ADOPTING ORGANIC DYED TRADITIONAL FIBRES FOR THE PRODUCTION OF SELECTED FASHION ACCESSORIES

BY

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DECLARATION

I hereby declare that this submission is my own work towards the Master of philosophy in Integrated Art and Industry and that, to the best of my knowledge, it contains no material previously published by another person, nor material which has been accepted for the award of any other degree of the university, except where due acknowledgment has been made in the text.

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ABSTRACT

This research seeks to exploit the possibilities of using organic dyed fibres available in Ashanti, Northern and Volta regions of Ghana that are suitable for the design and production of fashion accessories for the local and international market. This concept provides an opportunity to improve upon the fashion industry and the indigenous weaving industries in Ashanti, Northern and Volta regions in Ghana. The study reviewed existing works on fibre and dye extraction among the communities mentioned above to build a conceptual framework that is appropriate for examining how to extract fibre and dye from plants for the production of fashion accessories. The study adopted the qualitative research method and employed descriptive and experimental research designs. The purposive sampling technique, interview and observation were adopted. The scope of the study covered selected indigenous textile centres in the Ashanti, Volta and Northern regions of Ghana. The population of the study was limited to weavers from *Bonwire, Bolgatanga, Kenyaase Abirem* and *Keta* and Dyers at *Ntonso* and *Daboya*. Plants capable of yielding fibres and dyes for the fashion industry were also studied. The findings of this research suggest that some plants found in Ghana have the potential for the production of very aesthetically pleasing fibres and dyes. It emerged from this research that macramé and other traditional weaving techniques can be adopted to produce fashionable fashion accessories using the organic dyed traditional fibres. Further investigation must be conducted on other potential yielding plants that are capable of producing fibres and dyes for the fashion industry.

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CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter covers the background to the study, statement of the problem, purpose of the study, research question, and significance of the study, limitation of the study, delimitation of the study, definition of terms and organization of the study.

1.1 Background to the Study

The research highlighted on Adopting Organic dyed Traditional Fibres for selected fashion accessories. Organic dyes are dyes that are made with a natural plant pigment. This usually means that they were made by plants, flowers or other organic substances. Many of nature's own items can be used to create dyes that can be used to colour the various items of clothing (what-are-organic-dyes and-why are-safer, 2014).

There are different countries in Africa that use natural fibres for weaving, normally dictated by the resources available or the characteristics of the region. However, such resource north of the Sahara desert region differs from those of other African countries especially in West Africa.

Ghana which could also be found in West Africa among other countries occupies a land area of about (238500km) square kilometres, in the African Continent. Ghana is a country located on the Gulf of Guinea only a few degrees north of the Equator, therefore giving it a warm climate (GSS 2010). Some part of the West African Countries, specifically the Northern regions of Ghana and the Ashanti Region are the industrial centres of weaving production that employs directly and indirectly about 25% of the population (Wikipedia, 2014). The new consumer preference of many Ghanaians now depends on imported non-degradable container products and this trend is a source of worry for the economic growth of the country. One way of redeeming this alarming situation is to think of possible ways of improving the durability, functionality and the novelty of natural fibre weaving in Ghana as a practical way of solving this problem. The practical utilization of these available raw materials is what this project seeks to explore to reduce the trend of spending money on imported non-degradable container products.

Apart from West Africa, the South East Africa also produces indigenous weaving vessels or containers using local fibre such as jute, kenaf or sisal fibre.

Although fibres abound in these natural environments, such fibres are treated and used in different ways for different applications depending on their manufacturing process and their end use. Women in *Ukambani*, a semiarid region in the Eastern Province of Kenya, predominantly earn their living by weaving baskets using sisal as a raw material (Natalie 2011). The people of Congo and Bolgatanga (in the Northern part of Ghana) naturally used dried grasses to make hand woven and durable basket for the domestic and external markets (Baskets of Africa 2002-2015). Fibres now found across the African continent which was previously used for local purposes such as the production of basket, hats, etc. has various utilization possibilities and this project seeks to access these possibilities to produce innovative, fashionable accessories to promote and enhance its use for both the local and the external markets.

