A STUDY ON APPLICABILITY OF BAMBOO FIBRE REINFORCED MYCELIUM BONDED SAWDUST MATERIAL FOR PARTITION WALL

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ABSTRACT

In building construction there is a need of alternative materials which are low cost, high efficiency and environmentally responsible. This research presents an innovative solution for partition walls. The solution is produced by using sawdust, mycelium and other ingredients which are normally used in mushroom cultivation. In this material the mycelium acts as a natural glue to bind sawdust particles. Also bamboo fibre was introduced to increase the strength of the innovative material. The panel making process was done by four steps as preparing mixture, preparing mould to grow mycelium, getting mushroom cultivation and compressing and drying the panel. To find the standard of the properties of the material, compression strength parallel to surface and water absorption tests were done by using the test specimens of the new material. All the tests were conducted according to the ASTM D 1037 (1978) standard to keep the test results at a standard level. The compression strength test showed that the optimum amount of bamboo fibre proportion in order to get the maximum compressive strength. Other than that ultimate compressive strength, yield strength, density, specific strength and Young's modulus were calculated too. The properties of new material were compared with Gypsum and MDF panels to find the position in the market. In this process mushroom is harvested as a by-product which leads to make a link between food industry and construction industry. This material fulfils the requirements of partition walls and can be applied as a green solution in partition wall construction.

Keywords: *Bamboo Fibre; Mycelium; Partition Wall.*

1. INTRODUCTION

In construction industry there is a vast range in use of materials (Marotte, 2005). According to Ecovative's Mushroom Materials (2013), researchers continually do experiments, on low cost environmentally responsible materials which can be developed from natural things. To find out environmental friendly effective materials researchers turned to develop materials with vegetable fibres including bamboo, industrial waste, soil and agricultural wastes (Ghavami, 2004). Ecovative's Mushroom Materials (2013) illustrated that the researchers do researches on fungus in order to develop such materials. Mycelium, the vegetative part of fungus is rapidly grown on sawdust (Arulnandy *et al*., 2008). Ecovative's Mushroom Materials (2013) elaborated that the mycelium, a natural self-assembling glue which is grown on agricultural waste. At present the people use mycelium for producing medicine, producing food, healing landscapes, pest control, increasing plant productivity, packaging and insulation material (The Power of Fungi, Mushrooms and Mycelium, 2012). Arulnandy *et al*. (2008) stated that people use sawdust as the media for mycelium in order to cultivate mushrooms in food industry. Naturally mushrooms are grown on wooden particles as well as on bamboo successfully (Oyster Mushrooms Growing on Bamboo Rraft, 2011). Ghavami (2004) found that bamboo fibre can be used for tensile loading applications. There is a possibility of using bamboo fibre with mycelium as a reinforcement material because bamboo helps mycelium to grow well.

In this research mycelium bonded material and bamboo fibre are combined in order to make bamboo fibre reinforced mycelium bonded sawdust material. Mycelium bonded material has properties of flame

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retardant, thermal insulation, impact absorbent, flexibility and light weight as a packaging material (Ecovative's Mushroom Materials, 2013). Applying the above mentioned materials to make a wall panel may be end up with combination of above mentioned properties. According to Ecovative's Mushroom Materials (2013) mycelium bonded material is a non toxic environmentally responsible material. So this combination may give a green building material that timely requisite to the world. The aim of this research paper is to test and develop partition wall panels using bamboo fibre reinforced mycelium bonded sawdust material.

2. PARTITION WALL AS A BUILDING ELEMENT

Partition wall is one of the non-structural building elements (Munir, 2012). It is a non load-bearing wall designed for the purpose of separating a space (Civil Engeneering Terms, 2011). The partition walls can be mainly classified as fixed and movable. Partition walls may be constructed of bricks, blocks, steel, concrete, clay blocks, Glass blocks and timber.

2.1. MATERIALS USED FOR PARTITION WALL PANELS

Partition wall panels are made of various kinds of materials. They can be categorized under natural materials and manmade materials. Some of the natural materials are clay, wood, and straw. The man made materials are glass, metal and concrete. Several man-made products are more or less synthetic. In current market there are many types of materials available for partition walls. These materials have been designed to fulfil the different kinds of user requirements such as price and durability. Different types of materials have their inherent properties. In this research an innovative building material for partition walls is based on mycelium.

2.2. MYCELIUM

Mycelium is the vegetative portion of the fungus (Arulnandy *et al*., 2008). Fungi kingdom consists of yeast, mildews and mushrooms (American Heritage Science Dictionary Online, 2005). Campbell (2008) declared that the parts of mushrooms can be identified separately as follows.

