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An Overview On A Study On High Performance Reinforced Concrete Using Pyprophylite

Mrs.MALARVIZHI(1),Mr. MD ASHIF ALAM(2),Ms. POOJA. S(3), Mr. MANI . S (4).

1Assistant Professor Civi lEngineering Department,Rajarajeswari College of Engineering, Bengaluru, Karnataka.

2,3,4 UG Students,Rajarajeswari College of Engineering ,Bengaluru, Karnataka

5% to 30% replacement were investigated. The compressive strength of mortars Abstract: Sugarcane bagasse ash is a byproduct of the sugar factories found after burning as a cement replacing material. bagasse ash content increases and all the blended concretes showed a higher bagasse ash from 5% to 30% replacements were also investigated. Four cement by bagasse ash in the concrete have shown a slightly lower compressive cement were replaced by ground bagasse ash. Normal consistency and setting chemical properties were investigated. The bagasse ash was then ground until concluded that 10% replacement of cement by bagasse ash results in a similar concrete properties and higher replacement could also be used with a slight construction activity in the country, a huge shortage is created in most of the construction materials especially cement, resulting in steady increase of price. containing ordinary Portland cement and Portland pozzolana cement with different concrete mixes with the bagasse ash replacing 0%, 5%, 15% and 25% environmental problems around the sugar factories. Due to the boost of the Initially, bagasse ash samples were collected from Wonji sugar factory and its maximum penetration depth than the control concrete. It can therefore be mixes have then been assessed both at the fresh and hardened state. of the ordinary Portland cement were prepared for 25MPa concrete with water ordinary Portland cement by bagasse ash achieved a higher compressive ordinary µ Portland cement. Ordinary Portland cement and Portland pozzolana reduction in the performance of the concrete. strength at 56 days. The water penetration depth was found to increase as the strength at all test ages i.e.7 and 28 days, whereas the 15% replacement of the sugar from sugarcane. The disposal of this material is already causing sugarcane bagasse which itself is found after the extraction of all economical the particles passing the 63 m reaches about 85%, which is similar to that of The results of the mortar work have shown that, up to 10% replacement of the This research was therefore, conducted to examine the potential of bagasse ash time of the pastes containing ordinary Portland cement and bagasse ash from to cement ratio of 0.55 and 350kg/m 3 cement content. The properties of these

Introduction :

Sugar production has emerged as one of the major agro industries all over the world during the last few decades. In India sugar production is undertaken practically throughout the country and there are well-established large scale factories in 18 out of 29 States. According to the reports for the last crushing season, there were 338 factories in operation which crushed about 60 million tons of cane, producing 6.1 million tons of sugar and 2.5 million tons of molasses. Average bagasse production is about 30 percent of the sugarcane crushed and about 90 percent of bagasse produced is used as fuel. After controlled burning of bagasse, the ash obtained is known as bagasse ash. Now a day, bagasse is also being used in the manufacturing of pulp and paper products. Previous researches have shown that for each 10 tons of sugarcane crushed; a sugar factory produces nearly 3 tons of wet bagasse which is a waste product of the sugar cane industry. It is the cellular and fibrous waste product after the extraction of the sugar juice from sugarcane. Bagasse ash is a residue obtained from the burning of bagasse in sugar producing factories. A good solution to the problem of recycling of sugarcane residues would be by burning them in a controlled environment and use the ashes (waste) for more noble means (Ghavami et al., 1999). SCBA constitutes an environmental nuisance as they form refuse heaps in areas when they are disposed of in low lying areas. Western Maharashtra is having maximum number of sugar factories and these factories are now facing disposal problem of large quantity bagasse. The effective utilization of these waste products is a challenging task for a researcher through economical and environmental friendly way. The use of SCBA in concrete reduces the heat of hydration and increases

