

Exploration of Textures on Tree Barks as a Medium for Decorating Ceramic Tile Murals

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Abstract
This paper presents comprehensive methods of exploring textures on tree barks to decorate ceramic tile murals and their results. The bark of different tree spices has been explored extensively in conjunction with modern technologies to design tiles. Materials used for the tile production were Abonko clay and grog. A plasticity and shrinkage test were conducted on of the Abonko clay. Therefore, a composition of 90% Abonko clay and 10% grog fired at 1050 ^{o}c was suitable for ceramic tile murals. The study concluded that textures on tree barks could be exploited to obtain designs to serve as a medium for decorating ceramic tile murals. It is therefore recommended among other things, that care should be taken when felling trees from our environments since textures of tree barks could be of interest to ceramic artists or designers in design processes.
Keywords: Clay**,** Tree barks, textures, and tiles.
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1.0 Introduction

In Ghana, there abound rich forest vegetations. These forests contain trees with very interesting textures on barks that can be explored to create designs with aesthetic values and also for decorating tiles. The bark is a protective layer on the surface of stems and roots of woody plants. It overlays the wood and consists of inner and outer bark. The outer bark is made up of dead cork cells which insulates the tree from drying out and protects the inner bark from insect infection and pathogens that want to gain access to the living tissue (Wolfe & Hitchcock, 2015). Again, the bark protects the tree from weather conditions, insect pests, and browsing, and it also has critical role in the case of wood fires (Schafer et al, 2015).

According to Pasztory et al (2016), bark has numerous functions during the lifespan of the tree, while it also changes with age. The outer bark is very diverse and can take shapes characteristics to some species. Its thickness depends on the species, the age of the plant, and ecological factors, and it can even vary in different parts of the same tree. For example, sclerieds, which develop in the outer bark and make their structure rigid and hard, are located in many species (Butterfield et al, 1997). It is as a result of these natural textured designs that the study seeks to explore the textures on tree barks as a medium for tiles decorations and production.

1.1 Research Question

To what extent can textures on trees barks be exploited to design ceramic tiles?

1.2 Objectives of the Study

1. To take inspirations from textures on tree barks as an idea development.

2. To create designs from textures on tree barks that could be suitable for decorating tiles using ceramic and sculptural methods.

3. To produce decorative tiles with textured patterns from tree barks.

1.3 Importance of the Study

The study will be useful to artists (sculptures and ceramists) to explore other possibilities of creating designs from tree barks for decorations.

1.4 Delimitations (Scope)

(i) The study is limited to only using textures on tree barks for decorating tiles.

(ii) The decorated tiles would be executed only at the bone dry state.

1.5 Limitations

There was scanty literature on textures of tree barks in design processes especially in the making of 3-dimensional objects.

1.6 Variations and Importance of Tree Barks

Tree back are the out most part of the trunk of a tree usually in texture and they vary form one tree to another. Bark is a physical-chemical barrier for bacteria, fungi, parasitic plants, and animals like insects, birds, and mammal (Sakai, 2001). According to Conrad (2014), tree barks play and important role in the life circle of the tree in the following ways.

i. Protect the delicate cambium layer (live cells) from bump and cuts.

ii. Protects the tree against high temperatures.

iii. Protects the tree against disease organisms

iv. Help the tree to absorb air.

v. Help the tree store water.

Morris & Jansen (2016) mention that tree have designated names given to types of barks , with common terms such as smooth, shaggy, flaky, dappled, stringy, tessellated , rugose, rough and others. Such terms as well as being important for identification are strongly tied to ecological adaptation.

Historically, tree barks use has a long tradition as a construction material for roofing, heat and sound insulation, and other specialized purposes (Kain, 2016). In various parts of Mexico, an over 1,400 year-old tradition of paper making from tree bark exists. This paper production method reached dimensions partly causing a shortage of appropriate trees (Peters et al, 1987). Between 1700 and 1900, Sami people in the Northern Sweden used the inner bark of scots pine harvested in every summer as food. Bark was also a healthy supplementary food in Spring time when game meat naturally scarce (Rautio et al, 2014). Bark (birch) was also used by Indians for canoe-building (Adney & Chapelle, 2014) and for tapa-clothes in the South Pacific (Neich & Pendergrast, 1997). In Africa, other traditional uses of bark were flavours, anti-malaria drugs, antibiotics, leather tanning chemical used as dyes, African traditional medicines, and handicraft production, such as rope making, baskets, canes, clothes (Ogunwusi, 3013).

