



“Experimental Study on Ecofriendly Natural Herbal Paint”

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Abstract - In today's day and age pollution is becoming a major concern. The various building materials used in building construction cause a significant amount of pollution globally. To combat this pollution we need to promote the use of ecofriendly materials. The Conventional Chemical Paints are a major contributor of Total Volatile Organic Compounds, Formaldehyde. The Natural Paints such as Herbal Paints provide a great alternative to Conventional Chemical Based Paints.

These Conventional Chemical Based Paint cost much more than the Natural Paints such as Natural Herbal Paint which can be easily prepared at home and used as per need whenever needed.

Key Words: Herbal Paint, Formaldehyde (HCHO), Ecofriendly Paint, Total Volatile Organic Compound (TVOC), Low Cost Paint, Natural Paint.

1.INTRODUCTION

The Painting activity is of the usually last activity carried out after the construction of the building. The Paint protects the plaster by avoiding direct contact of anything with the plaster. The Painting increases the aesthetic value of house and also gives it a very pleasing view.

The Herbal paint is made from using Powdered herbs as pigment, Lime as binder, water. The Herbal paint gives a very smooth and even finish. The applications of Natural Ecofriendly Herbal Paints are they are mainly used to paint walls, ceiling, roofs.

Materials used in Herbal Paint:

- 1) Lime as a base.
- 2) Pigment: The below mentioned herbs can be used to obtain the colour as per requirement. We will be using Turmeric only.
 - Turmeric = yellow.
 - Spirulina = dark green.
 - Beet Root = red.
 - Bilberry Fruit = purple.
 - Activated Charcoal = black.
 - Kesar = reddish orange.
- 3) Water.

1.1 MIX DESIGN

- 1) The Lime to Turmeric ratio is 0.95:0.05.
- 2) Dry mix 0.95 parts Lime.
- 3) Now mix 0.05 parts Turmeric with water, and now filter with strainer.
- 4) Now Mix Turmeric water with Lime.

Note: Water/Lime ratio can be taken as 0.45.

1.2 ADVANTAGES

- 1) Low Cost: The herbal paints are the low cost paints as the herbs can be used from the kitchen, also the paint is much cheaper than the paints currently available in the market. Refer Table No 1 and 3.
- 2) Easy to Make and Apply: The mix design is easy to prepare and apply. Refer Figure No 1.
- 3) Variety: The variety of colours is endless and various herbs can be mixed to obtain any colour as per the imagination.
- 4) Natural repellent: Keeps termites and Mosquitos away.
- 5) Low Pollution: The Paint is having very low emission of Formaldehyde HCHO, Total Volatile Organic Compounds TVOC. Refer Table No 2.

1.3 DISADVANTAGES

- 1) Finish: The finish of paint is not very glossy it gives a matte finish. Refer Figure No 2.
- 2) Odour: Herbs having a strong odour can give the odour for a few days post painting.

1.4 APPLICATIONS

- 1) It is used in to Paint interior walls in buildings and in vernacular architecture based village homes.
- 2) It is used in ecofriendly green buildings to Paint interior walls.



Figure 1 Application of Herbal Paint



Figure 2 Air Quality Meter Test on Herbal Paint

1.5 OBJECTIVES

- 1) To develop and compare low cost Herbal Paint with Conventional Chemical Based Paint.
- 2) To develop and compare Herbal Paint with Conventional Chemical Based Paint with respect to Total Volatile Organic Compounds and Formaldehyde parameters.

2. LITERATURE REVIEW

1) Francesca Casadio et. al., They have studied the historical evolution of wall paints with respect to organic material use in europe in particular. They have discussed on secco, fresco, i.e. general, portions of walls painted with pigments that have been mixed with an organic binder (a technique called a secco) are more vulnerable than those painted with pigments dispersed in water and applied on fresh plaster (a fresco).

They have studied a total of 231 recipes, and reviewed 16 general classes of organic constituent were identified, which include: beer, wine, vinegar, egg (egg white and yolk), gall, glues, flour and starch, oils, gums, resins, varnishes, waxes, milk, sugar, vegetable

products. They have studied and discussed about various techniques of painting i.e. secco, fresco, various natural binders, various natural pigments throughout the 1970's to 2003.