Interestingly, every community in Ghana is surrounded by different types of plants which have the potential to be used as dyes. Parts of these plants, such as the flowers, leaves, bark, roots and the nuts can be processed to obtain colorants. Natural plants such as Mango, Mahogany, *Nim* tree, among many indigenous plants in Ghana, can be exploited to derive vibrant colours. Adu-Akwaboa (1994), shares the view that natural dyes of various colours can be obtained from many local plants in Ghana and these dyes can be extracted from the barks of trees, leaves, roots, seeds, fruits, flowers, or young shoots

Since time immemorial, natural dyes derived from roots, seeds, leaves, barks and flowers of plants and mineral matter have been used to dye textiles and food, however, and these advantages derived from natural dyes have not been fully exploited in the dyeing industry in Ghana.

Recent disturbing trends in the local weaving industry in Ghana are the introduction of synthetic fibres for varied containers in place of the naturally derived fibres. The advantages of these synthetics were, in general, less expensive as well as more stable and intense in colour than the natural fibre sources. The safety and acceptable use of natural fibres remained controversial and went down drastically. However, synthetic fibres such as the Nylon cords used for weaving though do not run when washed, but fade in colour after a while when they becomes exposed to light.

The manufacture of polyester and other synthetic fibres is energy intensive so is its use as it emits volatile organic compounds, particulate matter and acid gases such as hydrogen chloride, all of which can cause or aggravate respiratory diseases. Currently high import taxes on the ports prevent importers from importing large quantities of these fibres. These and many more, including the increase of fibre price necessitate return to the use of natural fibres to avoid the health implications and frustrations that are associated with the use of synthetic fibres.

In view of the above and the cost coupled with the problems of importing most synthetic fibres and dyes for local use; this research seeks to exploit the possibility of using organic dyed fibres available in Ashanti, Northern and Volta regions of Ghana fibre that are cheaper, readily available and more suitable for the African harsh climatic condition for the design and production of fashion accessories for the local and international market

1.2 Statement of the Problem

Organic dyes, or colourants applied to raffia, cotton, jute, sisal and kenaf fibres are still being practiced in Ghana in the local textile manufacturing industry with the sole aim of making attractive products.

However, the introduction of Synthetic dyed fibres during the late 1800s and 1900s, owing to their colour fastness property drastically reduced interest in the exploration and use of local fibre in most local weaving industries. Though the natural dyed fibres are less harmful, inexpensive and environmentally friendly chemical dyed fibres are used instead. Its use has been extended to the production of mats, fabrics, hats and even our Kente cloth which are sold in the local market.

The essence of this research therefore is to find ways of processing locally available fibres for manufacturing of durable dyed fibres. An innovative way of manufacturing and utilization of natural dyed fibres from local plants will help minimise the use of synthetic fibres and dyes. This will introduce versatility in the artistic setting by educating urban dwellers and local weavers on the processes involved in obtaining and producing naturally dyed fibres from the environment, including the forest reserves.

1.3 Purpose of the Study

The purpose is to design an innovative way of processing organic, natural fibres and dyes for the production of selected fashion accessories by adopting other unconventional weaving techniques.

1.3.1 Specific Objectives

1. To identify some plants from which fibres and dyes can be derived.
2. To ascertain the properties of these relevant plant fibres and dyes for their adoption into other weaving techniques.
3. To Design and utilize macramé techniques and other traditional weaving techniques, for the production of selected fashion accessories.

1.4 Research Questions

An analysis of the purpose of the study indicates that the following research questions will be appropriate.

1. What are some of the natural plants from which fibres and dyes can be manufactured?
2. How can these extracted fibres be dyed to attain colour fastness?
3. How can these manufactured fibres be used to weave selected fashion accessories? (Containers and footwear).

1.5 Significance of the Study

The research provides a baseline data which sets the pace for further research. Moreover, it would:

1. Serve as a reference material for researchers who will want to investigate fibre extraction.

2. Offer employment opportunities for local dyers as they demand for organic dyed fibres

3. Explore and capture some traditional plants from which fibres can be extracted and dyed for fashion accessories.

4. Play a distinctive role in providing beneficial information to the textile industries.
5. Create awareness of unexplored plant fibres and dyes that serve as a reference material to other research works.

1.6 Limitations of the Study

The major setback that the researcher encountered was the difficulty in the language of some of the various study regions. This was because the researcher does not understand the local dialect of some of the study population. The project also suffered transportation set back since some roads leading to selected communities such as *Daboya* and *Keta* were in a deplorable state endangering smooth commuting on such roads.

1.7 Delimitation

The study is limited to exploring the organic, natural plants fibres and colourants within the environment for the manufacture of selected fashion accessories.

The research makes use of organic dyed fibres from targeted weavers from, Ashanti, Northern and Volta regions of Ghana so as to enable the study meet its stated objectives.