In contemporary times, the economic interest of bark is low, because bark tends to be accumulated in relatively small pieces and its mechanical properties are inferior to those of wood (Martin & Crist, 1968). As a result, artists have expanded the frontiers of the use of tree for various artistic expressions. These include: (i) drawings - free hand sketches drawing of a tree barks executed in various media examples are displayed in figure1.

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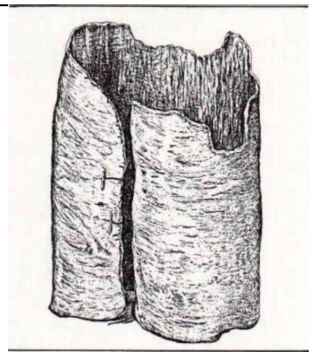

Figure 1: Pencil drawings of removed tree bark

(ii) Photography - the exhibition of tree back photography is another artistic practice detail of textures and physical features as shown in figure 2; as well as (iii) Paintings - paintings have also be produced based on textures and nature of the tree barks as highlighted in figure 3

Figure 2: Photograph of tree bark.

Figure 3: Painting of tree bark.

(iv) Textiles - the textures on the tree barks has also been explored for the production of designs on fabrics as showcased in figure 4 and (v) Print work - artworks created by using tree barks texture to print directly on paper as displayed in figure 5.

Figure 4: Textiles of tree bark.

Figure 5: Printing of tree bark.

1.7 Ethics of Research.

Since trees play a major role in the environment and are also protected. The harvesting of the tree barks from live tree is against the laws of the country, especially trees by the road side. The research avoided the harvesting of tree barks from live trees but adopted a technique of copying the texture on the tree by using silicon and would not harm the live tree.

2.0 Materials and Methods

The stage involves the various processes through which the research was undertaken. These processes involved the following;

(i) tree barks used for the research were obtained from already harvested wood at the various timber processing companies in Sekondi-Takoradi; fire wood obtained from cook food sellers, bakery, and others who use fire in their operations, blown down trees during rain storms on the Sekondi-Takoradi main road after heavy rain fall with winds; and tree wood logs supply to the wood carvers in the metropolis.

(ii) Plastic clay obtained from Abonko in the Central Region of Ghana, and

(iii) Grog - clay that has been bisque fired and then crushed be it course grained, medium, fine or very fine grained.

2.2. Test for Clay

Various tests on plasticity for clay were conducted in order to achieve an appreciable result for the tile production. Therefore, linear shrinkage and moisture absorption test were conducted at 1050 °c and 1100 °c respectively. Since the tiles could be mounted both indoor and outdoor, the moisture absorption test was very relevant and the temperatures (1050 °c and 1100 °c) selected were ideal for firing tiles. The tables 1, 2 and 3 give the sample results of the test for clay and grog conducted for study.

Table 1: Linear shrinkage and moisture absorption conducted at 1050 °c for Abonko Clay 90% and Grog 10%

SAMPLE	WET LENGTH (Centimeters)	DRY LENGTH (Centimeters)	FIRED LENGTH (Centimeters)	DIFFERENCE (Centimeters)	FIRED WEIGHT (grammes)	SOAKED WEIGHT (grammes)
1	6	5.9	5. 7	0.2	33.2	38.5
2	6	5.8	5.65	0.15	31.7	37.3
3	6	5.9	5.7	0.2	32.5	38.7
4	6	5.7	5.6	0.1	32.8	36.6
5	6	5.8	5.7	0.1	31.4	36.5
AVERAGE	6	5.82	5.67	0.15	32.32	37.52

Table 2: Linear shrinkage and moisture absorption conducted at 1100 ^{o}c for Abonko Clay 90% and Grog 10%