2) Anjali Sharma et. al., In this paper they have discussed the history of the ancient wall paints and how these paints were made to be natural paints. In this paper they have discussed on Earth paints and there various types along with an discussion on the types of Earth Pigments used in India's Wall Paintings culture. They have given a Chronological development order of pigment used in Indian mural painting with techniques with respect to time. There concluding remark states pigments such as (iron) ochres, green earth, wads and white earth etc were prominently used.

3) Poorvi Rai et. al., In this paper they have discussed the Impacts of toxic paints on our environment and the human health. They have discussed about low Volatile Organic Compound Voc and high Volatile Organic Compound (VOC) paints in India. To control the disposition of paints in garbage, roads, open areas etc. which can easily come in contact with the environment. The excess of paint should be used in government departments, houses of people who cannot afford or the paint can be returned to the shops for recycling and disposing at the place which does not harm our environment. As per them a proper and a better solution for the paint disposal shall be provided to curb the pollution. According to there final concluding remark the Government shall mandate the private companies to use the 3 R (reduce, reuse and recycle) schemes like other countries around the world already have done to curb this pollution caused by paints.

4) Suman Sahu et. al., In this paper they have studied and discussed in about Natural dyes. They have studied various literature review about various other articles with respect to there own study. The natural gulal is an natural pigment powder and it can be made from beetroot. The gulal prepared from can be used in natural paints as a pigment admixture. Wet Mixture of Beetroot in combination with wheat flour and rice flour and water is prepared and dried for 3 to 4 days to get gulal as per there study they have concluded.

3. COSTING AND RATE ANALYSIS

Herbal Paint: To paint 100 sqfeet area in Double Coat.

Assume 1 liter paint is able to cover 80 sqfeet area in Double Coat.

Now, $1/80 \times 100 = 1.25$ liter

Table No 1 Costing Rate Analysis of Natural Herbal Paint

Sr No	Item	Quantity	Rate in rupees	Amount in rupees
	Material			
1	1) Herbs Turmeric Powder	0.05 kg	400 rs/kg	20 rs
2	2) Lime	0.95 kg	10 rs/kg	9.5 rs
3	3) Water	0.2 liter	-----	-----
	Labour			
5	1) Painter	2	500 rs/day	1000 rs
6	2) Contingencies, tools, and plants	Lump Sum	Lump Sum	500 rs
			Total	1530 rs

Total Cost of paint material and labour = 1530 rs

Add contractors profit 10% total = 153 rs

Gross total = 1683 rs

Rate per sqfeet = $1683/100 = 16.83$ rs/sqfeet

4. RESULTS

Table No 2 Results of Air Quality Meter fo Natural Herbal Paint and Asian Apcolite Paint

Sr No	Parameter	Herbal Paint	Asian Apcolite Paint	WHO Standard Permissible Limit
1	Formaldehyde(HCHO)	0.004 mg/m ³	0.326 mg/m ³	< 1mg/m ³
2	Total Volatile Organic Compound (TVOC)	0.016 mg/m ³	1.956 mg/m ³	< 1mg/m ³

We can observe that as per Table No 2 The Natural Herbal Paint is well within the permissible limits of WHO World Health Organization Standard Limits for Indoor Air Pollutants. As compared to Asian Apcolite Paints which is high in emissions of Formaldehyde HCHO , Total Volatile Organic Compound TVOC.

Table no 3 Comparison of Natural Herbal Paints and Asian Apcolite Paint

Sr No	Type of Paint	Rate in rupees
1	Our Natural Herbal Paint (including labour and tools,plants)	16.83 rs/sqfeet
2	Our Natural Herbal Paint (without labour and	0.30 rs/sqfeet

	tools,plants)	
3	Asian Apcolite Paint (including labour and tools,plants)	23.375 rs/sqfeet
4	Asian Apcolite Paint (without labour and tools,plants)	6.25 rs/sqfeet

We can observe that as per Table No 3 that our Natural Herbal Paint is much more cheaper in the cost than the Chemical Based Asian Paints available in the market currently which are high in cost.

5. CONCLUSIONS

The Herbal Paint has a very low cost. The Paint acts as a repellent to mosquito, cockroach. The lifespan of paint is six months after which new Paint layer has to be applied. The Paint is completely natural and ecofriendly for human health and our environment.

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