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Innovation of Rice Husk as Resist Agent for Fabric Embellishment: Implication on Waste Management

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ABSTRACT

The study concerned with innovation of rice husk as resist agent for fabric embellishment: Implication on waste management. Two research questions were formulated to guide the study. The study utilised one shot experimental research design to obtain data. It measures only the post-test results and does not use a control group. The population of the study comprises of students of Fine and Applied Art and Home Economics departments respectively in Federal College of Education Kontagora in Niger State. This population was selected because the students carry out practical on fabric embellishment and as such will be able to give valid data.A sample size of fifty (50) was used for the study. A purposive sampling technique was used to select this sample from the two departments. The main instrument for this study was a researcher self-designed questionnaire, which was face validated by statistician and one professor in textile science department in Ahmadu Bello University Zaria. Reliability of the instrument was determined through pilot study. An internal consistency coefficient of 0.87 was obtained through Cronbach's alpha test and the findings revealed that the resist agent for fabric decoration was produced from rice husk through the addition of antisol (CMC) which serves as a binder and water to the husk .The production exercise was demonstrated to the respondents. It was also revealed that rice husk is a suitable resist agent for effective fabric embellishment.

Keywords: Innovation, Rice husk, Resist agent, Fabric embellishment, Waste management.

1.INTRODUCTION

The indispensability of rice husk as an unidentified waste product of rice cannot be quantified. This is because it is one of most widely available agricultural waste in many rice producing countries around the world. Rice husk is described as the outermost layer of protection encasing a rice grain . It is yellowish in colour and has a convex shape. It is slightly larger than a grain of rice, thus lengths up to 7mm are possible. Typical dimension are 4mm by 6mm. It is light weight, having a ground bulk density of 340kg/m3 to 400kg/m3 (Ajayi, Devendra& Om, 2012)

This study is necessitated because of improper way of disposing rice husk by so many milling factories across some local governments in Niger state, also personal interaction with some factory operators has shown that rice husk has limited use due to its low nutritional value for animal feeding , also handling and transportation of rice husk is problematic due to its low density, no wonder heaps of these has always being dumped very close to the milling centres with little or no demand made on them like husk of other grains. The improper disposal of this waste has been causing trouble to the areas especially during the raining season as running water will carry it away and scatter the waste at different places, block the water ways which cause flooding , also indiscriminate burning of the waste produces thick smoke that cause respiratory diseases to the residents nearby.

2. FABRIC EMBELLISHMENT

Textile /fabric embellishment is the art of changing the appearance of natural and synthetic surfaces by the application of traditional, stylized , digital and illusionary techniques to embellish a product (Eric, 2015). It is also the art of enhancing a surface

structure by applying three dimensional techniques, such as weaving, knitting, embroidery, lacing, beading and embossing. Audubon (2009) states that some educators have described it as image, colour, texture and pattern applied to surface within the man-made environment. Camila (2012) opined that fabric embellishment encompasses the colouring, patterning, and structuring of fibre, yarn, and fabric. This involves creative exploration of processes such as dyeing , painting, printing, stitching, embellishing, quilting, weaving, knitting, felting and paper making. She further mentioned that fabric embellishment is used to define all projects made by a designer in respect to graphic treatment and colour used on a certain surface, industrial or not. Evelise (2005) stated that in Camila (2012) that fabric embellishment is a technical creative that aims to create bidimensional images (Visual and tactile textures) projected specifically for the constitution and /or treatment of surface, presenting aesthetic and functional solutions to the different materials and processes of industrial and handicraft production.

2.1 Resist dyeing

Resist dyeing as special dyeing method has been recognised as a unique design technique. Wada (2002) defines resist as technique or material that creates pattern on cloth by impeding dye from penetrating fabric. Resist can be defined as a process of textile colour patterning by preventing the uptake of fixation of dye in a subsequent operation (McIntyre & Daniels, 1997). Resist dyeing has been historically created in many ways throughout the world, such as wax resist, tied resist, pattern-dyes indigo and shibori (Bosence, 1985). Dyeing provides rich colour but once the fabric has been coloured in a dark shade, lighter colour patterns will not show up. In order to allow lighter colours to come through, areas have to be blocked from receiving dye. Any of these techniques of blocking the dye are referred to as a "resist". Sometimes these techniques have arisen independently; sometimes the techniques have been passed across cultures through trade and exchange.

2.3 Waste management and Wealth Creation

According to Okebule (2001) waste are all things we consider as unfit, unwanted and discarded due to economic reasons or ignorance of alternative technologies to re-use them. It can be seen as a solid, liquid or things that is discarded as useless but that has a potential of causing death, illness or injury to people or destruction of environment if improperly treated, stored, transported or discarded (Tchnobauglous, Theisen and Uigil, 1993), while waste management as stated by Anurigwo (2000), is the collection, transportation, processing, recycling or disposal of waste to wealth programs exits. Waste can be managed, treated or recycle by converting or reforming the material that would otherwise be considered a waste as they are not fit for animal feeding due to its coarseness and low nutritional value, and so are dumped very close to milling factories and as such causes a lot of danger to the environment where there are dumped, as running water carries them and dump them at various corners which causes a threat to the environment and the humans around here. This research will help to utilize rice husk in a proper way for fabric decoration invariable creating wealth from waste.