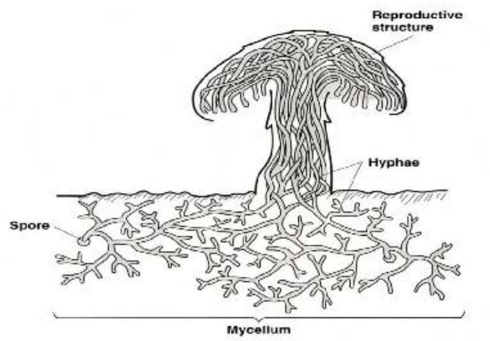


Figure 1: Sketch of Mushroom Indicating Hyphae and Mycelium
Source: Campbell (2008)

There are slender tubes named hyphae that spread like a network (Campbell, 2008). Stamets (2005) mentioned that the hyphae feed off the dead or living organisms. Through the hyphae a fungus absorbs nutrients from the environment (Stamets, 2005). According to the Stamets (2005) the hyphae have been linked as a network which is called as mycelium. The visible part of mycelium is named as mushrooms (American Heritage Science Dictionary Online, 2005).

2.3. USAGE OF MYCELIUM

Mycelium is significantly used in mushroom cultivation. Other than that Mycelium is linked with food industry, agricultural industry, and other manufacturing industries. It is also used to make ethanol and to make some medicine. Ecovative's Mushroom Materials (2013) emphasised that mycelium is used to prepare packing materials. Agricultural waste is a good media for growing mycelium.

3. RESEARCH METHODOLOGY

Research approaches are classified into two categories as quantitative and qualitative. Quantitative approach tends to relate to positivism and seek to collect actual data and to study relationships between facts. Experimental researches and survey researches come under quantitative approaches. This research can be categorized under experimental approach.

4. DESCRIPTION OF EXPERIMENTAL STUDY AREA

The process of preparing the panel was done by major four steps as preparing mixture, preparing mould to grow mycelium, getting mushroom cultivation, compressing and drying the panel. In this research a partition wall panel was prepared with saw dust which was bonded with mycelium. As this was a new concept there was not a predetermined process of preparation this kind of panel. It is necessary to design a process of preparing a bamboo fibre reinforced mycelium bonded sawdust panel. In the mushroom cultivation industry, the cultivators grow mushrooms using containers which are called as cultivation bags. When preparing these cultivation bags cultivators insert some kinds of germ which are called as mushroom seeds in normal context. After about four weeks the bags get full of white in colour due to growth of mycelium. This mycelium seems to be used as a binding material in construction work. By keeping this as a base concept the process of bamboo fibre reinforced mycelium bonded sawdust panel was derived. One kilogram of mixture consists of 1kg of Sawdust, 100g of Brown cover of rice (by-product of threshing), 20g of $CaCO_3$, 2g of $MgSO_4$, 100ml of Water and 2g of Mushroom seeds which are used to get optimum mushroom harvest.

4.1. PROCESS OF PREPARING MYCELIUM PANEL

Step 1 - Preparing mixture	
Mix the sawdust, brown cover rice, bamboo fibre, $CaCO_3$, $MgSO_4$ and water together.	Put the mixture in to the polythene bag and close by fixing a cotton wool prop
Keep the mixture bags for 24 hours at the room temperature.	Sterilize prepared bags by steaming.
Step 2 - Preparing mould to grow mycelium	
Prepare the moulds using hard board.	Sterilize the polythene bag by steaming.
Insert the polythene bag with the cotton cloth into the mould.	Insert the cotton cloth into the sterilized polythene bag as a cover of the panel.
Fill the bag with pre prepared saw dust mixture.	Compact saw dust mixture using a rod.
Put a ring around the mouth of the bag and close the mouth of the bag with cotton wool.	Put seeds of mushroom (germ) in to the bag.
Cover the ring with a paper.	Keep the mould in a dry, dark place for weeks to grow mycelium
Step 3 - Get mushroom cultivation	
Remove the cotton wool and cut the mouth of the bag.	Harvest mushroom cultivation for about 5 times within 7-10 days intervals.
Step 4 - Compressing and drying the panel	
Remove the mycelium grown panel from mould and place it in between above prepared steel plates.	Prepare two steel plates which can be tied each other by screws.
Compress the structure which contains mycelium panel by using mechanical compressor.	To keep the plates in same position after compression, tight the plates with screws.
Damage the polythene bag to remove moisture properly.	Keep this structure about 3 days which allows mycelium to make new bonds.
Put the structure into an oven or a dryer about 24 hours for drying.	Get the structure out from the oven and remove the plates.

Figure 2: Process of Preparing Mycelium Panel

4.2. FIXING PANEL TO THE STRUCTURE TO FORM A PARTITION WALL

After preparing bamboo fibre reinforced mycelium bonded sawdust panel the water proofing coat can be applied. Panels can be fixed to the wood or steel frames with help of the screws. Screws should be placed about every four inches. Two panels need to be fixed on either side allowing a space in between them. The space can be left empty or filled with heat insulation material. Jointed areas should be covered with water proofing tape and relevant finishes should be applied. As this bamboo fibre reinforced mycelium bonded sawdust panel mainly contain decaying ingredients, it is possible to use to prepare compost.