THE LIFE OF STRUCTURE. THE REASONS BEHIND USING THIS MATERIAL IN CONCRETE IS THAT IT CONTAINS LARGE PERCENTAGE OF AMORPHOUS SILICA AND ALUMINA, WHICH IS RESPONSIBLE FOR SECONDARY HYDRATION, WHEN SCBA COMES IN CONTACT WITH HYDRATION PRODUCTS OF CEMENT AND PRODUCES HIGHER STRENGTH AS COMPARED TO CONVENTIONAL CONCRETE DUE TO FORMATION OF ADDITIONAL C-S-H GEL UTILIZING HARMFUL LIME PRODUCED DURING HYDRATION. IT HAS BEEN FOUND BY VARIOUS RESEARCHES THAT BAGASSE ASH IS A VALUABLE POZZOLANIC MATERIAL SIMILAR TO THAT OF SLAG, FLY ASH AND GROUND GRANULATED BLAST FURNACE ASH (GGBS). MOREOVER, USAGE OF BAGASSE ASH IN CONCRETE HELPS IN REDUCTION OF DEAD WEIGHT THEREBY PRODUCING LIGHT WEIGHT STRUCTURES

➢Chemical Composition

Carbon – 40 -50% hydrogen – 5-7% oxygen – 40-45% nitrogen <1% sulfur <0.1%

➢Physical Properties

The mineral typically occurs in white, green, grey or brown in colour. It has a pearly or greasy luster and hardness ranging from 1 to 1.5 on the Mohs scale. Sugarcane baggaseis known for its excellent cleavage in one direction, allowing it to be easily split into thin, flexible sheets.

➢Formation and Occurrence

Sugarcane baggaseforms in low-temperature hydrothermal environments, often in association with other aluminium silicate minerals. It is commonly found in metamorphic rocks, such as schist and slate, and is associated with minerals like talc, serpentine, and kaolinite.

Cement concrete

Cement concrete is a crucial building material used in construction projects worldwide. It's made by mixing cement, water, sand, and crushed stone or gravel. When these ingredients combine, they form a paste that binds the aggregates (sand and stone) together, creating a solid and durable material known as concrete.

Concrete has many advantages, including its strength, versatility and durability. It's used in various construction applications such as building foundations, roads, bridges, dams and sidewalks. Additionally concrete can be moulded into different shapes and sizes, making it suitable for a wide range of architectural designs.

Overall, cement concrete is a fundamental component of modern construction playing a vital role in creating stable and long-lasting structures.

Problem statement

The construction industry is continually seeking sustainable and eco-friendly alternatives to traditional construction materials to mitigate the environmental impact associated with conventional practices. In this context, the exploration of pyrophyllite, a naturally occurring mineral, as a potential replacement material in cement concrete presents a promising avenue. Sugarcane baggasepossesses unique physical and chemical properties that may contribute to the improvement of concrete performance, but the feasibility, effectiveness, and potential challenges associated with its incorporation remain largely unexplored.

The use of sugarcane baggaseas a partial substitute for traditional constituents in concrete raises questions related to its impact on the structural, mechanical, and durability properties of the resulting composite material. Furthermore, considerations must be given to the sourcing, processing and overall environmental sustainability of pyrophyllite, ensuring that any advantages gained in the concrete mixture are not offset by negative ecological consequences.

The cement industry is a major contributor to greenhouse gas emissions, prompting the need for sustainable alternatives. Pyrophyllite, a naturally occurring mineral, exhibits properties that make it a potential candidate for partial replacement in cement. This study aims to investigate the feasibility and impact of incorporating sugarcane baggaseas a partial replacement material in cement for concrete production.

The present study aims to address these critical knowledge gaps and uncertainties surrounding the utilization of sugarcane baggasein cement concrete by systematically investigating its effects on concrete properties and understanding the economic and environmental implications of its production and application, we seek to note valuable insights that could guide the construction industry toward more sustainable practices.
The specific objectives of this study include:

1.Assessing the mechanical strength and durability of concrete incorporating sugarcane baggaseas a partial replace cement for traditional materials.

2.Investigating the influence of varying sugarcane baggasepercentages on the workability and rheological properties of the concrete mix.

3.Evaluating the environmental impact of sugarcane baggaseproduction and its incorporation into concrete.

This research is crucial in fostering the feasibility and potential benefits of using sugarcane baggasein cement concrete. Ultimately, the outcomes of this study could contribute to the development of more sustainable construction practices and promote the adoption of alternative materials in the quest for a greener and more environmentally responsible built environment.