The scope of this research is strictly within the framework of the stated objectives. It is an effort to study the use of organic dyes, fibres and weaving techniques from the three regions in Ghana, and producing fashion accessories.

The respondents in this study were the indigenous weavers in the three regions selected for this study and also, views of selected customers and users of the fibre from the various regions.

1.8 Definition of Terms

Adhere	The ability for a dye to stick firmly to a substrate.
Affinity to dye	The ability for a fibre or fabric to attract dye and exhaust it.
Fashion Accessories	Is an item which is used to contribute in a secondary manner to complete an outfit and chosen to specifically complement the wearers look.
Cellulose	Is the main component of plant cell wall and the basic building block for many textiles. In other words, it is a fibre-yielding Substance found in plants.
Dye stuffs	To change the colour of something by using a special liquid. The substance has the ability to change the appearance of a Substance.
Dye Liquor	This is a solution or liquid mixed with colour to enable dyeing.
Fashion Accessories	They are decorative items that supplement one's garment, such as jewellery, handbags, hats, belts, etc.
Float	Loose yarns on the surface of a woven material.
Fibre	These are fine hair-like substances. They can be natural or manufactured.
Fastness	The resistance of a material to change in colour characteristics
Organic dye	They are dyes or colorants derived from plants in vertebrates or minerals.
Techniques	The body of specialized procedure and method used in any soporific field, especially in an area of applied science.
Weaving	It is an ancient method of cloth production in which yarns are interlaced to form a cloth.
Warp	The yarns of the ends that run length wise in a woven fabric.

Weft	Sometimes called the pick, woof, or filling yarn, it is the yarn that runs breadth wise in a woven fabric
Loom	A device or equipment for weaving.
Dye Bath	A solution of dye and water in which fibres and fabrics are dyed.
Dyes	Colorants used to colour fibres and fabric
Light fastness	Is a measure of how resistant a colouring material such as a dye is to fade due to exposure to sunlight.
Spinning	Is the process of making yarn from the fibre.
Tradition	The handing down of beliefs and practices from generations to generation.

1.9 Abbreviation

G.S.S		Ghana statistical service
K. N. U. S. T	-	Kwame Nkrumah University of Science and Technology
C. S. R. P. M	-	Centre for Scientific Research into Plant Medicine
U. G.		University of Ghana
U. E. W.		University of Education, Winneba

1.10 Organisation of the Text

Chapter one is the introduction of the project report. It contains background to the study, a statement of the problem, objectives, research questions, delimitations, limitations, the importance of the study, facilities available, and definition of terms, abbreviations and organisation of texts.

Chapter two is the review of related literature which primarily deals with documented information from various sources on natural overview, Traditional fibre, fibres, fibre of fibres, plant fibre, preparations of fibres, fibre twisting, fibre scouring, weaving, hand weaving structures, weaving mechanism, macramé, finishers.

Chapter three explains the research methodology adopted for the study. It embodies the overview, research design, primary and secondary sources of data, population for the study, sampling, design, data collection instruments (interview and observation) data collection procedures, interpretation and analysis of data.

Chapter four focuses on the identification and description of the sample plants studied, presentation of findings, the experimental procedures followed to ascertain their fibre yielding properties and the ability of dyeing the natural fibres with organic dyes to weave selected fashion accessories.

Chapter five is the presentation of the results of the experiment on plant fibre, plant dyes and weaving to produce the fashion accessories. It also produces the summary, conclusion and Recommendations for improving the fashion industry in Ghana.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

To appropriately analyse the set objectives of the research project, it is relevant to understand some concepts, including the history, technique and production. This was a necessary intellectual preparation to anticipate the knowledge gap and battle the pros and cons for sound analysis. Such related concepts as the Definition of Traditional fibres/Definition of Fibres/properties of fibre/plant fibres/preparation of fibres/fibre scouring and bleaching/fibre dyeing/weaving/weave structures/weaving mechanism/ finishes and many others reviewed to fully enhance the understanding of the thesis.

2.2 Definitions of Traditional fibre / indigenous fibre

According to the Pocket Oxford Dictionary (1994), the word *indigenous* means native or belonging naturally to a place while the Encyclopaedia Britannica (2008) explains the concept as relating to things having originated in and being produced, growing, living, or occurring naturally in a particular region or environment. Traditional on the other hand, according to the 21st Century Dictionary (1996), reflects concepts or items belonging, relating or referring to a place, based on or derived from tradition, but the Encyclopaedia Britannica (2008) refers to anything traditional as an inherited, established, or customary pattern of thought, action, or behaviour (as a religious practice or a social custom) and or a belief or story or a body of beliefs or stories relating to the past that are commonly accepted as historical though not verifiable.