2.4 Statement of the problem

Since rice husk has no use due to it coarse and low nutritional value which make it unsuitable to feed animals, and disposal of this waste poses a great challenge to millers and the environment where it is dumped. This research project will attempt to evaluate the utilization of rice husk for resist agent in fabric decoration a tool for environmental waste management and wealth creation. The findings would lead to suggestion, way, innovations and discoveries to create an alternative resist agent for fabric embellishment in schools and colleges and thus overcome the challenges faced in disposing this waste.

3. SIGNIFICANCE OF THE STUDY

This paper is hoped to be of beneficial in the following ways:

It will be of help to consumers of fabrics as it will provide cheap but quality and beautiful dyed fabric since the rice husk waste will be utilized and be gotten at no or little cost for the timing customers and lovers of fabrics that have resist patterns. Hopefully, the findings of this research will be of importance to Nigerian rice farmers and rice millers as it will overcome the challenges they face on rice husk disposal, which before now is seen as a waste but will now be an important raw material for the textile industry. The constant demand of this waste therefore may lead to source of revenue to them.

Also, since the rice husk waste constitute problem in the environment in terms of disposal due to its low density and demand, this research will help in the proper utilization of the waste and at the same time promote cleanliness of the environment through its increased demand.

Further, it will also be benefits to producer and consumers in resist dyeing business as it will not only provide an alternative mean of production in resist design but also provide a cheaper means of production and products, as the raw material are easy to access and available at low or no cost.

It will also provide a means of showcasing and preserving our rich cultural heritage as different design showing Nigerian cultural symbols and signs will be produce using the rice husk paste. It will be of importance to Home Economics and Textile Science teachers and students especially those in textile field as it will help in teaching and learning and also provides alternative method of resist dyeing techniques. And finally, it will also serve as a reference for future research studies related to rice husk or in batik and fabric decoration.

3.1 Research Questions

1. To what extent can rice husk be use for the production of resist agent?

2. How can rice husk be applied in resisting fabric embellishment?

4. RESEARCH METHODOLOGY

The study utilised one shot experimental research design to obtain data. The choice of this design lies in the fact that a single group of test unit (all NCE students of Home Economic and Fine and Applied Art) will be exposed to an experimental treatment and a single measurement will be taken to afterward. It measures only the post-test results and does not use a control group.The population of the study comprises of students of Fine and Applied Art and Home Economics departments respectively inFederal College of Education Kontagora in Niger State. This population was selected because the students carry out practical on fabric embellishment and as such will be able to give valid data.A sample size of fifty (50) was used for the study. A purposive sampling technique was used to select this sample from the two departments. The main instrument for this study was a researcher self-designed questionnaire. The questionnaire items was structured on a four point modified scale of weights of strongly agree, agree, disagree and strongly disagree 4,3,2, and 1 respectively. The instrument was face validated by statistician and one professor in textile science department inAhmadu Bello University Zaria. Reliability of the instrument was determined through pilot study . An internal consistency coefficient which ranged from 0.87 to 0.91 was obtained through Cronbach's alpha test.

5. PROCEDURE FOR THE DATA COLLECTION

Stage I: Collection of the material:

Rice husk: This was obtained from a milling factory very close to the researcher's residence at Kontagora Local Government Area of Niger State and is displayed on Figure.1

Fig.1: Rice husk resist agent gotten directly from mill

- Carboxymethyl cellulose (CMC) or cellulose gum also known as antisol a whitish powdered environmental free chemical made of wood pulp and cotton linters and other sources. It serves as a binding agent to the rice husk.
- Fabric to dye, Vat dye ,Salt, Sodium Sulphate, Caustic soda, Rubber gloves, Plastic containers, Plastic buckets, Measuring cups and spoons, Stirring spoon or stick. And Stencil (A hard cardboard paper with cuts of different shapes or patterns) and Water.

Stage II: Measurements and procedure for making of the rice husk resist agent:
Materials Measurement

Antisol (Carboxymethyl cellulose (CMC) or cellulose gum,)	Four (4) table spoons full
Water	2.5 litres
Rice husk	twelve (12) milk tins

- After measuring the water into the bowl, the antisol was measured and poured gradually into the water. The antisol was allowed to soak in water for thirty (30) minutes to allow it swell. The Rice husk was measured and added into the agent and stirred smoothly until a smooth paste was gotten(rice husk resist agent).

