



“Experimental Study on Ecofriendly Natural Herbal Lime Plaster”

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Abstract - The Natural Herbal Lime Plaster is a ecofriendly alternative to conventional Cement Plaster. The Natural Herbal Lime Plaster can reduce the Carbon Dioxide emission to a large extent as the Lime releases half the Carbon Dioxide of Cement. To combat the high pollution caused by huge Carbon Dioxide emissions by the Cement Industry right from its manufacturing to its final use in Construction Projects i.e. (Building Construction, Road Construction etc.), the Natural Herbal Plaster serve as a great alternative.

Key Words: Herbal Lime Plaster, Natural Plaster, Ecofriendly Plaster, Ecofriendly Building Material, Ecofriendly Construction Material.

1.INTRODUCTION

The Plastering is one the Last operations carried out. The Plastering has a significant importance as the Plaster protects the component on which it is applied it hides defects of brickwork, without plaster we cannot apply paint on the Walls, Columns, Beams, Slab. The plaster is applied on both interior and exterior of the building. The Plastering techniques and methods in terms of preparation and application vary significantly with respect to location.

The Natural Plasters are made from Lime, Clay and Natural Aggregates and can be colored with mineral pigments. The Natural Plaster repels dust rather than attracting it and is resistant to mold and mildew, which makes interior air quality healthier in general and specifically for people with allergies.

Natural Herbal Lime Plaster: The Natural Herbal Lime Plaster emits half the Carbon Dioxide of Conventional Cement Plaster and also it is cheaper than Conventional Cement Plaster. It has various uses and applications. The mix design and preparation of the Natural Herbal Plaster is very easy.

1.1 MIX DESIGN AND METHODS

- 1) The Lime to Sand ratio is 1:3.
- 2) The Water to Lime ratio is 0.5.
- 3) The mix ratio is 1 Part Lime, 8% Beetroot Powder the weight of Lime, 5% Turmeric Powder the weight of Lime.
- 4) The dry mix consists of Lime,Sand,Beetroot Powder,Turmeric Powder.
- 5) Add water to dry mix.
- 6) Wet mix the plaster for 3 minutes.
- 7) Apply the plaster in layers. (refer Figure No 2)
- 8) Cure the plaster for at least 20 days thoroughly.

Note: All the materials used are fresh. Various field test on Lime and Sand have been carried out, and the results obtained from these test are found to be satisfactory as per Indian Standards.

1.2 ADVANTAGES

- 1) It Repels Mosquito and Cockroach.
- 2) It is ecofriendly.
- 3) It has low cost as compared to Conventional Cement Plaster. (refer Table No 3)
- 4) With the use of different Herbs any desired Coloured Herbal Lime Plaster can be attained.

1.3 DISADVANTAGES

1) The strong herbs can give a strong odour.

1.4 APPLICATIONS

- 1) It is used in ecofriendly houses.
- 2) It is used in green buildings.
- 3) It is used in village homes.



Figure 1 Ingredients of Natural Herbal Lime Plaster



Figure 2 Application of Natural Herbal Lime Plaster



Figure 3 Natural Herbal Lime Plaster

1.5 OBJECTIVE

1) To develop and compare Natural Herbal Plaster with Conventional Cement Plaster with respect to various parameter such as cost, lifespan, labour, advantage, disadvantage.

2. LITERATURE REVIEW

1) Dr. Sekar S K et. al., The objective of this study was to study the herbs used in lime mortar. They have explained how there are many disadvantages of using cement. They have also stated that since ancient times lime mortar mixed with herbs has been used in India. They have discussed about various types of admixtures, organic, chemical etc. The main aim of the study is on Effects of Herbs used as Admixture in Traditional Mortar. In their concluding remark they have stated that the lack of traditional knowledge and skills has made eco-friendly construction techniques and practice obsolete.

2) Oğuzhan Yavuz Bayraktar et. al., The objective of this study was to study the performance of lime mortars. They have discussed about various limes and Applications of lime. They have studied various research papers and wrote various literature reviews. They have not carried out any experimental study themselves. In their concluding remark they have stated that they believe that the use of cement has led to destruction of ancient buildings and this has given rise again to the use of natural materials like lime.

3. COSTING AND RATE ANALYSIS

1) Cement Plaster Costing for 100 m² room, 12mm thick, 1:3. Ultratech OPC cement 500 rs per 50 kg bag.