5. TEST DATA COLLECTION AND ANALYSIS

Data analysis focused on how the strength of the panel material varies according to the bamboo fibre content. In order to standardization the test results, it was necessary to use standard test methods. For this innovative material, a similar type of standard testing method had been used. After getting the test results calculations were done and figured out the values through graphs. To show the market validity which can be achieved by this panel, strength, cost and weight parameters were compared with existing panels.

5.1. STANDARDIZATION OF PROPERTIES OF THE PANEL

ASTM D 1037 (1978) contains general methods for evaluating the engineering and design properties of wood-base fibre and particle panel materials. As this bamboo fibre reinforced mycelium bonded sawdust panel contains wood-base particles (sawdust) and bamboo fibre this standard testing method can be applied.

5.2. TEST 1 - COMPRESSION STRENGTH PARALLEL TO SURFACE (ASTM D 1037)

Scope

The goal of the test 1 was to identify the strength of bamboo fibre reinforced mycelium bonded sawdust panel and how the strength of the panel material vary depend on the bamboo fibre content. Test panels were made of 1kg mixture of above ingredients and different quantities of bamboo fibre (10g, 20g, 30g and 40g). Using the above mentioned process panels were prepared 24mm thickness and let them to the full growth of the mycelium. After harvesting the mushrooms for 5 times, they are 50% compressed until they got 12mm thickness using compression machine. After that specimens were dried in an oven for 24 hours at 100℃ temperature.

Test Specimens

The laminated specimens were prepared by using two panels applying epoxy resin in between them. After curing the applied resin for 8 hours the panels were sawed in to the size of 1x4 inches with the smooth right angle surfaces. Fifteen test specimens were prepared as generally minimum three figures should be taken to find out the average figure of compressive strength of different bamboo fibre contented material. Other than that, test specimens of Gypsum and Medium-density fibreboard (MDF board) were also prepared.

Test Procedure

Test specimen was kept in the centre of the testing machine in a vertical plane. Clamps of 3 inches in length were fixed to the two long edges of the specimen to keep plane vertically without bending. The load was applied at a uniform rate of head travel of the testing machine at the speed of 0.020 inches per minute. This test was focused on calculating values of ultimate compressive strength.

Calculations

The test graphs show the results of the tests which indicate the changes in length of the specimen due to externally applied forces. In this research analysis ultimate compressive strength, specific strength and modulus of elasticity are calculated with help of the test results.

5.2.1. *FINDING THE ULTIMATE COMPRESSIVE STRENGTH OF MYCELIUM PANEL*

Table 1 shows the average ultimate compressive strength against the content of bamboo fibre in the test specimens. Three sets of sample specimens have been tested to find out the average ultimate compressive strength of bamboo fibre reinforced mycelium bonded sawdust panel.

Table 1: Ultimate Compressive Strength of Mycelium Panel Specimens

	Sample set-1		**Sample set-2**		**Sample set-3**		**Average**
Bamboo fibre content (g)	Maximum force applied (N)	Ultimate compressive strength (N/m^2)	Maximum force applied (N)	Ultimate compressive strength (N/m^2)	Maximum force applied (N)	Ultimate compressive strength (N/m^2)	Ultimate compressive strength (N/m^2)
0	1435	2224254	1405	2177754	1742.5	2700880	2367629.74
10	1910	2960506	1730	2681505	2045	3169756	2937255.87
20	2265	3510757	1740	2697005	2630	4076508	3428090.19
30	2265	3510757	2125	3293757	2627	4071858	3625457.25
40	1630	2526505	2120	3286007	2142	3320107	3044206.09

