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Experimental Studies on Strength Properties of Concrete by Utilizing a Mixture of Bagasse Ash and Stone Dust

Shashi Ranjan Kumar[1], Pushpendra Kumar Kushwaha[2], Mithun Kumar Rana[3]

[1]*M. Tech. Research Scholar, Civil Department, RKDF College of Engineering, Bhopal (M. P.),402026 India*
[2]*Assistant Professor, Civil Department, RKDF College of Engineering, Bhopal (M. P.), 402026 India*
[3]*Assistant Professor, Civil Department, RKDF College of Engineering, Bhopal (M. P.), 402026 India*

ABTRACT

Nowadays, waste materials are used as advantageous replacement material industry. Sugarcane bagasse ash (SGBA) and stone dust (SD) used as partial replacement materials in the concrete mix. Sugarcane bagasse ash (SGBA) are used as pozzolanic materials for the development of blended cement. Few studies have been reported on the use of bagasse ash as pozzolanic material by partially replacing the cement and stone dust by partially replacing the sand in the concrete mix, Blended concrete was prepared by replacing OPC with SGBA (10% by weight of cement) and replacing river sand by stone dust (10%, 20%, 30%, 40% and 50% by weight of sand) in dry condition. , in the third phase, the study was limited to the concrete with 10% (optimum) cement replacement by SGBA added with stone dust in variable proportions (10%, 20%, 30%, 40% and 50%) by replacing sand. From Experimental Result compressive strength of concrete mix (BA -10+SD -40) prepared with 10% replacement of cement by SGBA and 40% replacement of sand by stone dust

Keyword - stone dust, Sugarcane bagasse, river sand strength and durability

I. INTRODUCTION

The most commonly used building material in the world, concrete a heterogeneous composite material made up of easily accessible fundamental ingredients such as cement, -water, CA and fine aggregates, and, depending on the situation, admixtures, fibres, or other additives. When combined, these components create a fluid mass that is easily shaped into any desired shape. When the cement has adequately dried over time, it creates a firm matrix that holds the other materials together to create concrete, a long-lasting substance that resembles stone. Concrete is used extensively in the building industry Due to its strength, stiffness, durability, moldability, economy, and versatility. It is also dependable and sustainable.

In concrete, quarry dust can be used in place of fine aggregates.

The purpose of the current study is to examine the effects of substituting quarry dust for fine aggregates through an experimental inquiry. The need for quarry dust to make concrete is growing daily as natural sand cannot keep up with the growing demands of the building industry. Natural sand is nonrenewable and takes millions of years to create. Nonetheless, a lot of Indians are sceptical about the quality of concrete that uses quarry dust. Quarry dust was used to partially replace fine aggregate in six distinct mixtures, with variable percentages of 0, 10, 20, 30, 40, and 50%. The parameters of compressive, tensile, and flexural strength were examined. Overall, the findings showed that quarry dust is a good replacement for natural sand in concrete.

Role of Quarry Dust

For the foreseeable future, the civil engineering community will have difficulties in putting sustainable development principles into practise. This means making use of high-performing products and materials that are produced cheaply and with the least possible harm to the environment. One of the most commonly used types of fine aggregate is pit or natural sand. The need for natural sand is particularly high in developing countries due to the quick development of their infrastructure.

Sugar Cane Bagash

In order to produce enzymatically hydrolyzed nanocellulose, sugarcane bagasse offered a plentiful supply of lignocellulose biomass. According to Aguilar et al. (2020), the nanocellulose demonstrated exceptional stability against heat, with a degradation temperature of over 300°C, and a good crystallinity index. A positive charged molecule appendage is necessary for the cellulose nanomaterial to be useful in adsorbing and coagulating negatively charged dangerous metal ions from an aqueous environment.

II. LITERATURE SURVEY

Cordeiro and others. al. (2017) looked into the impact on concrete's compressive strength at seven and twenty-eight days after curing when natural sand was substituted with crushed granite aggregate at replacement levels of 10%, 30%, and 50%. They found that at replacement levels of 10% and 30% after 7 days and 28 days, the addition of crushed granite aggregate had no detrimental effects on the concrete's compressive strength. In contrast to control concrete, the compressive strength at 50% replacement was much higher, reaching 48.3 and 58.0 MPa after 7 and 28 days of curing, respectively.