SAMPLE	WET LENGTH	DRY LENGTH	FIRED LENGTH	DEFFERENCE	FIRED WEIGHT	SOAKED WEIGHT
1	6	5.8	5.45	0.35	34	40
2	6	5.8	5.5	0.3	33	41
3	6	5.8	5.5	0.3	33	39
4	6	5.8	5.65	0.15	32	38
5	6	5.8	5.5	0.3	33	38.8
AVERAGE	6	5.8	5.52	0.28	33	39.36

In calculating the moisture absorption, the fired samples at two temperatures were weighed and calculated. They were then positioned in boiling water for about an hour and allowed to cool. The samples were taken out and excess water wiped and their weight recorded.

$$\text{Moisture Absorption} = \frac{\text{soaked weight} - \text{fired weight}}{\text{Soaked weight}} \times 100$$

Therefore at 1050 ^{o}c

$$\text{The, Moisture Absorption} = \frac{37.52 - 32.32}{37.52} \times 100 = \frac{5.2}{37.52} \times 100 = \frac{520}{37.52} = 13.86\%$$

At 1100 ^{o}c

$$\text{The, Moisture Absorption} = \frac{39.36 - 33.00}{39.36} \times 100 = \frac{6.36}{39.36} \times 100 = \frac{636}{39.36} = 16..16\%$$

Table 3: Summary of Moisture Absorption Percentage Test Result at 1050 ^{o}c and 1100 ^{o}c,

Temperature (^{o}c)	Average fired weight (grammes)	Average soaked weight (grammes)	% Moisture Absorption
1050 ^{o}C	**32.32**	**37.52**	**13.86%**
1100 ^{o}C,	**33.00**	**39.36**	**16.16%**

Table 4: Summary of Linear shrinkage percentage test result at 1050 ^{o}c and 1100 ^{o}c,

$$\text{At } 1050\,^{o}c\text{ ,} = \frac{\text{Dried length} - \text{fired length}}{\text{Dried length}} \times 100$$

$$= \frac{5.82 - 5.67}{5.82} \times 100 = \frac{0.15}{5.82} \times 100 = \frac{15}{5.82} = 2.58\%$$

$$\text{At } 1100\,^{o}c, = \frac{\text{Dried length} - \text{fired length}}{\text{Dried length}} \times 100$$

$$= \frac{5.8 - 5.52}{5.8} \times 100 = \frac{0.28}{5.8} \times 100 = \frac{28}{5.8} = 4.83\%$$

From table 4, it can be concluded from the test results that the 90% Abonko clay and 10% grog fired at 1050 ^{o}c could be conducive for the production of the tiles. This was due to relatively lower percentages in both moisture absorption and linear shrinkage. Therefore, a composition of 90% Abonko clay and 10% grog fired at 1050 °c was adopted for the production of the tiles.

3.1 Raw Materials Preparation

Ceramic tile production has several processes according to each different finished product (Framinan et al. 2014). However, this study adopted the schematic process as pictured in the flowchart shown in figure 6 below.