RESEARCH METHODOLOGY

B. Das and J.K. Mohanty.- Mineralogical and chemical analyses of three textural varieties of sugarcane baggasesamples collected from Baliadihi mine of Keonjhar district, Orissa, India are investigated. Mineralogically, they consist of quartz, pyrophyllite, altered feldspar as major minerals and muscovite, chlorite, tourmaline, hematite etc. as minor minerals. The samples exhibit compositional variation of SiO2 65.56 - 71.66%, Al2O3 18.79- 22.94%, FeO 1.13- 1.68% and alkalis 3.24 to 6 %. Beneficiation studies using flotation technique has indicated that silica can be reduced with concomitant increase in alumina and brightness from a raw sugarcane baggasesample which can be suitable for refractory purposes

M. Mansour Sabria Malika- The current trend of industrial concrete leans more towards the use of self-compacting concrete. These must have fresh properties well defined as fluidity, filling ability and resistance to segregation. However, to ensure the rheological stability, use mineral fines is required. In this work, powder of calcined sugarcane baggase(CP) was used as cement substitution at level of 10% and 20% by weight. The interest is focused on the role played by the calcined sugarcane baggaseto produce SCC with reduced impact environmental. Calcination of sugarcane baggasepowder was carried out at 750 °C. Its effect on the workability and mechanical properties of self-compacting concrete is analyzed. The results show that the properties of workability of SCC containing 10% of calcined sugarcane baggasetested at fresh state (Slump Flow, T50, passing ability and segregation resistance) are almost identical to those of the control SCC. Furthermore, the calcined sugarcane baggaseincreases the compressive strength, tensile and flexural strength of SCC approaching without exceeding those of the control SCC. It seems that 10 % of calcined sugarcane baggaseis the optimum replacement rate which improves mechanical strength compared to 20%. Replacing cement with the calcined sugarcane baggaseaims to save cement and reduce the CO2 emissions released during the manufacture of cement.

M s. Mansour[1], r. Chaid[2]-. The combination of sugarcane baggaseas mineral admixture, synthetic fibers and binder creates an unusual fiber reinforced concrete; new composite, which offers a wide field of possible use in construction industry. The Polypropylene fiber reinforced concrete containing sugarcane baggaserepresents a new step forward for concrete construction as it offers many advantages both economically and ecologically. The experimental results showed that: The use of sugarcane baggaseas substitution to cement slows down the hardening process of PFRC concrete, consequently producing lower strengths concretes at early ages approaching without exceeding those that the reference reinforced concrete. It seems that the rate of 10 % of sugarcane baggasegives the reinforced concrete, the best physical- mechanical performances compared to 20% Pyr and 30% Pyr.The application of this composite material is ensured by the synthetic fibers, which along with the other components constitutes the tough structure of the composite favorable especially under tensile loading due to its high ductility.

Abdultaha Demez, Mehmet Burhan Karakoc - As temperature increased, compressive strength of concrete mixtures decreased. The reduction in compressive strength, however, was more prominent in all concrete mixtures exposed to temperatures higher than 600°C. Cooling in water has more harmful effects compared to cooling in air. Under identical temperatures, air-cooling maintains relatively higher values of residual compressive strength. When subjected to the peak temperature of 750°C, the residual compressive strength of mixtures with 0 and 100% PA dropped to approximately 37 and 42% of the original values after air-cooling regime and 33 and 38% after water-cooling regime, respectively. The weight of the concrete specimens reduced significantly as the temperature increased. As the temperature increased, the weight loss of the concrete increased. Compared to five different m ixtures used in the study, mixture containing 100% PA showed better performance. In visual observation of concrete samples subjected to elevated temperatures, it was noticed that the surface cracks became visible when the temperature reached 600°C. The cracks were very pronounced at 750°C. These results were supported by SEM studies. As will be seen from the studies, the PA can be used especially in concretes that can be exposed to high temperature.
Anja Terzić, Milica V. Vasić : Sugarcane baggasewas successfully employed as a 50 % replacement resource in the refractory, ceramic, and carbonate raw clay composites, as well as up to 30 % replacement in mortars based on andalusite, ordinary Portland cement, and high aluminate cement. The investigation proved the efficiency and suitability of sugarcane baggaseas a resource for producing high-temperature processed building materials. In ceramics, sugarcane baggasereduced the firing shrinkage, but the optimal firing regime and percent of addition must be further tested to avoid undesired cracking. The recommended firing temperature is 1200°C. The composites with the best performances were sugarcane baggasewith either refractory or ceramic clay to manufacture floor tiles fired at 1200°C. Sugarcane baggasecan solely be used in wall tiles production. In mortars, sugarcane baggasecontributed to the hydration of ordinary Portland cement as it propagated the additional quantity of mineral phases (alite, belite, wollastonite, and gehlenite), which influenced the increase in compressive strength and refractoriness of Portland cement-based mortars. This influence was less notable in high aluminate cement mortars, while in blended cement mortars, the result was moderate. Crystalline folia, characteristic of pyrophyllite, was detected, forming the micro- reinforcement within the mortar's microstructure. Sugarcane baggaseaddition of up to 20 % can be used in building or refractory mortars (fired at 1000°C) without deterioration of their performances.

