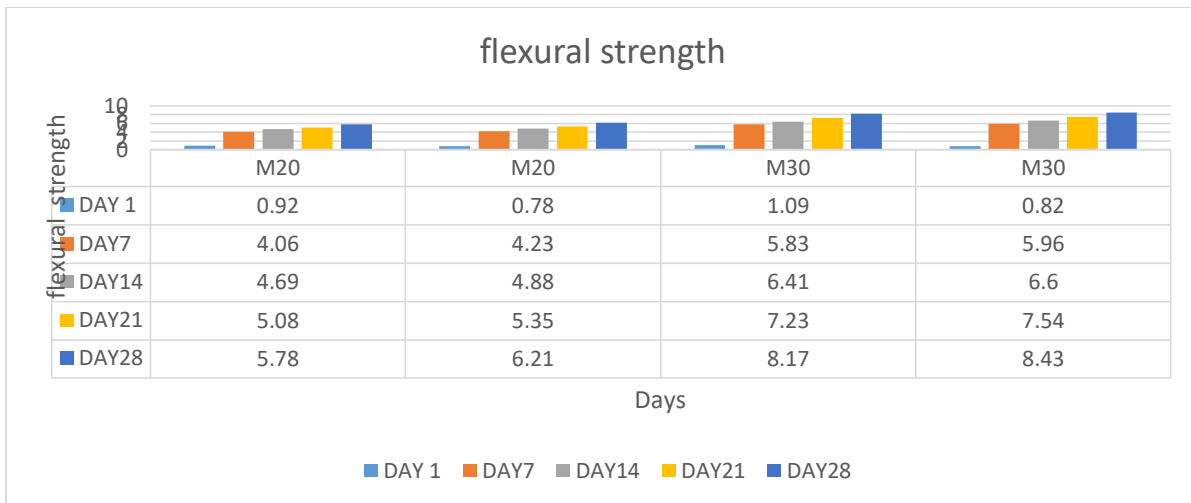
The banana peel is collected from different sources. As banana undergoes bio-degradation to avoid it peels are dried under sunlight for 2days. After complete drying the peels are powdered carefully. Obtained powder is packed in aluminum sheets or polythene cover helps in protecting powder from atmospheric moisture. While mixing the powder must be free from lumps.

An empty spaced cube with bottom, size of 10*10*10cm casted using concrete with peel powder concrete and walls of thickness 1cm. Water of 100⁰c was filled in empty cube and the time consumed for reduction of temperature of water to 40⁰c were noted down. This gives the time consumed by cube to reduce inner temperature of 100⁰c of water to 40⁰c.

An empty cube casted by using peel powder concrete size 10*10*10 was inserted into another larger empty cube casted using plane cement concrete size of 15*15*10cm. 3cm sufficient space was left between two cubes was filled with Water of 100⁰c and top side of cube was closed by lid. Water temperature was noted down after 8mins for 1,3,7,21,23 and 28 days of similar casted samples. The difference between the water temperature noted after 8min and the temperature at room temperature gives the amount of heat transmitted through the walls of inner cube.

3. Results and Discussions





4. Conclusions

From fig(3), it can be observed that M20 & M30 grade of concrete with banana peel powder transmitted less temperature (1.2⁰c)&(1.17⁰c) compared to the normal concrete

(1.37⁰c)&(1.39⁰c). Temperature transmittance capacity found more or less same for all grades. About 12.41% and 15.82% of heat transmitted property has reduced by M20 and M30 grade of concrete respectively.

In fig (4) shows, the time taken by each sample to cool down from 100⁰c to 40⁰c. present study reveals that banana peel dried powder added concrete cube takes very less that is 33min 29sec & 37min 4sec comparatively to the normal concrete that is 34min 13 sec and 38min 48sec by M20 &M30 grade of concrete respectively for 28days, That is 2.46% and 3.78% time faster compared to normal concrete . Hence it says the temperature liberated during chemical reaction may be less by using peel powder as admixture.

Fig (1) &fig (2) shows, there is no considerable change in the compressive strength & tensile strength, in all grades of concrete.

Hence banana peel can be used as admixture where temperature due to exothermal reaction place an important role to exothermal reaction place an important role and to be reduced un construction.

Acknowledgement

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References

- [1] Derived from: "FAOSTAT". Food and agriculture organization of United Nations. The data for bananas and plantations for 2011 were combined as the two are distinguishing by some countries but combined under "bananas" by others.
- [2] G.M. Babatunde; "Availability of banana and plantain products for animal feeding". In: D.Machin, S.Nyvoid: Roots, tubers, plantains and bananas in animal feeding. Proceedings of the FAO Expert Consultation held in CIAT, Cali, Colombia FAO ANIMAL PRODUCTION AND HEALTH PAPER 95, FAO, Rome,1992
- [3] A.Chaparadza, JM Hossenloppl; adsorption Kinetics, isotherms and thermodynamics of atrazine removal using a banana peel based sorbent. Water-Science technology, 65(5), 2012, PP.940-947.
- [4] HS Oberoi, PV Vadlani, L. Saida, S. Bansal; ethanol production from banana peel using statistically optimized simultaneous scarification and fermentation process. Waste management 31(7), 2011, pp1576-1584.
- [5] Hai-Yan Sun, Li Juanhua, Pingjuan Zhao Ming Peng; Banana peel. Novel substrates for cellulose production under solid state fermentation African Journal of Biotechnology 10(77), 2011, pp.1788.
- [6] V.Vivekanand, P.Dwivedi, N.Pareek, RP Singh; Banana Peel: potential substrates for laccase production by *Aspergillus Fumigatus* VKJ2.4.5 in solid-state Fermentation. Applied Bio-Chemistry and Bio-Technology 165(1), 2011, pp. 204-220.
- [7] "How to use banana peels in your gardens". Frugal Chicken 2015-07-05. Retrieved 2015-07-06.

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