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MAKING DYES FROM LOCAL PLANTS: AN ASSESS FOR TEACHING DYEING SKILLS

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Abstract: The study was conducted on making dyes from local pigments was carried out using natural pigments found within Zaria. An experimental study was carried out using ten selected natural pigments from Zaria, along with four local mordants for the purpose of dye extraction the major objectives of the study is making of dyes from local plants. Boiling and soaking methods were adopted for the dye extraction. On the whole forty-three different shades were got out of the experiment. On the whole the Ten (10) different pigments used includes Scale of Onions, Kola nuts, Guinea corn husk, mango bark, mango leaves, cashew bark, cashew leaves, cassia leaves and guava leaves locally obtained mordants were alum, potash, lye and common sal were used variously on the pigments. Two methods were basically employed to extract dyes from the selected pigments. These are boiling and soaking. Mordants were added to the pigments during the boiling and soaking processes. Length of white cotton was also dropped into each combination to test the color of dyes produced. The researcher further recommends that individuals as well as tie and dye companies or establishments are therefore encouraged to adopt the processes employed in this study to extract dyes from natural pigments within their environment in order to save cost and energy and students from home and rural economic departments and those willing should try out other methods of extracting dyes and as well combining different pigments and mordants to produced advanced or new colours which will serve as a literature for further academic work.

Keywords: Dyes, Extraction, Plants, Teaching, Dyeing, Skills

INTRODUCTION

Dyeing from natural sources is the oldest way of colouring textiles. Natural dyes can give subtle soft colours through to the very brightest of colour to yarn and fabric. The first colours used to dye fabrics were obtained from animal and vegetable sources. Colouring fabrics with natural dyes produces amazing colour combinations, depending upon the amount of natural product, fibre being dyed, concentration of the dye, time spent in the dye bath, and mordant used. One batch of onionskins for example can produce shades of yellow, through to orange and brown, all in a variety of intensity. No batch of colour is ever the same, and you can never make the same colour again, no matter how hard you try

(Mohammad, 2015). Almost anything from nature can be gathered to produce colour e.g. flower heads, twigs, stems, roots, berries, fruit, herbs and vegetables (see the table at the end for a list). Many varieties of colours can be obtained from such natural dyes, but these colours are not very colour fast. They fade in sunlight and wash out. Because they are difficult to collect, they are also uneconomical for dyeing large amounts of fabric. A mordant allows dyes to be taken up readily, evenly and permanently by fibres, and are usually placed in the dye bath before dyeing takes place. The most common chemicals used as a mordant are alum, chrome, iron and tin (Bruna, 2013). Textile materials (natural and synthetic) used to be coloured for value addition, look and desire of the customers. Anciently, this purpose of colouring textile was initiated using colours of natural source, until synthetic colours/dyes were invented and commercialized (Bruna, 2013). For ready availability of pure synthetic dyes of different types/classes and its cost advantages, most of textile dyers/ manufacturers shifted towards use of synthetic colourant. Almost all the synthetic colourants being synthesized from petrochemical sources through hazardous chemical processes poses threat towards its eco-friendliness (Ali *et al.,* 2013). Hence, worldwide, growing consciousness about organic value of eco-friendly products has generated renewed interest of consumers towards use of textiles (preferably natural fibre product) dyed with eco-friendly natural dyes. Natural dyes are known for their use in colouring of food substrate, leather as well as natural fibres like wool, silk and cotton as major areas of application since pre-historic times. Although this ancient art of dyeing textiles with natural dyes withstood the ravages of time, but due to the wide availability of synthetic dyes at an economical price, a rapid decline in natural dyeing continued.