Wet volume of mortar = $100 \times 12/1000 = 1.2 \text{ m}^3$

Add 30% mortar to fill up joints = $30/100 \times 1.2 + 1.2 = 1.56 \text{ m}^3$

Dry volume = 25% more than total wet volume = 1.95 m^3

Volume of cement = $1.95/1+3 \times 1 = 0.4875 \text{ m}^3$

Number of Cement bags = $0.4875/0.035 = 14 \text{ bags}$

Volume of Sand = $1.95/1+3 \times 3 = 1.47 \text{ m}^3$

Table No 1 Costing Rate Analysis of Cement Plaster

Sr No	Particulars	Quantity	Rate in rupees	Per	Amount in rupees
	Material				
1	1) Cement	14 bags	500 rs	Bag	7000 rs
2	2) Sand	1.47 m ³	3300 rs	m ³	4851 rs
3	3) Contingencies, tools, and plants	Lump Sum	500 rs	Lump Sum	500 rs
	Labour				
5	1) Head Mason	1	1000 rs	day	1000 rs
6	2) Mason	2	500 rs	day	1000 rs
	3) Male Mazdoor	2	500 rs	day	1000 rs
				Total	15351 rs

Total Cost of material and labour = 15351 rs

Add water charges 1% of total = 153.51 rs

Add contractors profit 10% total = 1535.1 rs

Gross total = 17039.61 rs

Rate per m² = 17039.61/100 = 170.3961 rs/m²

As per Table No 1 the rate per sq m is given above

2) Herbal Lime Plaster Costing for 100 m² room, 12mm thick, 1:3. Birla Super White Lime 300 rs per 50 kg bag.

Wet volume of mortar = 100 x 12/1000 = 1.2 m³

Add 30% mortar to fill up joints = 30/100 x 1.2 + 1.2 = 1.56 m³

Dry volume = 25% more than total wet volume = 1.95 m³

Volume of lime = 1.95/1+3 x 1 = 0.4875 m³

Number of Lime bags = 0.4875/0.035 = 14 bags

Volume of Sand = 1.95/1+3 x 3 = 1.47 m³

Table No 2 Costing Rate Analysis of Natural Herbal Lime Plaster

Sr No	Particulars	Quantity	Rate in Rupees	Per	Amount in Rupees
	Materials				
1	1) Lime	14 bags	300 rs	bag	4200 rs
2	2) Sand	1.47 m ³	3273	m ³	4811 rs
3	3) Contingencies, tools, and plants	Lump Sum	500 rs	Lump Sum	500 re
4	4) Herbs Turmeric powder and Beetroot powder	Lump Sum	500 rs	Lump Sum	500 rs
	Labour				
5	1) Head Mason	1	1000 rs	day	1000 rs
6	2) Mason	2	500 rs	day	1000 rs
7	3) Male Mazdoor	2	500 rs	day	1000 rs
				Total	13011 rs

Total Cost of material and labour = 13011 rs

Add water charges 1% of total = 130.11 rs

Add contractors profit 10% total = 1301.1 rs

Gross total = 14442.21 rs

Rate per m² = 14442.21/100= 144.4221 rs/m²

As per table no 2 the rate per sq m is given above

Note: To make the Herbal plaster more cost effective instead of using Turmeric Powder, and Beetroot powder the gual or extract juice of turmeric and beet can be used.

4. RESULTS

The Results of the Study are given below.

Table No 3 Results of Comparison between Conventional Cement Plaster and Natural Herbal Lime Plaster

Sr No	Parameters	Cement Plaster	Natural Herbal Lime Plaster
1	Cost	170.3961 rs/m ²	144.4221 rs/m ²
2	Lifespan	25 to 30 years	60 to 100 years
3	Labour	Skilled and Semi Skilled	Skilled
4	Advantages	1) If cement properly mixed and applied, a plaster coating creates a stronger and more durable wall finish. 2) It is used on both internal and external surfaces. 3) It has long durability. 4) It is resistive towards vegetation growth and chemical actions to a certain degree.	1) It Repels Mosquito and Cockroach. 2) It is ecofriendly. Low Carbon Dioxide emission as compared to Cement Plaster. 3) It has low cost as compared to Conventional Cement Plaster. 4) With the use of different Herbs any desired Coloured Herbal Lime Plaster can be attained.

As per Table No 3 The Natural Herbal Lime Plaster has various advantages over Cement Plaster with respect to Cost, Lifespan, Natural Mosquito and Cockroach repellent.

5. CONCLUSIONS

The Herbal Lime plaster offers better resistance to water spills. The plaster also acts as a repellent to mosquito, cockroach. The plaster can also give any desired colour as per requirement as herbs can be mixed to obtain a desired colour.

The cost of Herbal Lime Plaster is only 144.4221 rs/m² which is less than the Cement Plaster cost which 170.3961 rs/m².

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