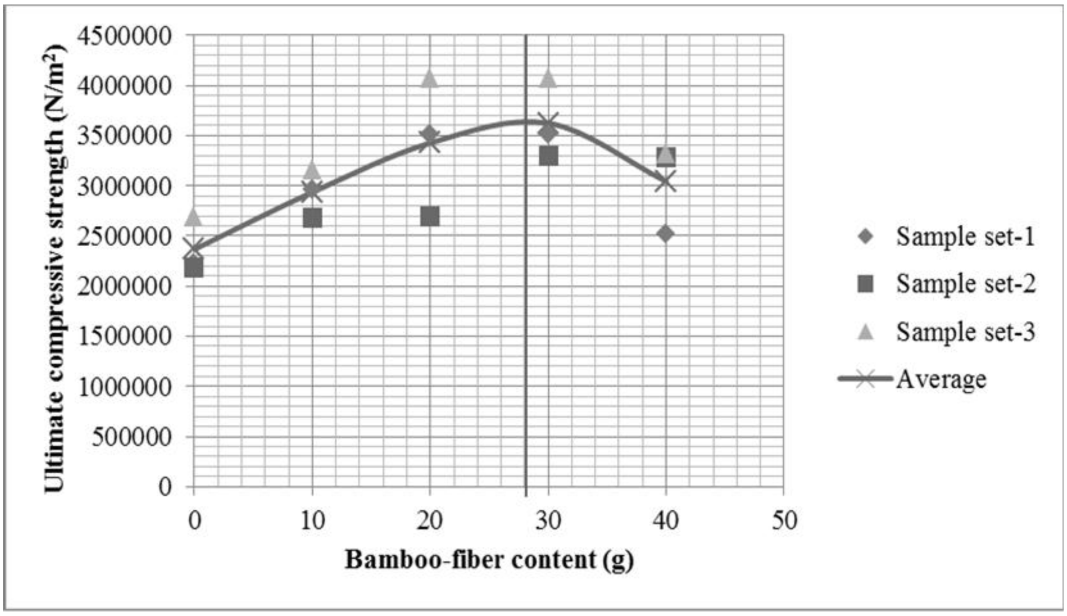


Figure 3: Ultimate Compressive Strength of Mycelium Panel Specimens

From Figure 3, it can be identified 28g is the optimum amount of bamboo fibre that can be used to 1kg of mixture in order to get the maximum compressive strength. So the fibre mixture ratio for this specific panel is 0.028 that gives the maximum strength.

5.2.2. *COMPARISON OF THE ULTIMATE COMPRESSIVE STRENGTH WITH OTHER MATERIALS*

The average ultimate compressive strengths of Gypsum and MDF test specimens were compared with the ultimate strength of bamboo fibre reinforced mycelium bonded sawdust panel which contains 28g of bamboo fibre in the 1kg of mixture as suggested in Figure 3.

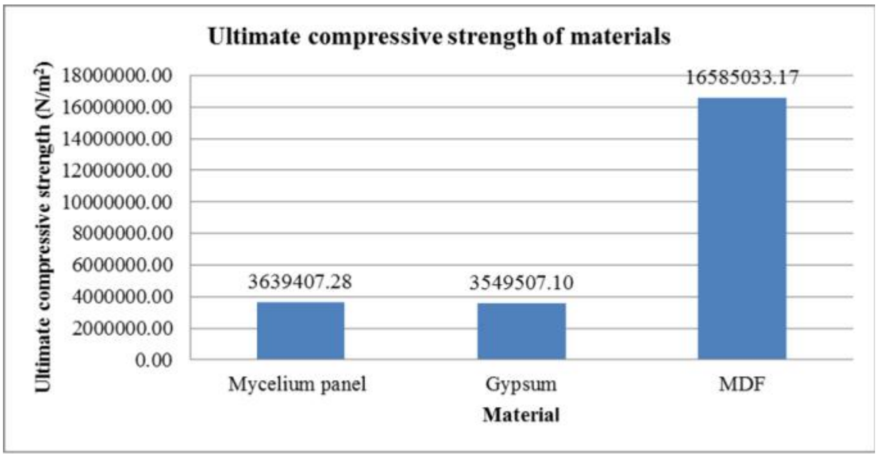


Figure 4: Ultimate Compressive Strength of Mycelium, Gypsum and MDF Panels

Figure 4 shows that ultimate compressive strength of the bamboo fibre reinforced mycelium bonded sawdust panel is higher than Gypsum panel and lower than MDF panel.

5.2.3. COMPARING YIELD STRENGTH COMBINED WITH DENSITY OF MATERIALS

Yield strength can be defined, in materials science, as the stress at which a material begins to plastically deform (Corrosionpedia, 2014). Before the yield point, the material will deform elastically and will return to its original shape when the applied stress is removed (Corrosionpedia, 2014). Yield strength is very important when designing a component and selecting a material.

Table 2: Yield Strength and Density of Mycelium, Gypsum and MDF Panels

Material	Yield Strength (N/m^2)	Yield Strength (MPa)	Density (kg/m^3)
Mycelium panel	3345230.25	3.35	732.59
Gypsum	3098253.10	3.10	755.63
MDF	15293520.00	15.29	787.82

5.2.4. FINDING OUT THE SPECIFIC STRENGTH OF MYCELIUM PANEL

The specific strength of a material is the yield strength divided by its density (Peirson, 2005). The SI unit for specific strength is Pa/(kg/m3), or Nm/kg. Increasing of the specific strength, point out that the specific material has high strength while reducing the weight (Peirson, 2005).

Figure 5 shows the specific strength of bamboo fibre reinforced mycelium bonded sawdust panel, Gypsum panel and MDF panel.