However, even after a century, the uses of natural dyes never erode completely and they are being still used in different places of the world. Thus, natural dyeing of different textiles and leathers has been continued mainly in the decentralized sector for specialty products besides the use of synthetic dyes in the large scale sector for general textiles/apparels. Recently, most of the commercial dyers and textile export houses have started re-looking to the maximum possibilities of using natural dyes for dyeing and printing of different textiles for targeting niche market. Natural dyes produce very uncommon, soothing and soft shades as compared to synthetic dyes. On the other hand, synthetic dyes, which are widely available at an economical price and produce a wide variety of colours, sometimes causes skin allergy and other harmfulness to human body, produces toxicity/chemical hazards during its synthesis, releases undesirable/hazardous toxic chemicals etc(Redwan, 2014). For successful commercial use of natural dyes for any particular fibres, the appropriate and standardized techniques for dyeing for that particular fibre-natural dye system need to be adopted (Mohammad, 2015).Therefore to obtain newer shade with acceptable colour fastness behaviour and reproducible colour yield, appropriate scientific dyeing techniques/procedures are to be derived.

Thus, relevant scientific studies and its output on standardization of dyeing Natural Dyes methods, dyeing process variables, dyeing kinetics and test of compatibility of selective natural dyes have become very important, however the information on which is insufficient. That is why; this study is very much relevant to the current need of the textile dyers. An attempt has been made here to give scientific overview on dyeing of textiles with natural dyes and related issues.
The primary aim of this research work is to investigate making of dyes using locally available plants. While the specific objectives are to

i. access the forms of dyes made from these locally available plants
ii. figure out the adverse effects of making dies using locally available plants
iii. Dyeing of Textiles using the locally available plant dyes

LITERATURE REVIEW

Natural Dyes/Colourants

The word 'natural dye' covers all the dyes derived from the natural sources like plants, animal and minerals. Natural dyes are mostly non-substantive and must be applied on textiles by the help of mordants, usually a metallic salt, having an affinity for both the colouring matter and the fibre. Transition metal ions usually have strong co-ordinating power and/or capable of forming week to medium attraction/interaction forces and thus can act as bridging material to create substantivity of natural dyes/colourants when a textile material being impregnated with such metallic salt (i.e. mordanted) is subjected to dyeing with different natural dyes, usually having some mordantable groups facilitating fixation of such dye/colourant. These metallic mordants after combining with dye in the fibre, it forms an insoluble precipitate or lake and thus both the dye and mordant get fixed to become wash fast to a reasonable level (Redwan, 2014).

Dyeing of Textiles with Natural Dyes

Some of its constituents are anti-allergens, hence prove safe for skin contact and are mostly non-hazardous to human health. Some of the natural dyes are enhanced with age, while synthetic dyes fade with time. Natural dyes bleed but do not stain other fabrics, turmeric being an exception. Natural dyes are usually moth proof and can replace synthetic dyes in kids garments and food-stuffs for safety. Despite these advantages, natural dyes do carry some inherent disadvantages, which are responsible for the decline of this ancient art of dyeing textiles (Mohammad, 2015).

Classification of Natural Dyes

Natural dyes can be classified (Gulrajani & Gupta, 1992) in a number of ways. The earliest classification was according to alphabetical order or according to the botanical names. Later, it was classified in various ways, e.g. on the basis of hue,

chemical constitution, application class etc. In "treatise on permanent colours" by Bancroft, natural dyes are classified into two groups: 'Substantive Dyes' such as indigo, turmeric etc. which dye the fibers directly and 'Adjective Dyes' such as logwood, madder etc. which are mordanted with a metallic salt. Humme classify the colouring matter as 'Monogenetic Dyes', those produce only one colour irrespective of the mordant present on the fibre or applied along with the dye and 'Polygenetic Dyes', those produce different colour with different mordant applied, e.g., alizarin (Dedhia, 1998)

METHODOLOGY

This study is designed to test local pigments with the aim of extracting dyes. The test was based on two main methods, boiling and soaking. The parts of the local pigments used for the study were subjected to the processes, that is, boiling and soaking differently. In both methods, four different local mordants were added to the pigments singly. The results of each test were confirmed by dropping a length of white cotton fabric for a period of time. Both local pigments and mordants were used in all the tests based on an established recipe. References were made to color charts of textile and paint to draw the names of colors produced.