IV. RESULTS AND DISCUSSION

Compressive strength test on cubes

- Compressive Strength of Nominal Concrete Cubes

Table 7.1.1. : Compressive Strength of Nominal Concrete cubes in 7 days curing

No. of Blocks	Compressive strength N/mm^2	Avg N/mm^2
Cube 1	19.84	18.84
Cube 2	19.97	
Cube 3	18.98	

Table:7.1.2 Compressive Strength of Nominal Concrete cubes in 28 days curing

No. of Blocks	Compressive strength N/mm^2	Avg N/mm^2
Cube 1	27	23.68
Cube 2	21.06	
Cube 3	22.56	

- Compressive Strength of Partial Replacement by 5 % of baggase ash in Concrete Cubes

Table 7.1.3 : Compressive Strength of reinforced Concrete cubes in 7 days curing for 5%

No. of Blocks	Compressive strength N/mm^2	Avg N/mm^2
Cube 1	22.07	22.05
Cube 2	21.87	
Cube 3	22.02	

Table 7.1.4: Compressive Strength of reinforced Concrete cubes in 28 days curing for 5%

No. of Blocks	Compressive strength N/mm^2	Avg N/mm^2
Cube 1	31.85	31.55
Cube 2	21.55	
Cube 3	21.09	

- Compressive Strength of Partial Replacement by 10% of Sugarcane baggasein Concrete Cubes

Table 7.1.5 : Compressive Strength of reinforced Concrete cubes in 7 days curing for 10%

No. of Blocks	Compressive strength N/mm^2	Avg N/mm^2
Cube 1	22.62	22.95
Cube 2	24.22	
Cube 3	22.02	

Table 7.1.6 : Compressive Strength of reinforced Concrete cubes in 28 days curing for 10%

No. of Blocks	Compressive strength N/mm^2	Avg N/mm^2
Cube 1	26.46	23.20
Cube 2	21	
Cube 3	22.14	

- Compressive Strength of Partial Replacement by 10% of sugarcane baggase in Concrete Cubes

Table 7.1.7 : Compressive Strength of reinforced Concrete cubes in 7 days curing for 10%