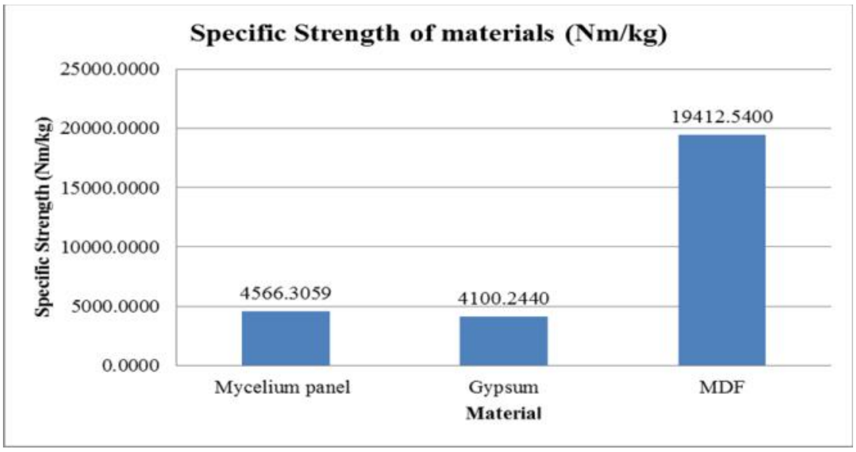


Figure 5: Specific Strength of Mycelium, Gypsum and MDF Panels

5.2.5. MODULUS OF ELASTICITY OF MYCELIUM PANEL

The modulus of elasticity or Young's modulus enables to calculate the change in the dimension of a specimen under tensile or compressive loads (Mcnaught and Wilkson, 1997). It predicts how much a material specimen extends under tension or shortens under compression. As the test 1 is a compression test stress-strain curve is drawn based on that results. Young's modulus is calculated from that stress-strain curve shown in Figure 6.

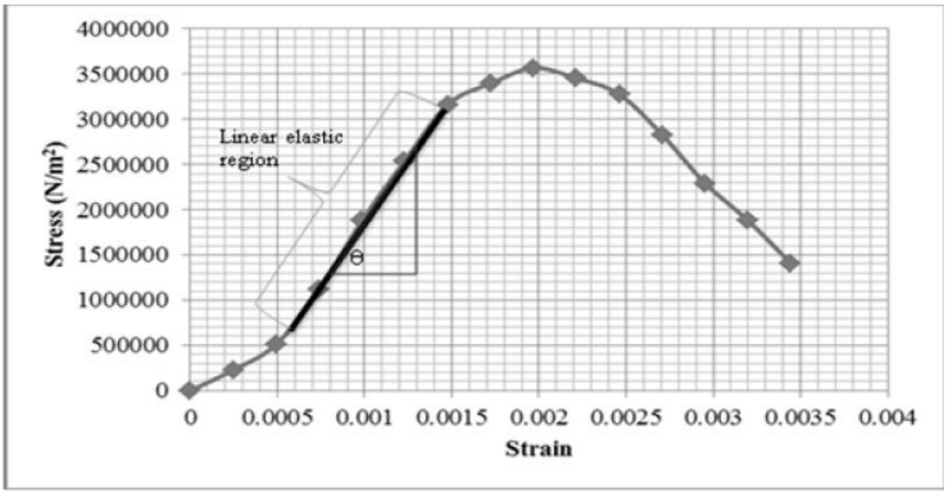


Figure 6: Stress-Stain Curve of Mycelium Panel

Young's modulus = 1400000/0.0005 = 2.8 x 10^9 N/m^2 = 2.800 GPa

Figure 6 is drawn for the bamboo fibre reinforced mycelium bonded sawdust panel which contain 30g of bamboo fibre inserted in 1kg of above prepared mixture. The optimum amount of bamboo fibre is 28g according to Figure 3. Figure 6 has been drawn for the panel which contains 30g bamboo fibre instead of the panel which contains 28g bamboo fibre as they are similar approximately. So, the Young's modulus of panel which contains 28g bamboo fibre is around 2.8 GPa.

5.2.6. COMPARING YOUNG'S MODULUS OF MYCELIUM PANEL WITH OTHER MATERIALS

The Young's modulus is in essence the stiffness of a material (Mitchell and Green, 1999). It is important when selecting material for construction work. The table shows the Young's modulus of bamboo fibre reinforced mycelium bonded sawdust panel, Gypsum panel and MDF panel. Figure 7 shows the Young's modulus of bamboo fibre reinforced mycelium bonded sawdust panel is in between Gypsum and MDF panels.

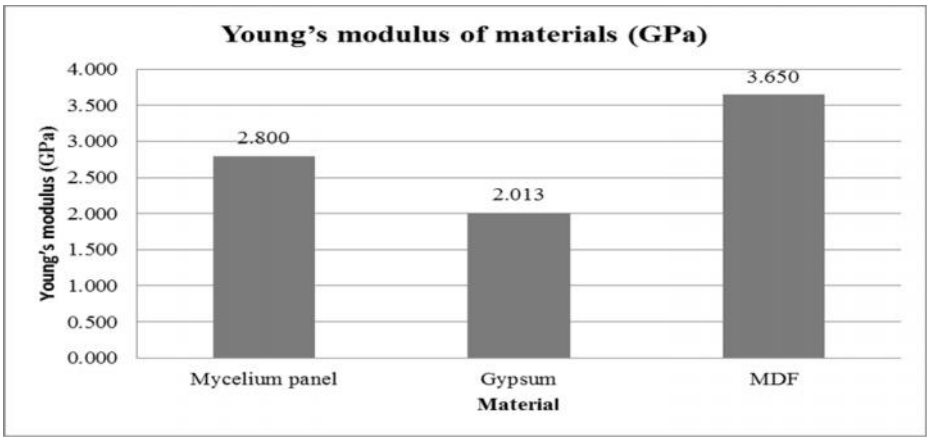


Figure 7: Young's Modulus of Mycelium, Gypsum and MDF Panels.