Data Collection

Data collected for the study includes ten different natural pigments which are onion (*allium cepa*), Kolanut (*cola nitida*), Guinea corn husk (*sorghum*), leaves of mango tree (*mangiferaindica*), bark of mango tree Mango bark has been reported to be used on silk and cotton materials as a source of natural dyes, and a wide range of colors have been produced using different mordants (Bains et al. 2003; Win and Swe 2008). (*mangiferaindica*), cashew tree leaves (*anarcadium*), cashew (*anarcadium*), pawpaw leaves (*carica papaya*), cassia tree (*cassia*) and guava leaves (*psidiumguajava*) and four local mordants (chemicals) which includes granulated potash, lye, granulated alum, table salt.

Procedure

Boiling and soaking methods were used to extract dyes from the raw materials (local pigments). The leaves (fresh) and bark of the selected plants were heated and maintained at boiling point were pounded or crushed into smaller pieces and soaked for four days. In each case, appropriate mordant (granulated potash, alum, lye and table salt were added at the time of boiling and soaking respectively. The actual test on each pigment was based on a standard formula or recipe as 400g of natural pigment, 4 liters of water, 2 table spoonful (level) of mordant, and in the case of lye which is liquid, one standard tea cup was used. In each procedure, a length of white cotton fabric is dropped into the combination of the recipe and boiled for thirty minutes (30) or soaked for four days as the case may

be. In this case therefore, the procedures of dyeing the fabric are not cold methods.

Pilot Test

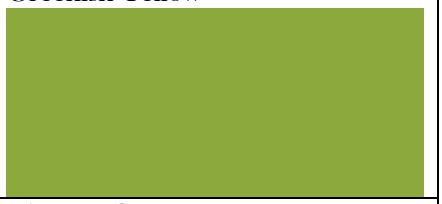
Three of the natural pigments were used for the pilot study, these includes onion scale, guinea corn husk and mango bark. The standard recipes was adopted to test the three pigments. Each pigment gave four different shades of potash to the pigments gave the darkest shade of colours produced. The pilot test, therefore proved that the tested pigments combined with the listed mordants were capable of producing colours. This has encouraged the researcher to uphold the listed materials, mordants and recipe in the final test.

RESULTS AND DISCUSSION

Results

The results of the tests carried out in this study are presented below.

Tests	Procedure `	Result/Output
First Test	The scale of onion and potash and the length of white cotton fabric were boiled together for 30 minutes	Golden Orange
Second Test	Scale of onion and lye with a length of hite cotton fabric were boiled together for thirty (30) minutes which produced yellow green color	Yellow Green
Third Test	The scale of onion and aluum with a length of white cotton fabric where boiled together for thirty (30) minutes.	Greenish yellow
Fourth Test	The scale of onion, combined with table salt and a length of white cottom fabric were boiled for 30 minutes.	Greenish brown
Fifth Test	Guinea corn husk with lye which was boiled together for 30 minutes with a length of white cotton fabric for 30 minutes.	Dark Brown
Sixth Test	Guinea corn husk was	Brownish Purple

	combined with lye boiled together for 30 minutes with a length of white cotton fabric for 30 minutes.	
Seventh Test	Guinea corn husk and alum were boiled together for 30 minutes with a length of white cotton fabric for 30 minutes.	Yellow Brown 
Eight Test	Guinea corn husk and potash were boiled together for 30 minutes with a length of white cotton fabric for 30 minutes.	Brownish Purple 
Ninth Test	Mango bark was also boiled together with potash for 30 minutes with a length of white cotton fabric for 30 minutes.	Yellow
Tenth Test	Mango bark and lye combined was boiled together for 30 minutes with a length of white cotton fabric for 30 minutes.	Dark Cream 
Eleventh Test	Combination of mango bark with alum was boiled together for 30 minutes with a length of white cotton fabric for 30 minutes.	Yellow
Twelfth Test	Salt was added to bark of mango and boiled together for 30 minutes with a length of white cotton fabric for 30 minutes.	Greenish Yellow 
Thirteenth Test	A length of white cotton fabric was tied and dropped into the combination of guava leaves and lye, then boiled for thirty (30) minutes.	Tie-Dye Guava Leaves 