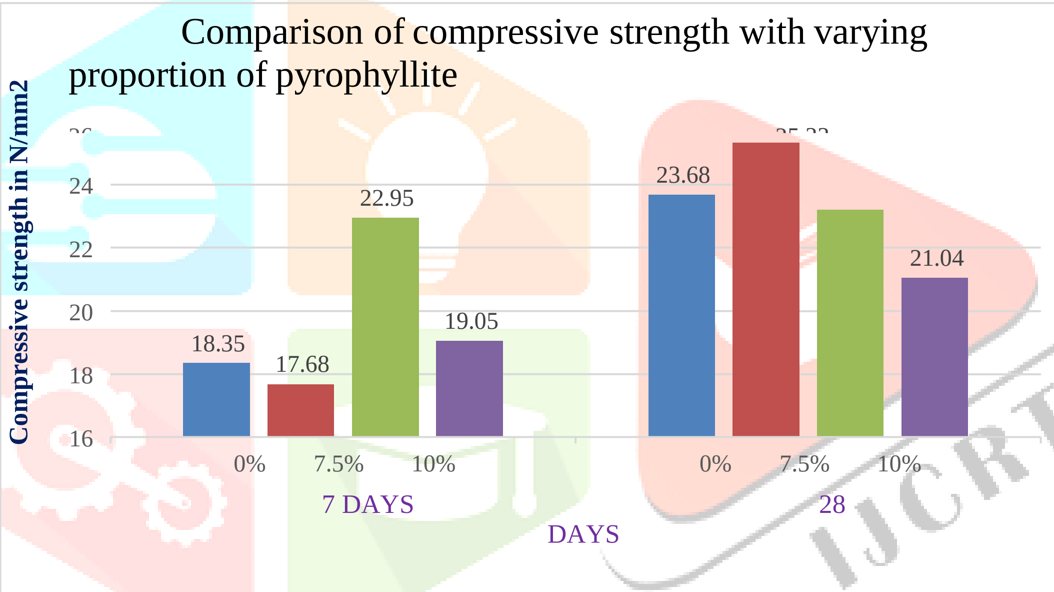
No. of Blocks	Compressive strength N/mm^2	Avg N/mm^2
Cube 1	24.99	24.87
Cube 2	24.54	
Cube 3	24.89	

Table 7.1.8 : Compressive Strength of reinforced Concrete cubes in 28 days curing for 10%

No. `of Blocks	Compressive strength N/mm^2	Avg N/mm^2
Cube 1	35.04	35.02
Cube 2	35.00	
Cube 3	34.97	

Table 7.1.9 Average Compressive Strength N/mm^2

SL NO	% Of Sugarcane baggaseAdded	Compressive Strength of 7 days curing in N/mm^2	Compressive Strength of 28 days curing in N/mm^2
1	0	19.84	31.85
2	5	22.07	32.88
3	10	24.99	35.04
4	15	17.92	24.58



7.2. Split Tensile Strength Test on Cylinder

➢ Split tensile Strength of Nominal concrete Cylinder

Table 7.2.1: Split tensile Strength of Nominal Concrete cylinder in 7 days curing

No. Of Blocks	Split tensile strength N/mm^2	Avg N/mm^2
Cylinder 1	2.28	2.24
Cylinder 2	2.43	
Cylinder 3	2.02	

Table 7.2.2: Compressive Strength of Nominal Concrete cylinder in 28 days curing

No. Of Blocks	Split tensile strength N/mm^2	Avg N/mm^2
Cylinder 1	2.7	2.56
Cylinder 2	2.72	
Cylinder 3	2.26	

- Split tensile Strength of Partial Replacement by 5% of sugarcane baggase in Concrete Cylinder

Table 7.2.3 : Split tensile Strength of Partial Replacement by 5% sugarcane baggase in Concrete Cylinder in 7 days curing

No. Of Blocks	Split tensile strength N/mm^2	Avg N/mm^2
Cylinder 1	1.56	1.77
Cylinder 2	2.04	
Cylinder 3	1.73	

Table 7.2.4 Split tensile Strength of Partial Replacement by 5% of sugarcane baggase in Concrete Cylinder in 28 days curing

No. Of Blocks	Split tensile strength N/mm^2	Avg N/mm^2
Cylinder 1	2.72	2.47
Cylinder 2	2.20	
Cylinder 3	2.41	

- Split tensile Strength of Partial Replacement by 10% of sugarcane baggasein Concrete Cylinder

Table 7.2.5 Split tensile Strength of Partial Replacement by 10% of Sugarcane baggasein Concrete Cylinder in 7 days curing

No. Of Blocks	Split tensile strength N/mm^2	Avg N/mm^2
Cylinder 1	1.40	1.59
Cylinder 2	1.55	
Cylinder 3	1.83	

Table 7.2.6 Split tensile Strength of Partial Replacement by 10% of Sugarcane baggasein Concrete Cylinder in 28 days curing