Singh and co. al. (2018) investigated the behaviour of concrete produced by adding granite dust to river sand when exposed to unfavourable conditions. They investigated the impact of substituting granite dust for river sand at replacement levels of 10%, 25%, 40%, 55%, and 70% on chloride-ion penetration at ages of 28 days, 56 days, and 90 days, respectively, at two distinct w/c ratios of 0.3 and 0.4 each, in addition to a number of other parameters.

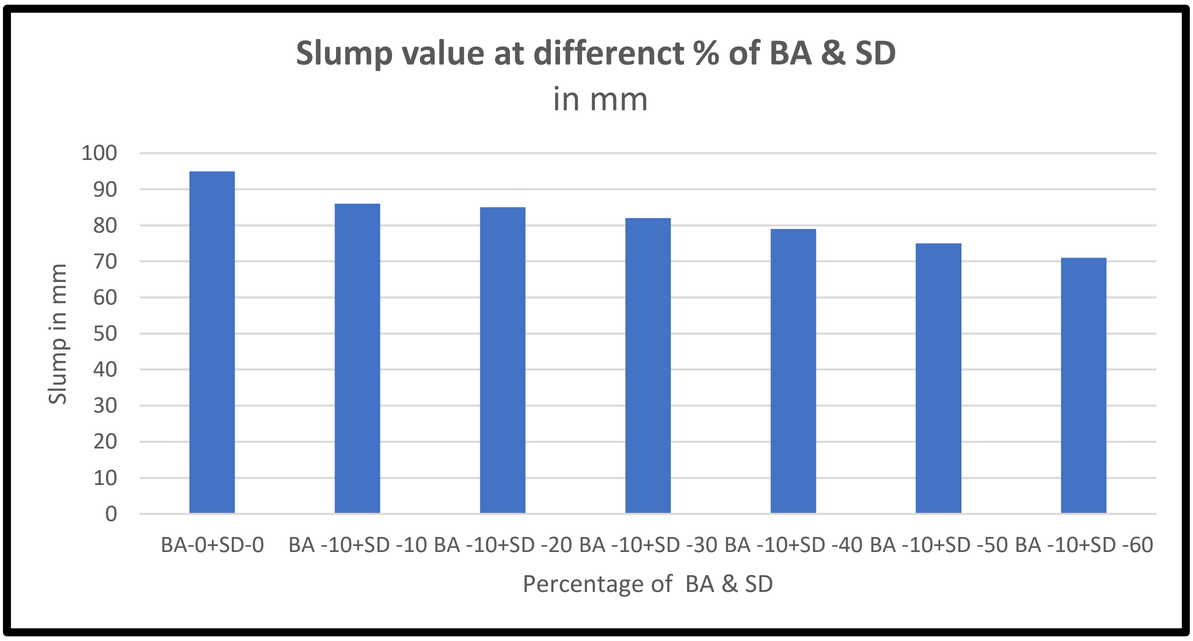
III. OBJECTIVE

- To evaluate the workability of concrete mixtures that partially substitute natural sand with dust from sandstone quarries with a control mixture.
- To compare the density, splitting tensile strength, and compressive strength of concrete mixes tha partially substitute natural sand with quarry dust from sandstone with the control concrete mix.