5.3. TEST 2 - WATER ABSORPTION (ASTM D 1037)

Scope

This test was done to decide water absorption level of bamboo fibre reinforced mycelium bonded sawdust panel and to compare it with the water absorption levels of the other panels. Test panels were prepared according to above procedure which was used in test 1. Other than that Gypsum and MDF panels were also used to compare the water absorption levels. This test was conducted according to the ASTM D 1037 (1978) standard.

Test Specimen

The test specimens were cut from bamboo fibre reinforced mycelium bonded sawdust panel in 6x6 inches (152x152 mm) in size according to ASTM D 1037 (1978) standard. The edges of the specimen should be smooth. Other than that, tests specimens were taken from Gypsum and MDF panels to compare the water absorption level of the materials.

Test Procedure

The different specimens were taken according to their content of different amounts of fibre in bamboo fibre reinforced mycelium bonded sawdust panel and test specimens of Gypsum and MDF panels. Then the specimens were weighed accurately to the nearest decimal before submerged them in water. The specimens were submerged horizontally under 1 inch of water. After 10 minutes submerged specimens were taken out and drained for 10 minutes and measured the weight of the specimens. The same specimens were submerged in the water again and measured the weight of each specimen after 10 minutes. The researcher repeated the same procedure and measured the weight of the specimens at specified time durations.

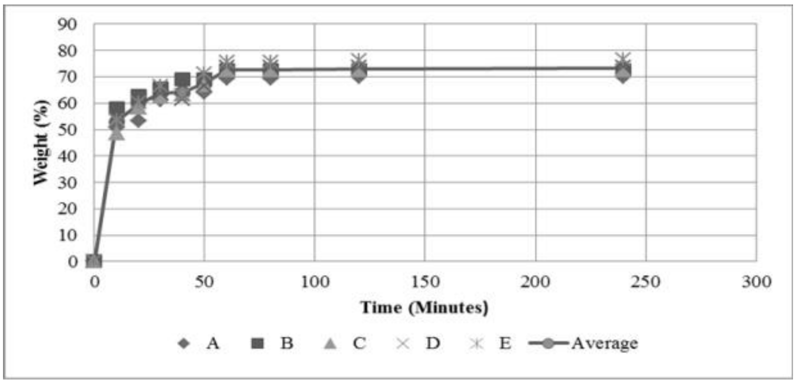
Calculations

Measuring the water absorption levels of test specimens according to the bamboo fibre content of the mycelium panel and comparing the average water absorption level of mycelium panel with the Gypsum and MDF were done under this calculation.

5.3.1. WATER ABSORPTION OF MYCELIUM PANEL

Figure 8 show the increase in weight percentages of the different specimens during the submersion. Initially the weight was increased but after about 60 minutes it becomes to a constant amount. Table 3 shows the weight of the different test specimens of bamboo fibre reinforced mycelium bonded sawdust panels. According to Table 7, the weight of the test specimens were shown in a percentage as it is required by ASTM D 1037 (1978) standard.

Though the bamboo fibre contents were different in each specimen, the water absorption pattern and the amount of water absorbed were nearly the same. According to these results it can be concluded that the water absorption of bamboo fibre reinforced mycelium bonded sawdust panel is not depend on bamboo fibre content. After 60 minutes, increment of the weight was stopped and the percentage of weight became to a constant value in all bamboo fibre reinforced mycelium bonded sawdust panel specimens.



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Fibre Content
A – 0 g
B – 10 g
C – 20 g
D – 30 g
E – 40 g

Figure 8: Young's Modulus of Mycelium, Gypsum and MDF Panels.

5.3.2. *COMPARISON OF WATER ABSORPTION OF MYCELIUM PANEL WITH OTHER MATERIALS*

The same test procedure was done for test specimens of Gypsum and MDF panels. The average amount of water absorption bamboo fibre reinforced mycelium bonded sawdust panel specimens was compared with the amount of water absorption of Gypsum and MDF panels. The amount of water absorption is shown by increasing weight of the panel specimens. To draw Figure 9, the weight percentages are considered instead of the weight of the panel specimens.