Procedure for the Data Collection and the practical

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- Fabric to dye, vat dye, salt, sodium sulphate, Caustic soda, Rubber gloves, plastic containers, plastic buckets, Measuring cups and spoons, stirring spoon or stick. And stencil (A hard carboard paper with cuts of different shapes or patterns) and water.
- After measuring the water into the bowl, the antisol was measured and poured gradually into the water. The antisol was allowed to soak in water for thirty (30) minute to allow it swell. The rice husk was measured and added into the agent and stirred smoothly until a smoothly paste was gotten (rice husk resist agent).
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Fig. 2: Procedure for making of the rice husk resist agent

Fig. 3: Procedure for making of the rice husk resist agent

Fig.4: Fabric embellishment with rice husk resist agent

Fig.5: Fabric designs produced from rice husk resist agent.

Fig.6: Fabric designs produced from rice husk resist agent.

Procedure for Data Analysis

The data obtained from the experiment was subjected to statistical analysis usingdescriptive statistics (percentage and frequencies) for answering the research question raised for the study.

5. RESULTS AND DISCUSSION

Research question one

Table 1: How can resist agent be produced from rice husk?

S/N	Resist agent can be Produced from rice husk by…	SA 4	A 3	D 2	SD 1	Total no of items	$\bar{x}$	Decision
1	Using the rice husk alone	0	0	12	112	30	1.0968	Disagree
2	Adding water to rice husk	0	2	24	92	30	1.1774	Disagree
3	Adding rice husk in the mixture of water and antisol	104	18	0	0	30	3.6935	Agree
4	The production of rice husk as resist agent is fast and easy	80	30	2	1	30	3.3468	Agree
5	The production exercise is strenuous and time consuming	5	12	24	52	30	1.2581	Disagree

Source: Field survey, 2019

Table 1 revealed the opinions of respondents on the production of resist agent from rice husk, mixing the rice husk with water and antisol, production of rice husk as resist agent is fast and easy, the production exercise is strenuous and time consuming which got the mean scores of (X=3.6935), (X=3.3468) which is above the cut off mean (2.50) and thus stands for agree. This implies that resist agent can be produced by adding rice husk in the mixture of water and antisol. Also the production of rice husk as resist agent is fast and easy thus saves energy and hastens the procedures. The response pattern to item number 1, 2 and 5 got the lowest mean score that is adding water to rice husk will produce a resist agent. Also the production exercise is strenuous and time consuming, Item number 1, 2, and 5 shows the mean rating of 1.0968, 1.1774, and 1.2581 which was found to be less than the bench mark of (2.50) stands for disagree. This implies that rice husk resist agent cannot be produced by using rice alone or adding water to rice husk and the production exercise is not strenuous and time consuming.

5.2 Research question two

Table 2: How can rice husk resist agent be used for fabric decoration?

S/N	Suitability of rice husk as resist agent for effective teaching and learning of fabric decoration	SA 4	A 3	D 2	SD 1	Total no of items	$\bar{x}$	Decision
6	Rice husk is effective as resist agent	128	0	0	0	30	4.5210	Agree
7	It is easy to spread the rice husk resist agent on the fabric	108	15	0	0	30	3.3903	Agree
8	One can generate wealth out of this if produced and package well	116	9	0	0	30	3.8355	Agree
9	There is high dye absorption rate through the rice husk resist area	2	0	0	120	30	1.0323	Disagree
10	Rice husk can be washed easily from fabric after the dyeing of the fabric	48	30	16	2	30	2.5484	Agree
11	Rice husk resist agent is odourless and skin friendly	112	12	0	0	30	3.2323	Agree
12	Rice husk resist agent is suitable for fabric decoration	128	0	0	0	30	4.5230	Agree

Source: Field survey, 2019

Table 2 shows the view of the respondents on the suitability of rice husk as resist agent fabric embellishment. The response pattern to item number 6,7,8,10,11 and 12 which states that rice husk can be used as resist agent for fabric design(X=4.5210) it is easy to spread the rice husk resist agent on the fabric (X=3.3903), One can generate wealth out of this if produced and package well (X=3.8355), rice husk can be washed easily from fabric after the dyeing of the fabric (X=2.5484), rice husk resist agent is odourless and skin friendly (X=3.2323) and rice husk resist agent is suitable for teaching and learning of fabric decoration (X=4.5230) which are above the cut off mean (2.50). This implies that rice husk is sustainable resist agent for effective fabric decoration. Also the application procedure of rice husk resist agent on the surface of fabric is easy, and rice husk serves as an effective resist agent as dyes were unable to pass through the resist agent, this is in agreement with response pattern of item 9 which disagrees to the statement that there is high dye absorption rate through the rice husk resist agent with mean score of (X=1.0323) which was found to be less than the bench mark of (2.50) and thus stands for disagree.

6. DISCUSSION OF FINDINGS

From the result of the analysis presented, the major findings of this study are summarized thus:

1. The resist agent for fabric decoration was produced from rice husk through the addition of antisol (CMC) which serves as a binder and water to the husk .The production exercise was demonstrated to the respondents.

2. Result of research question two revealed that rice husk is a suitable resist agent for effective fabric embellishment.

7. CONCLUSION

From the findings of the study, it can be concluded that rice husk is a sustainable resist agent for fabric embellishment. Also, resist agent if produced and packaged well will result will generate income for the teeming youths who are jobless.

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