IV. RESULTS AND DISCUSSIONS

Effect of SGBA on Workability

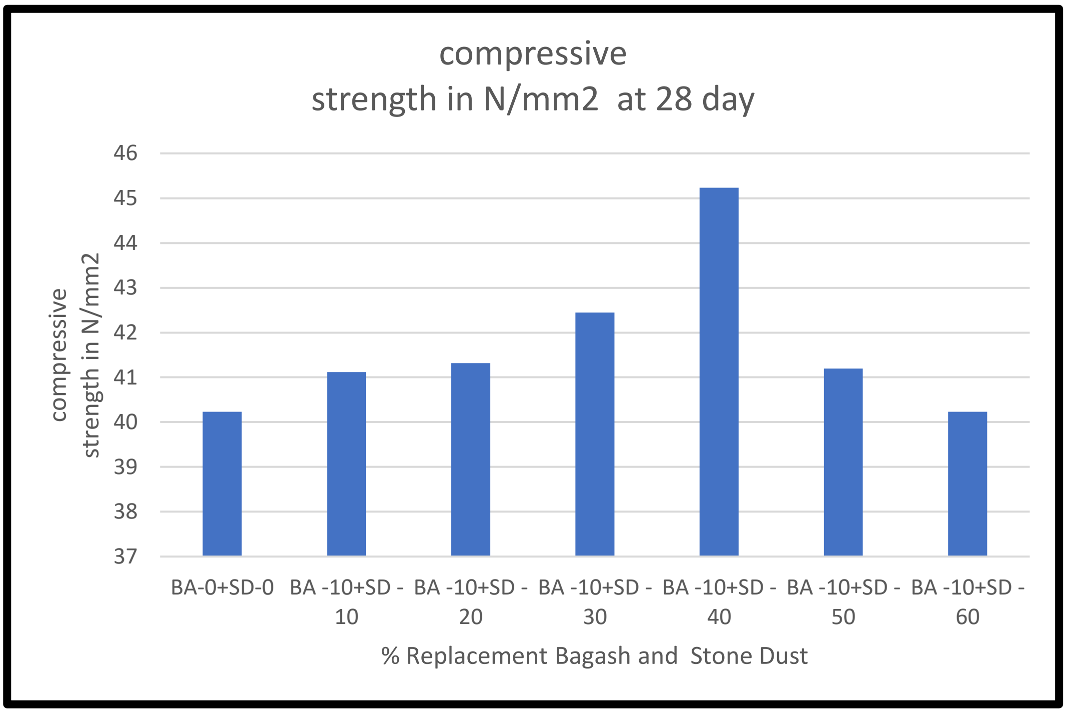
SN	**Mix Description**	**Slump in mm**
		Slump in mm
1	BA-0+SD-0	95
2	BA -10+SD -10	86
3	BA -10+SD -20	85
4	BA -10+SD -30	82
5	BA -10+SD -40	79
6	BA -10+SD -50	75
7	BA -10+SD -60	71



Concrete mix workability was found to decrease as SD percentages increased (0%, 10%, 20%, 30%, 40%, 50%, and 60%). The concrete was more workable due to its smooth texture and round particle shape, while the control mix's WKA was found to be 80 percent higher. The internal friction in concrete mixes that used SD in place of some natural sand was increased by the SD's angular shape and rough texture.As a result, WKA dropped as the percentage of SD substitution increased.

Compressive strength variation in M30 grade concrete with replacement of fine aggregate by Stone Dust and Bagash

SN	**Mix Description**	% Replacement Bagashand Stone Dust	Compressive strength in N/mm2
			28 day
1	**BA-0+SD-0**	0+0	**40.23**
2	**BA -10+SD -10**	10+10	**41.12**
3	**BA -10+SD -20**	10+20	**41.32**
4	**BA -10+SD -30**	10+30	**42.45**
5	**BA -10+SD -40**	10+40	**45.23**
6	**BA -10+SD -50**	10+50	**41.2**
7	**BA -10+SD -60**	10+60	**40.23**



Compressive strength variation in M30 grade concrete with replacement of fine aggregate by Stone Dust and Cement by Bangash

From experiment Result , the maximum compressive strength of the concrete grain at BA -10+SD-40 is 45.23 N/mm2, when the combination mix of 10% cement by SCBA and fine aggregate replaces from 0 to 60. As the proportion of SD increases, the concrete loses compressive strength value.

V. CONCLUSION

The study's findings show that when the amount of SGBA used to partially substitute cement increased, the workability (WkA) of concrete was seen to decrease.

The results further show that the highest tensile and compressive strengths were attained at 10% cement replacement by SGBA, and that there was a declining tendency after 10% cement replacement by SGBA.

The results of substituting stone dust for natural sand show that as the quantity of stone dust increased, the slump reduced. Consequently, as the percentage of stone dust increases, the workability decreases.

Based on the experimental findings, it can be deduced that the compressive and tensile strengths were highest when 40% stone dust was substituted for natural sand, and that there was a declining tendency after that point. Thus, it may be concluded that a replacement level of stone dust of 40% is ideal.

Based on the results of testing for tensile strength and compressive strength, it has been determined that the concrete mix created with 10% SGBA in place of cement and 40% SD in place of fine aggregate yields the best results in terms of CS and TS. The workability of concrete has decreased in mixes that incorporate 10% bagasse ash in place of cement and 10, 20, 30, 40, 50%, and 60% SD in place of sand. In concrete mix including 10BA40SD sample cured in water, a higher compressive strength of 45.23 N/mm2 was observed.

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