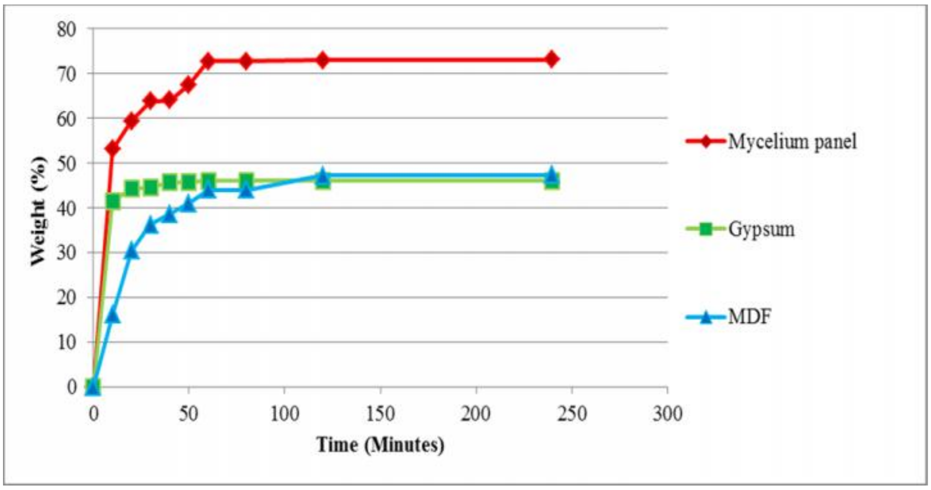

Figure 9: Water Absorption Percentage of Mycelium, Gypsum and MDF Panels.

According to the observations of the Figure 9 bamboo fibre reinforced mycelium bonded sawdust panel specimen took about 60 minutes to come to the maximum water absorbed level (73%). Gypsum and MDF specimens took 40 minutes and 120 minutes respectively to come to the maximum water absorbed levels (46% and 47%). After 120 minutes bamboo fibre reinforced mycelium bonded sawdust panel shows the highest water absorption level when compared to Gypsum and MDF panels. To minimise this issue water proof coating can be applied to the bamboo fibre reinforced mycelium bonded sawdust panel.

5.4. *WEIGHT COMPARISON OF MYCELIUM PANEL WITH OTHER MATERIALS*

The weights of 1ft^2 size specimens of bamboo fibre reinforced mycelium bonded sawdust panel contain different amounts of bamboo fibre. The average weight of Mycelium panel is compared with Gypsum and MDF panels shown in Figure 10.

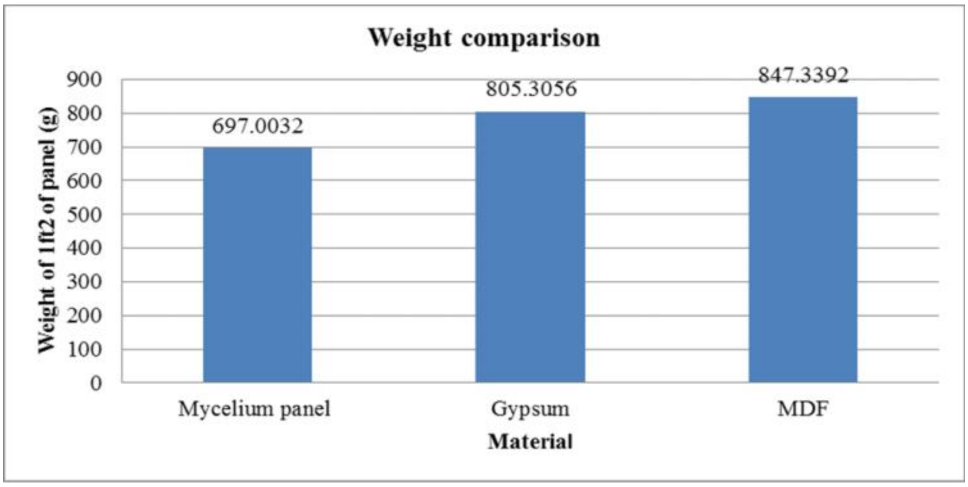

Figure 10: Weight of Mycelium, Gypsum and MDF Panels (1ft^2)

According to Figure 10 it can be identified that bamboo fibre reinforced mycelium bonded sawdust panel has the lowest weight when compared to Gypsum and MDF panels.

5.5. *Cost Comparison of Mycelium Panel with Other Materials*

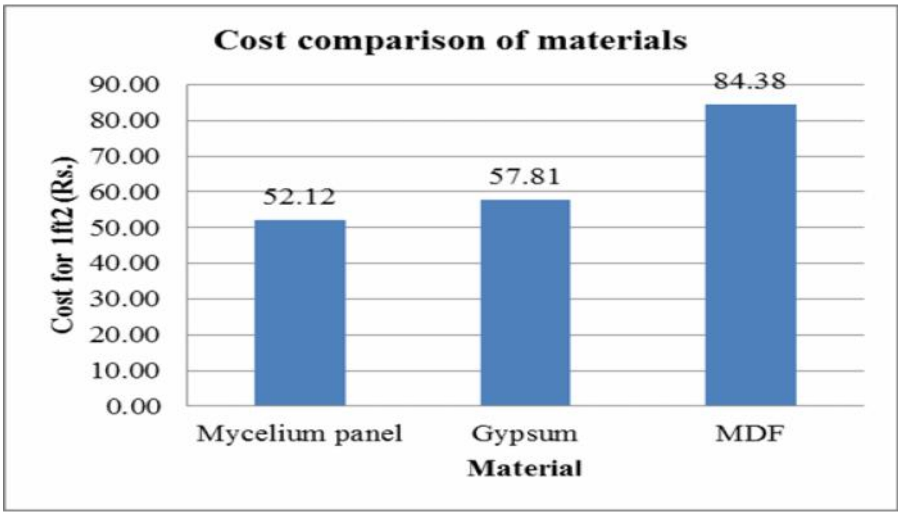

Figure 11: Cost Comparison of Mycelium, Gypsum and MDF Panels (1ft2)