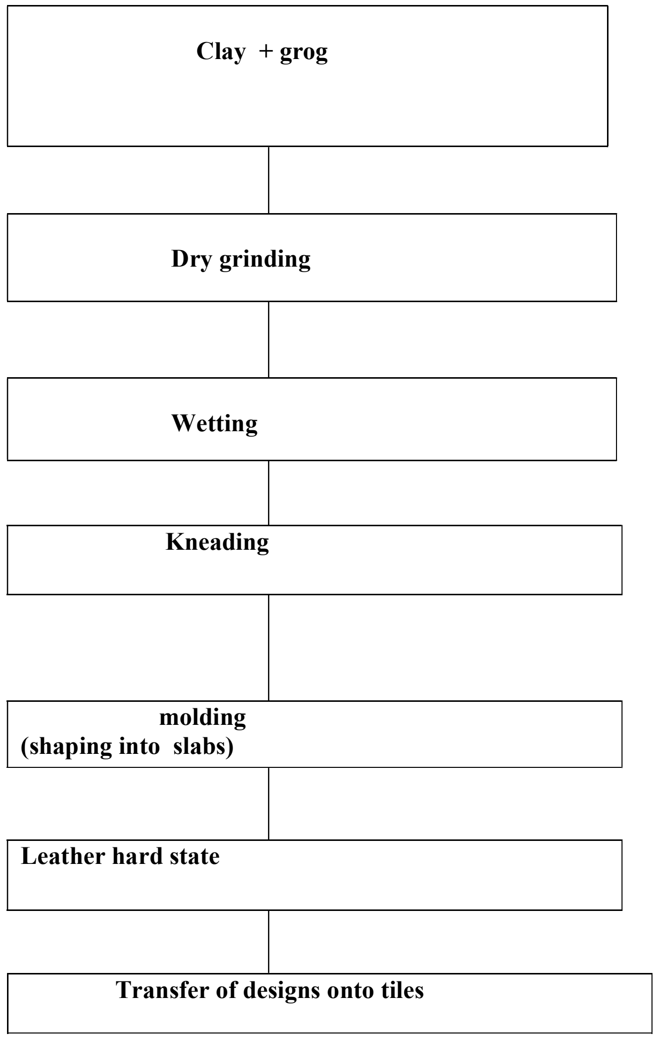

Figure 6: Flowchart of the production process of decorative tiles at leather hard stage.

3.0 Results and Discussions

The ideas developed from the tree barks were manipulated with the aid of computer to arrive at several designs as shown in the figure 8 below.

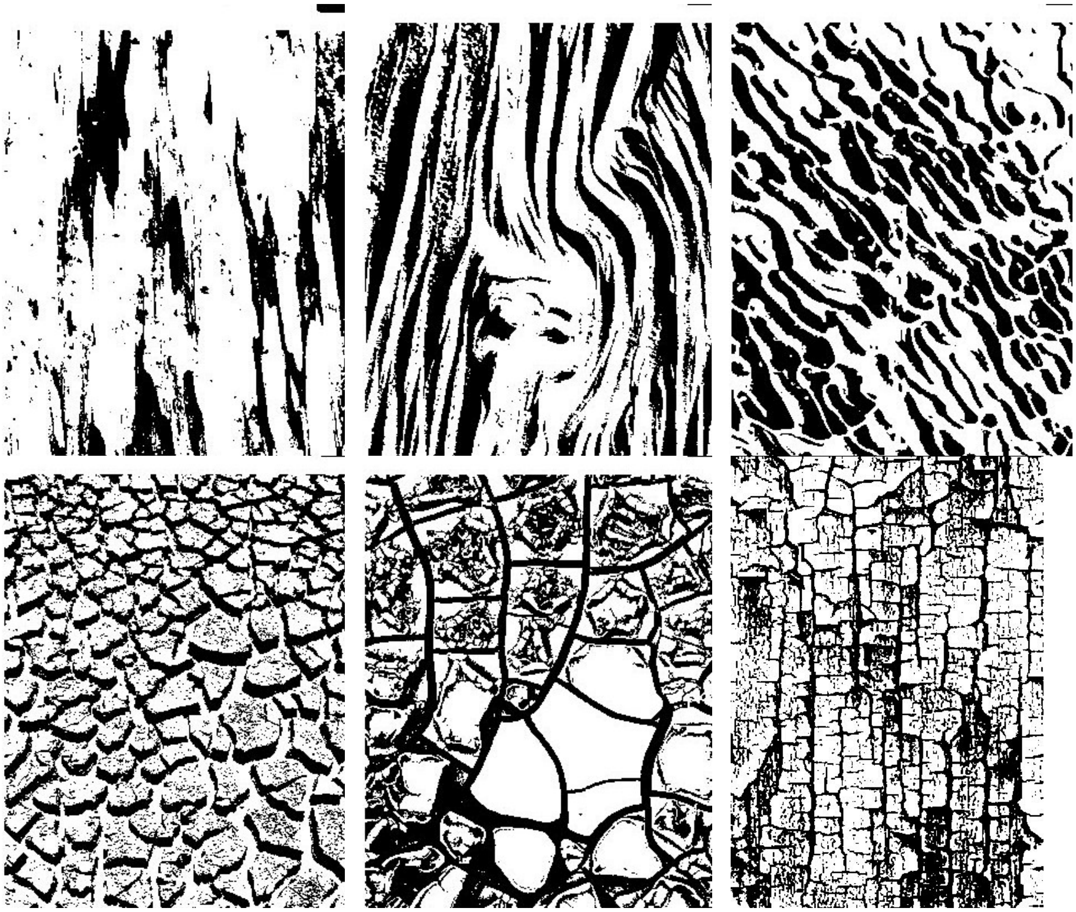

Figure 7: Samples of tree barks manipulated with the aid of computer.