No. Of Blocks	Split tensile strength N/mm^2	Avg N/mm^2
Cylinder 1	2.24	2.12
Cylinder 2	1.85	
Cylinder 3	2.29	

- Split tensile Strength of Partial Replacement by 12.5% of Sugarcane baggasein Concrete Cylinder

Table 7.2.7 Split tensile Strength of Partial Replacement by 12.5% of Sugarcane baggasein Concrete Cylinder in 7 days curing

No. Of Blocks	Split tensile strength N/mm^2	Avg N/mm^2
Cylinder 1	1.70	1.75
Cylinder 2	1.54	
Cylinder 3	2.02	

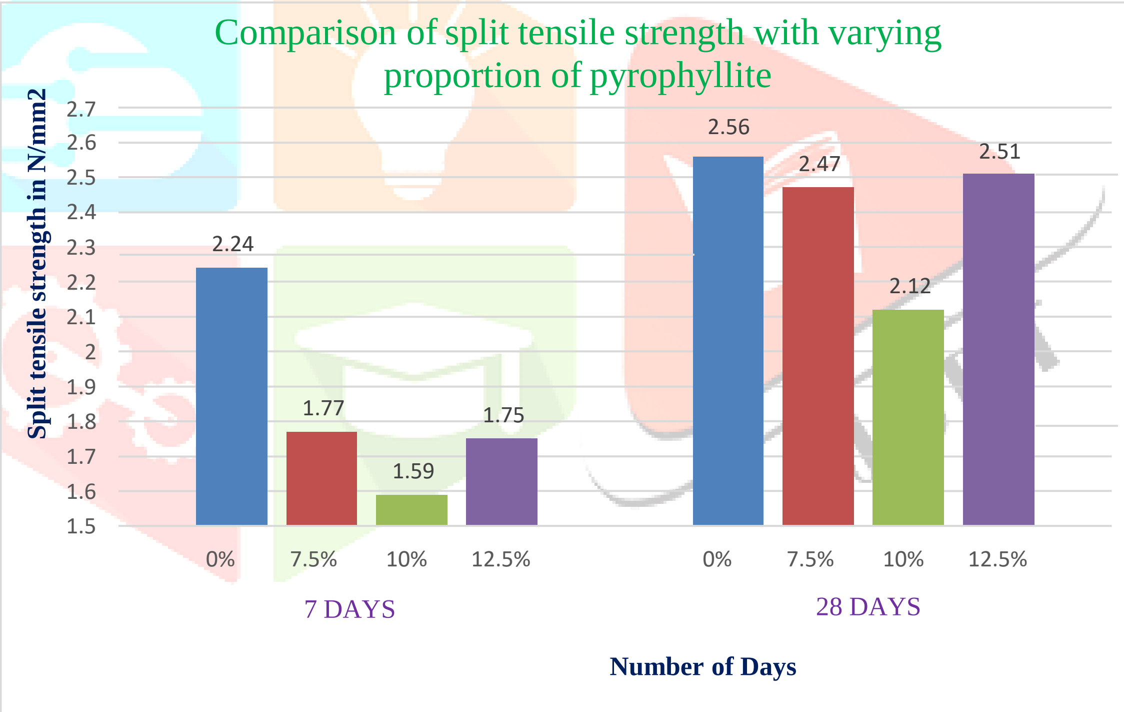
Table 7.2.8 Split tensile Strength of Partial Replacement by 12.5% of Sugarcane baggasein Concrete Cylinder in 28 days curing

No. Of Blocks	Split tensile strength N/mm^2	Avg N/mm^2
Cylinder 1	2.80	2.51
Cylinder 2	2.79	
Cylinder 3	2.04	

Table 7.2.9 Average Split tensile Strength in N/mm^2

Sl.no	% Age of sugarcane baggaseadded	Split tensile strength in 7 days curing in N/mm^2	Split tensile strength in 28 days curing in N/mm^2
1.	0	2.24	2.56
2.	7.5	1.77	2.47
3.	10	1.59	2.12
4.	12.5	1.75	2.51

strength comparison chart of Cylinders



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