MECHANICAL CHARACTERIZATION OF COIR AND BAGASIS REINFORCED HYBRID NATURAL POLYMER COMPOSITE

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Abstract - *Polymer matrix composites are gaining more importance compare to monolithical materials as being more reliable and cheaply available. Polymer matrix composites finding application from household to engineering approach. With the advancement of PMC their properties have been increased by one the addition of one more fiber made as hybrid composite which boost the property of PMC where a single fiber composite lags.*

In our project we have chosen coconut coir as the major reinforcement and bagasis as an additional fiber to improve the mechanical property of polymer composite with vinyl ester as the base material prepared by hand layup process according to ASTM standards Test specimens are prepared with different weight fractions of coconut coir at the optimization point of tensile test a small percentage of bagasis are added and tests were conducted and the improvement in mechanical properties (tensile strength and flexural strength) of the hybrid composite material is observed.

***Key Words*: Bagasis, coconut coir, hybrid composite, polymer composite, vinyl ester.**

1. INTRODUCTION

The existing investigation work is much more committed on Composite materials as they meet up with industrial, automobile and home hold requirements with much better mechanical qualities when compared with the monolithic material that are scarcely currently available a days, that is the explanation all of the scientists are eyeing on composite materials, although they're heterogenic in nature but software good they perform far better when compared with original materials.

The composites with individual fiber reinforcement gains or maybe you are able to state improves the home on the starting material but moreover at specific percentage limit the reinforcement on the base material fails to boost the home to additional degree, rather it bring down its energy that made the researches to choose hybridization of composite which considerably increase and also enhances the functionality of the content beyond the fiber reinforced composite that's meant to created for appropriate application.

1. 1 MATERIALS AND METHODS

- Cut the Mylar sheet according to Mold size and place it on the Mold.
- According to calculation pour the resin into the mug.
- According to the percentage of volume required the calculated amount of bagasse is mixed into the weighted resin.
- Stir well for about two minute in clock-wise and alternatively anticlockwise to mixthe content thoroughly
- Then add hardeners i.e. promoters, accelerators and catalyst of 1 % to 2% depending of volume fraction mixed to the bowl containing epoxy and stirred uniformly.
- Once it is mixed thoroughly now it is ready to lay on the mold.
- Before layup clean the Mylar sheet with little amount of resin.
- Pour the mixer continuously over the mold apply little pressure using plates to fill the mixer all along the mold.
- Wait for a minute and apply pressure using hand rollers to remove air bubbles and to maintain uniqueness in the laminate

- Once the layup is over put Mylar sheet on it to avoid sticking of specimen onto the male portion of the mold.
- And put heavy weight on the specimen and leave it for curing.
- Approximately after 24 hour at room temperature the laminate is ready for cutting Operation The specimen is cut to the desired size and taken for testing.

2. TEST RESULTS

2.1 TENSILE TEST

Tensile test was carried out on the Hounstill's UTM in accordance with ASTM D3039.

Table 5.0 Ultimate tensile strength of Bagasse / Vinyl ester composite

Samples	bagasse (%)	Ultimate Tensile Strength (MPa)			Avg UTS (MPa)
A	0	32.36	30.28	27.42	30.80
B	5	32.00	32.80	32.78	32.52
C	10	33.28	33.98	33.82	33.69
D	15	33.90	35.09	35.58	34.85
E	20	32,08	32.10	32.80	32.32

Table 5.1 Ultimate tensile strength of Bagasse and coconut coir / Vinyl ester composite

Samples	Coconut coir (%)	bagasse (%)	Ultimate Tensile Strength (MPa)			Avg UTS (MPa)
F	3	12	35.74	35.63	36.26	35.87
G	5	10	36.46	36.96	37.02	36.81
H	7	8	38.40	38.50	38.46	38.45