According to Figure 11 it is clear that the cost of 1ft^2 of bamboo fibre reinforced mycelium bonded sawdust panel is less than the cost of Gypsum and MDF panels. Through the experimental study it is found that, the bamboo fibre reinforced mycelium bonded sawdust material is suitable for partition wall panels when compare to other materials available in the market. Tests specimens were prepared according to the ASTM D 1037 (1978) standard. To find the standard of the properties of the material, compression strength parallel to surface and water absorption tests were done by using the test specimens of the bamboo fibre reinforced mycelium bonded sawdust material.

Compression strength test was done by varying the bamboo fibre content in the specimens. The optimum amount of bamboo fibre proportion, in order to get the maximum compressive strength was shown by the compressive strength test. Other than that ultimate compressive strength, yield strength, density, specific strength and Young's modulus were calculated too. The properties of bamboo fibre reinforced mycelium bonded sawdust material were compared with Gypsum and MDF panels to find the position in the market. The test data analysis showed the strength of the bamboo fibre reinforced mycelium bonded sawdust material was more than the strength of the Gypsum board and lower than the strength of MDF board. As the water absorption of bamboo fibre reinforced mycelium bonded sawdust material is higher than Gypsum board and MDF board, a water proofing is applied on the surface of the panel to overcome this weakness. When compared to Gypsum panels and MDF panels unit weight of bamboo fibre reinforced mycelium bonded sawdust panel is low, which is a significant property of partition wall.

The cost comparison shows the cost of bamboo fibre reinforced mycelium bonded sawdust panel is cheaper than the Gypsum panel and the MDF panel. The cost of bamboo fibre reinforced mycelium bonded sawdust panel can be reduced by using the new techniques.

Finally it can be concluded that the bamboo fibre reinforced mycelium bonded sawdust material is at a competitive level when it is compared with other partition wall panel materials in the market.

6. Conclusions

In building construction some materials that used in the past cannot be used today because of the resource limitations and economical impact. To overcome this problem researchers have done experiments to find new sources of material. Usually many people require good quality, low cost, energy efficient and environmental friendly materials which help to increase the adoptability and efficiency of the construction. Therefore bamboo fibre reinforced mycelium bonded sawdust composite material is found as an alternative building material which can be used for partition wall panel material. Mycelium is a part of part of the life cycle of the mushrooms. Mycelium has a vast usage in many industries, highly use in food industry. In this innovative material, mycelium is used as a glue to bind sawdust particles. As the mycelium is a living agent it grows on sawdust media. This panel making process was done by four major steps as preparing mixture, preparing mould to grow mycelium, getting mushroom cultivation and compressing and drying the panel. In the preparing process of this panel board, mushrooms are taken out as a by product which is widely use in food industry. The validity of this production is creating a link between construction industry and food industry. This material can be successfully used to build partition walls which fulfil the performance attributes that partition wall panels should have as one of the objectives of this research.

During this research of study bamboo fibre reinforced mycelium bonded sawdust material was tested for compression strength parallel to surface and water absorption to indicate the properties of material. As the results of the compression strength test it showed this material can bare 3.64×10^6N load per square meter. When the average ultimate compressive strengths of Gypsum and MDF test specimens were compared with the ultimate strength of bamboo fibre reinforced mycelium bonded sawdust panel the result showed the compression strength of mycelium panel is slightly higher than Gypsum boards. It also indicated that the amount of bamboo fibre proportion that gives the higher strength is 28g of bamboo fibre per 1kg of prepared sawdust mixture. Other than that it has calculated yield strength 3.35 $\times 10^6$N/m^2, density 732.59kg/m^3, specific strength 4566.31Nm/Kg and Young's modulus 2.800 GPa. All these properties of new material were compared with Gypsum and MDF panels to find the position in the market. The result showed the stiffness of bamboo fibre reinforced mycelium bonded sawdust panel is in between Gypsum and MDF panels. When compare the specific strength of above mentioned materials it can be identified that bamboo fibre reinforced mycelium bonded sawdust panel has a value between Gypsum panel and MDF panel. In the water absorption test, the amount of water absorbed by this mycelium material was higher than when compared to other materials such as Gypsum and MDF. To minimize the amount of water absorption, water resistant coat can be applied. When compared to the other materials such as Gypsum and MDF the unit weight of bamboo fibre reinforced mycelium bonded sawdust material was the lowest. Light weight is an important property of partition walls. The estimated cost for 1ft^2 in size bamboo fibre reinforced mycelium bonded sawdust material is Rs.52.12. It is lower than the cost of Gypsum and MDF boards. As the low cost is a primary attribute that partition wall should have, the new material has fulfilled that requirement. From these values finally it can be concluded that bamboo fibre reinforced mycelium bonded sawdust panel remains competitive level with other materials that available in the current market.

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