

# Study on Combination of Mycelium and Fly Ash Brick

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**Abstract-** This study introduced us the development of combination of mycelium and fly ash brick with certain characteristics. As the mycelium brick grows, heals and repairs itself whereas fly ash is the recyclable and organic by product of burnt coal. This brick includes the use of natural resources and it maintains the harmony of environment. The aim is to produce natural construction material which will match the existing alternatives. The testing data showed that this combination gives good performance result. Moreover, the use of such unique construction material in construction field will help us to have a sustainable and eco-friendly infrastructural development.

**Index Terms-** Brick trends, Eco-friendly construction material, Mycelium brick, Sustainable construction material

## I. INTRODUCTION

In current scenario there is a lot of need of construction material which is cheap and eco-friendly. Universally, it is hard to assess what number of individuals ceases to exist rashly because of various toxins. According to WHO for air contamination roughly 3 million passed on every year. Among them 8lack individuals die because of lung, cardiovascular and respiratory issues etc. One of the major source of air pollution is brick kilns. Breathing in such pollutants causes skin and eye irritation and pneumonic ailments such as pneumoniosis and silicosis. Contamination additionally affects rural yield and organic products. In order to overcome all these issues a great replacement against standard modular bricks can be done by combination of fly ash and mycelium brick.

### 1.1 Concept of mycelium and fly ash bricks

When mycelium is left to dry it can become an excellent raw material for construction, as it forms a root like structure called *hyphae* which binds the mixture. A mycelium brick is an organic brick that is grown from organic waste and fungus of mycelium.

The use of fly ash improves the workability of concrete and reduces the use of portland cement. It strengthens and hardens the brick. Fly ash is obtained from coal dust which is been considered as waste product from homes and industry. The combination of these two bricks and properties of their component provides an efficient alternative to traditional construction material at cheaper cost.

Constituents of the brick are as follows:

#### 1. Organic waste:

Wheat straws, saw dust, mushroom seeds (Oyster Spawn), agricultural waste are used.

#### 2. Binding and growing agents:

Sugar, flours etc helps to initiate the growth and bind the mixture.

#### 3. Fly ash:

It is a grey colored by product of coal which is completely natural and doesn't harm environment. It also helps in providing good strength of brick.

#### 4. Cement:

Ordinary Portland cement which is a combination of lime sludge, cement, aluminium powder and gypsum is used in this brick.

#### 5. Sand:

The locally available sand or stone dust or river sand can be used for making of the brick. The deleterious materials such as silt, clay lumps and coal particles should not be more than 5%.

### 1.2 Contribution of constituents:

The proportion of mycelium and fly ash brick components is taken as 40% and 60%. Hence 30% is the contribution of organic waste, 10% is the contribution of growing and binding agent. Fly ash contributes about 36% of the total brick mass,

18% sand is added to it and 6% Ordinary Portland Cement (OPC) is also a part of brick constituents .  
 Brick Dimensions: 230mm X 110mm X 70mm  
 Frog Dimensions: 100mm X 40mm X 10mm  
 Brick Weight: 1.5 Kg

## 2. BRICK ASSESSMENT

2.1 The mycelium + fly ash brick weighs less than conventional fly ash brick and reduces the dead load on the structure which is considered as a great benefit. The brick ingredients are easily available. It possess high fire insulation. This is eco- friendly, cheap and completely biodegradable. It leads to the innovation in brick trends.

2.2 This brick requires precise work and skilled supervision. Most importantly it needs proper proportioning and mixing of ingredients. 10 days of curing must be done for better strength. This is a time consuming process.

2.3 The analysis of the brick represents the behavior and results of various tests conducted on it. The brick was kept in clean water in vertical position of about 25% of its total height for 48 hours. As no constructive soluble salt depositions were observed, the test showed results of slight efflorescence.

Table I : Efflorescence Test

Serial Number	Brick Type	Results
1.	Mycelium	Slight
2.	Mycelium + Fly Ash	Slight

2.4 Resistance to scratch is called as *hardness*. A scratch was made on brick surface with the help of the finger nail and no impression was observed on the brick which showed the brick is hard.

Table II : Hardness Test

Serial Number	Brick Type	Result
1.	Mycelium	Good Quality
2.	Mycelium + Fly Ash	Good Quality

2.5 Bricks are generally used for construction of masonry wall and it experiences compressive loads. To determine the load carrying capacity of brick under compression load with the help of universal testing machine (UTM), compressive strength test is carried out . The average compressive strength of the brick is 7.54 N/mm<sup>2</sup>

Table III : Compressive Strength Test

Serial Number	Brick Type	Result (N/mm <sup>2</sup> )
1.	Mycelium	14.52
2.	Mycelium + Fly Ash	i. 7.920
		ii. 7.160
		Average =7.54

## 3. CONCLUSION

The combination of mycelium and fly ash brick is a whole new concept with a new technology and innovation. The motive is to create socio-economic benefit and empower sustainable construction material. Air pollution to a greater extent will be reduced as this brick doesn't require brick kiln.

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