DISCUSSION

The result obtained showed that the ten natural pigments were found capable of producing different shades of colours as contained in chapter three. More than one colour was one color was obtained from the same particular pigment as regards the colour produced from the pigments. A good illustration of this can be seen in the colours produced from the husk of guinea corn. An addition of potash to the husk of guinea corn which were boiled together for 30 minutes, produced dark, brown, when lye was added to the same substance given the same treatment, brownish purple color was produced. Similarly, with the addition of alum and treated the same way, yellow brown color was produced. Furthermore, when common salt was added to the husk of guinea corn and treated as in other three above, brownish purple was obtained. The second assumption of this study which states that the shades of colours extracted from natural pigments are determined by the mordants use is hereby supported and can be accepted as a principle. In addition, the methods of extraction employed in this study showed that differences in the colors obtained from particular types of pigment. Boiling and soaking devices were employed in extracting the dyes. The results of the tests showed that colors obtained through the two devices were not the same. From the characteristics features of the mordants and techniques employed in the extraction of dyes from the natural pigments, it seems obvious that the number and types of colors obtained depends on how resourceful a teacher is. As many ways as the individual concerned can used different mordants, combined with a series of techniques, so that he or she can obtain different colors. In this wise, the colors (dyes) that a teacher or an environment would be unlimited. The individual only needs to put in energy, and be ready to make use of his or her creative ability.

SUMMARY

An experimental study was carried out using ten selected natural pigments from Zari, along with four local mordants for the purpose of dye extraction the major objectives of the study is to facilitate the teaching of tie-dye and batik decorations in the secondary schools. Boiling and soaking methods were adopted for the dye extraction. On the whole forty-three different shades were got out of the experiment.

CONCLUSION

The results obtained showed that fabric was used to test the dyes being extracted. The results were fascinating. It can then be concluded that diverse and varieties of colors are produced from locally available pigments (plants) surrounded within the community, which further shows that dyes are locally produced in must part of the continent and globe at large.

RECOMMENDATIONS

Based on the findings, the following recommendations are made;

i. Individuals as well as tie and dye companies or establishments are therefore encouraged to adopt the processes employed in this study to extract dyes from natural pigments within their environment in order to save cost and energy.

ii. Students from home and rural economic departments and those willing should try out other methods of extracting dyes and as well combining different pigments and mordants to produced advanced or new colours which will serve as a literature for further academic work

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BIOGRAPHY

Dr. (Mrs.) Vahey Janet Nzuta was born on the 27th March 1958 at Takum Local Government Area of Taraba State. She attended her primary school at Ekas Primary School Takum, from 1963 to1969 and letter proceeded for her Secondary Education in Teachers College, Wukari in 1975 to 1980 and furthered to Advance Teachers College Zaria from 1983 to 1986 where she obtained her NCE in Home Economics. Dr. Nzuta also obtained her B.Ed. in Home Economics in the year 1989; M.Ed. Home Economics in 1992 at ABU Zaria, she finally obtained her Doctorate Degree in Home Economics (clothing and textile) at University of Nigeria Nsukka in the year 2016. She is married to Mr. Vahey Nzuta with Five (5) children, she has written, reviewed and supervise so many academic projects and published both locally and internationally. She is currently a Chief Lecturer with the Department of Home and Rural Economics, College of Agriculture, Jalingo Taraba State.

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