Reuse of Solid Waste Generated from Weaving Based Textile Industry for Constructing the Eco-Friendly Building Material

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***Abstract*- This plan is based on the Yarn waste. Huge quantities of cotton and limestone waste are received all over the earth which creates various dangerous environmental challenges and fitness dangers. Textile organizations are now thinking for utilization where waste particles can be utilized as the value-added component. The goal of this job was to investigate the mechanical and physical requirements of scrap fiber reinforced composites and the result of some parameters on their construction appearance. Yarn waste is a replacement non-biodegradable material ready in excess and at a reduced cost. The modern study reveals that the impact of yarn waste on common concrete on the base of its compressive, Reuse of textile scrap has been used to make the concrete block as low construction and building material is a wonderful way to decrease environment difficulties which maintain in solid waste management.**

***Index Terms*- concrete, yarn waste, eco-friendly, reuse, building material**

1. INTRODUCTION

Huge quantities of cotton and limestone waste are collected entirely over the earth which creates several dangerous environmental difficulties and health risks. Textile organizations are presently studying for utilization where waste elements can be used as a value-added element. In the laboratory studies conducted an investigation, that was found that the increase of jute yarn provides enriched issues for mechanical characteristics of concrete composites for a special yarn content and yarn range. Fiber reinforcement can efficiently increase the shrinkage, stability, and toughness properties of concrete. The purpose of recycle fibers from industrial or postconsumer trash gives extra benefits of excess minimization and resources protection. This paper reviews some of the performance on concrete support applying recycled fibers, including huge-density polyethylene, and tire wires/cords paper scrap. This paper additionally gives a study of the properties and prospects of concrete reinforced with the fiber. The reproduction of polymer concrete reinforced with textile reducing waste was reviewed. Series of two polymer concrete formulation was analyzed, with various resin/silica (i.e. fine aggregate/binder) weight ratios. The flexural and compressive test was completed at chamber temperature and load vs. displacement graph was planned to fail. Recycle textile chopped fibers on 1% and2% of entire weight did use. In the study, both the importance of fiber content and sand/resin weight proportion were considered related to the performance of polymer concrete reinforced with textile fibers. Reduce in resources was observed as a purpose from textile fibers content.[1]

2. LITRATURE REVIEW

REUSE OF YARN WASTE:

The dumping of solid waste is the main difficulty on the earth. Recycling and use of these waste products are increasing worldwide, specially in the construction field. Using of recycle materials and wastes in construction is becoming most popular because shortages of natural mineral resources and rising waste disposal charges. However, with increasing use of wastes in engineering applications, a need for further understanding of their engineering behavior is required.

Synthetic fibers are develop mainly to satisfy the high need for textile products. Rayon and Nylon were

the first ones to be developed and commercialized. Nowadays, textile fibers are manufactured from a unique type of fiber or from a combination of several fibers, natural or synthetic, providing a huge variety of final products1. Brazil is an outstanding manufacturer of textile products worldwide according to previous studies. The textile cuttings waste form those industries are usually disposed of as waste product which becomes an environmental nuisance because of its non-biodegradability, or burned in heaps thus releasing highly toxic fumes into the surrounding air.[2]

The practice of disposal requires the constant creation of new landfill spaces, which is in contradiction to the environmental goals, including ecosystem protection. Significant effort has been devoted to the reduction, reuse, and recycling of the waste materials. Typically, recycling technologies are divided into primary, secondary, tertiary, and quaternary approaches. Primary approaches involve recycling a product into its original form. Secondary recycling involves processing a used product into a new type of product that has a different level of physical and/or chemical properties. Tertiary recycling involves processes, such as pyrolysis and hydrolysis, which convert the waste into basic chemicals or fuels. Quaternary recycling refers to waste-to-energy conversion through incineration. All four approaches exist for textile, plastic, and paper recycling. [1]

Objective:

To quantify the generation of the textile solid waste especially yarn waste which can be further used as low cost and light weight construction and building material.

To test the strength of construction material and compare with the Traditional one.

3. METHODOLOGY

The locally accessible rough jute yarn of 10 lb/spindle with 5 TPI (Twist per inch), was handled without any processing. Here jute yarn with 4 various cut lengths (25, 20, 10 and 15 mm) is shown in Figure 1, was utilized with a different volumetric percentage of the concrete mixture. Regular Portland cement is apply as binding materials and having a natural consistency is 30 %, final setting time is 7.00 h. and have initial setting time is 131 minute Sand (fineness of modulus = 2.5) and 25 mm down well-graded of crushed bricks did use as coarse aggregate.[3]

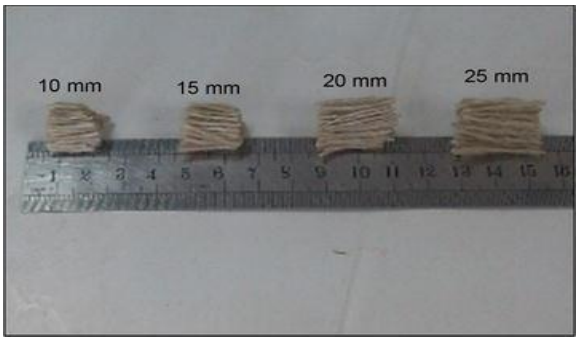

Fig. 1 jute yarn of different cut length

Concrete mix:

Mix design is the selection of mix ingredients and their proportions required in a concrete mix. The mix design involves that amount of cement, fine aggregate, and coarse aggregate be available and the relation between water/cement ratio and target strength have understood. Since the purpose of the research is to study the impact of incorporating jute yarn on different mechanical properties of concrete, mix design with target strength is not accomplished in a study. So, the common practice mix ratio use in Bangladesh and all neighbor countries like parts of India and Pakistan is used. In the modern research, 2 various mix ratios, cement: sand: brick chips (by volume) = 1:1.5:3 and water/cement ratio (by weight) 0.60 and 0.55 are have to maintain. In the concrete mix preparation, initially, various jute yarn volumetric content and cut length is apply to a concrete mix and observe the mixing performance to get a better composition of jute. Finally jute yarn of 25, 20, 15 and 10 mm lengths with 0.75, 0.50, 0.25, 0.1 and 0% volume dosing are select; and Finally, samples are prepare for a particular parameter.

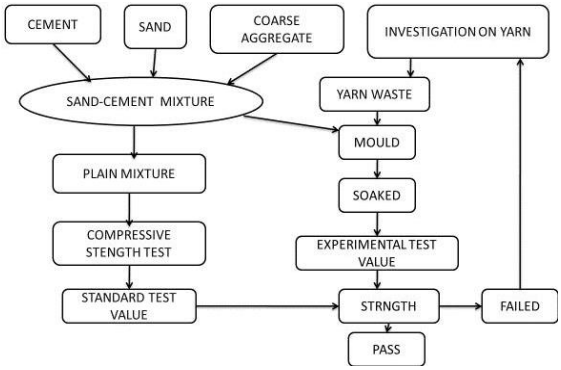

Fig. 2 flow chart of methodology

4. RESULT ANALYSIS

Experimental Program

The modern experiment determining the compressive strength of concrete composites with jute yarn and

Fig. 3 Automatic Compression Testing Machine

was compare to that of plain concrete. The Automatic Compression Testing Machine (MATEST s.r.l, Italy, capacity 3000 KN) shown in Figure 3, for the compressive test.

Compressive Strength:

Figure 4 represents the variation of compressive strength with respect to yarn content and yarn length for concrete mix ratio 1:1.5:3. A particular curve represents the variation of the compressive strength with volumetric content of yarn. It is to mention that 0 % yarn content represents that no yarn was mixed which indicates plain concrete. From the figure no specific trend with yarn length with yarn content can be observed. Compressive strength increment up to a certain yarn content that is 0.1 % with yarn lengths can be seen for 10, 15, and 20 mm yarn while that is found to decrease for 25 mm yarn.

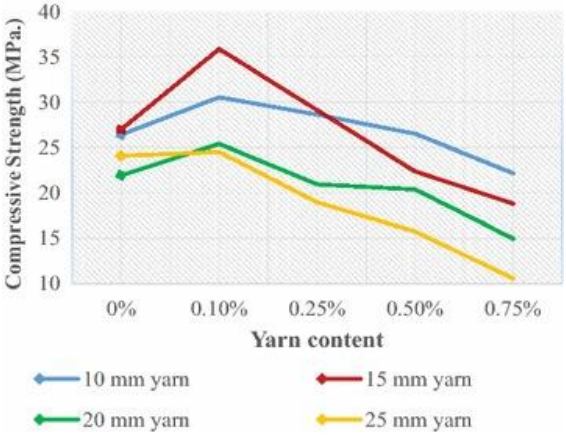

Fig. 4 Compressive strength of JYRCC with 1:1.5:3 mix ratio

The rate of increase for 15 mm yarn with 0 % content is the largest. With further increase of yarn content the compressive strength is seen to decrease for different lengths of yarn. The reason for irregular variation can be interpreted in the following way. In the case of larger yarn length (yarn length >15 mm) and content (>6 %) difficulties were encountered to maintain consistency in concrete mix. Since numerous studies have considered reinforcing materials i.e. Fibres or yarns as similar to coarse aggregate, the inclusion of jute yarn leads to an increase of coarse aggregate fraction in spite of the fine aggregate fraction which could result in a high porosity in the cement matrix. For decreasing trend with yarn content can be explained that with the addition of jute yarn in concrete reduces the specific gravity of the composites and due to the low specific gravity, inadequate mixing and high porosity of the JYRCC, a lower compressive strength with respect to the reference concrete particularly, when a high volume and larger length of yarn was added.

5. CONCLUSION

The experiment of investigation in the study says that it was found that the increase of jute yarn contributes get results for mechanical properties of concrete composites for a particular yarn length and yarn content.

More specifically, tensile, flexural, and compressive strength are found to enhance significantly for volume content of 0% and 6% and the yarn cut the length of 10 and 15 mm. But, with large yarn length and content the mechanical properties were found to affect adversely.

At Last, the jute yarn shows the positive contribution to minimize irregular mixing disabilities of concrete composites that creates a major problem regarding fiber reinforcement. So JYRCC can be developed with locally fabricated jute yarn in Bangladesh.

The least cost of jute yarn, its being renewable resources, the reduced weight of the JYRCC and the environmental compatibility would clearly show the socioeconomic viability of JYRCC. This diversified use of jute may redeem the lost glory of jute in Bangladesh.

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