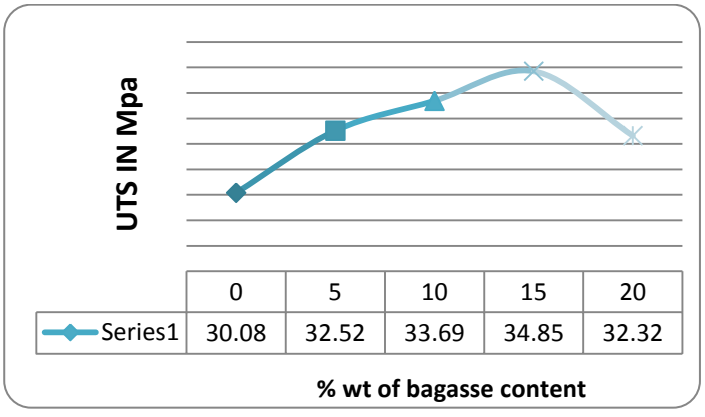


Chart- 1 Extension at max load

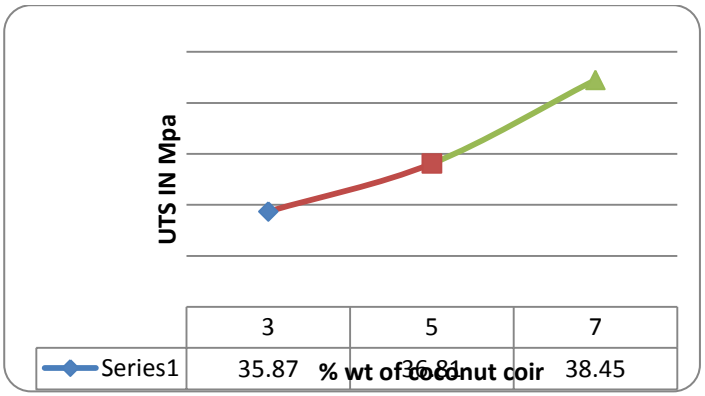


Chart - 2 Tensile stress

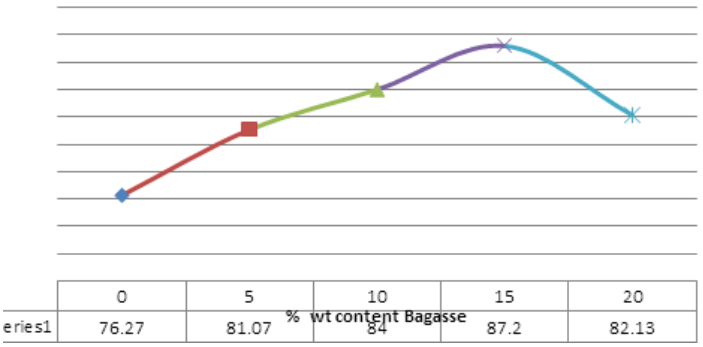
2.2 FLEXURAL- TEST

Flexural test was carried out on a universal testing machine. The readings are tabulated in table 2

Sample	Bagasse (%)	Flexural strength (MPa)			Avg FS (MPa)
A	0	74.00	78.40	76.40	76.27
B	5	79.20	80.00	84.00	81.07

Sample	Coconut coir (%)	Bagasse (%)	Flexural strength (MPa)			Avg FS (MPa)
F	3	12	91.2	90.40	88.00	89.87

Table 2 -Flexural- test results



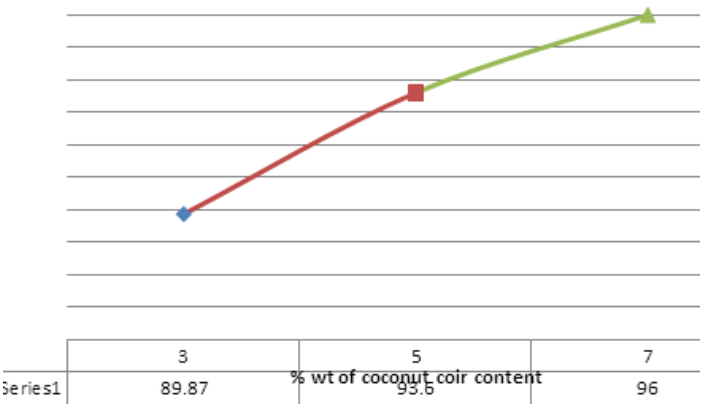


Chart 3&4-

Ultimate Fluxural Strength of bagasse & coconut coir composite at different percentage loading

3. CONCLUSIONS

1. Tensile strength and Tensile modulus increased (by 37.66%, 58.73% respectively) gradually with more percentage of loading of Bagasse composite and hybrid composite.

2. The flexural Strength and Flexural modulus increases (by 20.56%, 59.58% gradually with the more percentage Bagasse.and hybrid composite.

3. To increase the physical qualities of the composite there has to be homogenous combination of the fiber and matrix to keep home on the composite.

4. To have better manual qualities at greater fibre material, The bonding between The vinyl and bagasse ester must improved.

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