3.2 Systematic Procedures in Obtaining Designs on the Tiles

The tree bark designs were printed to the sizes of the tile slabs and placed on top of the slabs at the leather hard stages. The designs were traced and carefully transferred onto the required slabs as shown in figure 8.

Figure 8: Tracing of design on slab

With the aid of cutting knife, and straight edge the designs were impressed and ultimately carved on the slabs to obtain the images on the tiles as demonstrated in figure 9 below.

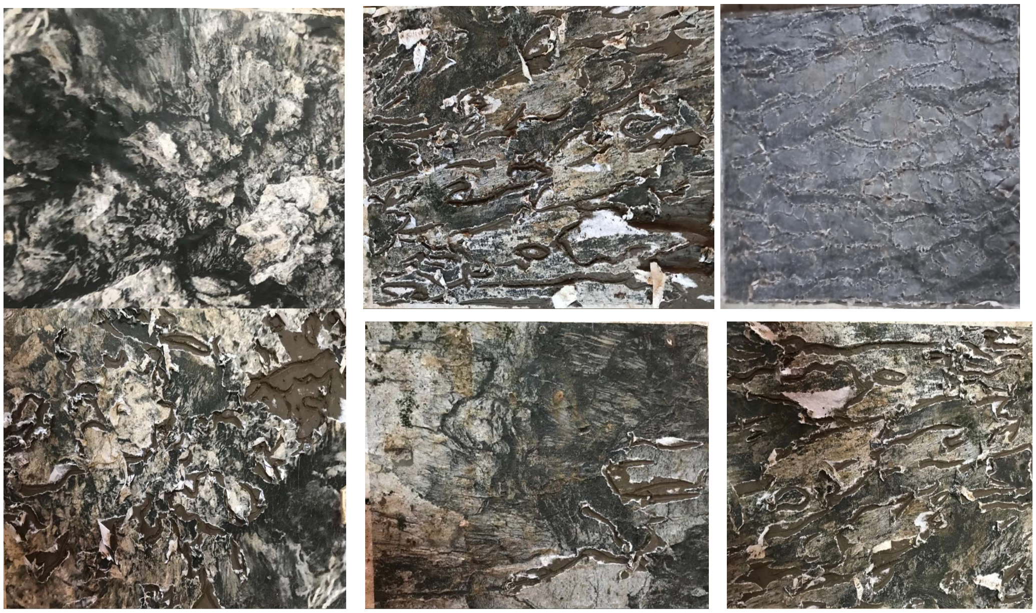

Figure 9:: Samples of designs being transferred onto slab

The processes of transferring and cutting of different designs on the slabs were manually executed and allowed to dry as highlighted in the figure 10 below;

Figure 10: Samples of final designed mural tiles being dried at room temperature.

Mural tiles could be prone to warping and cracking because they normally have only one long surface exposed to the air, causing the slabs to dry unevenly. To avoid these defects, the slabs were dried evenly by placing them on wire rack after they had been formed. The essence of this method was to help minimize the possibility of the slabs being folded or severely bent which causes internal stress that could lead to warping.

4.0 Conclusion

From the successfully designs transferred to the slabs to depict tree barks, the study concluded that textures on tree barks could be exploited to obtain designs to serve as a medium for decorating ceramic tile murals.

5.0 Recommendations

Based on the conclusion drawn from the study, it is therefore recommended that care should be taken in when felling trees from our environments since textures of tree barks could be of interest to ceramic artists or designers in design processes.

Further studies could be conducted to find out if textures of tree barks can be used to decorate other ceramic wares.

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