Throughout this thesis, however, the two concepts would be used simultaneously to infer customs, religious beliefs, as well as practices handed down from one generation to another within the three selected regions, relative to the kind of textiles being done.

According to Asante (2005), "traditionally, textiles are made from yarns, which are developed by processing fibre, although many textiles can be made by the direct conversion of fibre". In the indigenous setups, however, textiles are one of the aspects of art by which people's culture is expressed through the use of traditional fabrics. This is very paramount in the Ashanti culture of the Ghana.

Other forms of textiles include the traditional Zulu and Ghanaian dresses stressing on cloths and their designs being peculiar to the designer's tribe and custom influence. As a result, it is notably prominent to find almost every society in Africa to be associated with a peculiar art of textiles. The Yoruba of Nigeria for instance, are noted for their, "Adire" and "Aso Oke"; Raffia cloths of Zaire, "Bogolan", Mud-dyed cloths of Mali and "Pakhamani" of Zulu-South Africa whilst the Ashanti's of Ghana are noted for their weaved Kente cloth. (Clarke, 1997). Likewise, the Northern regions of Ghana are noted for spinning locally grown cotton in Daboya locality. The Ewe's are also well recognized in processing fibres such as *Cyperus Articulates* and many others for local use, Whereas, the Ashanti's are also well-known for processing raffia grown in a village called Apromaase in the region.

2.3 Fibres

Fibre has been used to produce artefacts since ancient times. (Korankye, 2010) defined fibre as fine hair like substances. They may be natural or manufactured and are the smallest components of a textile product.

The term "fibre" or "textile fibre" as defined by the Legal encyclopaedia (2012), means a unit of matter which is capable of being spun into a yarn or made into a fabric by bonding or by interlacing in a variety of methods, including weaving, knitting, braiding, felting, twisting or webbing and which is the basic structural element of textile products.

Bishop and Smith (2004) define fibres as the raw material for any textile product. Dankwa (2001) reiterate that they are thin, flexible, and hairlike, a natural staple substance that ranges in length from a few centimetres to hundreds of metres capable of being twisted into yarns. However, in commerce, “fibres” practically refers to all small, thin, fragments of any substances. These include fibres of mineral origin (asbestos and spun glass) and of animal origin (wool and other animal hair, silk and feathers), as well as plant origin (Bledziki & Gassan, 1999).

Marjory (1986) defines fibre as "any product capable of being woven or otherwise made into fabrics". The World Book Encyclopaedia (2013) has also defined fibre as "the raw material for all fabrics". Fibre thus refers to any material that is capable of undergoing weaving or processing into fabrics. In this regard, the research fibres such as jute, plantain/banana bark, sisal, guinea grass, cotton and raffia would also undergo weaving processes and can therefore be considered as fibres.

In relation to this research project, the identified plant fibres being jute, plantain bark, sisal, guinea grass and raffia considered as raw materials by their flexibility, strength and durability as woven materials, has the potential to be used in the production of fashion accessories such as bag, hat, belt, purses, foot ware, and other products.

2.4 Properties of Fibres

The properties of fibres are the basic characteristics inherent in the materials that make them competent for the production of yarns and other artefacts. According to Dankwa (2001), the properties of fibres are categorized into two - primary and secondary, which are explained as follows:

2.4.1 Primary Properties of Fibres

High-length-width ratio: Fibrous materials must possess adequate staple length greater than the diameter.

Tenacity: It is important for a fibre to possess sufficient strength and durability to be worked with.

Flexibility: The fibre must be bendable, pliable to form yarn without breaking.

Spinning quality: The fibre must have the ability to stick together in yarn manufacturing.

Uniformity: The yarn should be regular, appear smooth, and accept dyestuff and chemical finishing.

2.4.2 Secondary Properties of Fibres

Physical shape: It describes the appearance of the fibre in both macroscopic and microscopic.

Lustre: It is the result of light reflected by fibre and natural brightness or dullness.

Colour: The natural colour of fibres varies from pure white to deep grey, tan and black.

Moisture regain and absorption: Fibres must have a certain amount of water as an integral part of their structure.

Elastic recovery and elongation: This is the amount of stretch that occurs to the point Where fibre breaks.

Resiliency: The ability for a fibre to return to shape after bending or compression.

Flammability: The burning characteristics of fibres".

The properties of fibres mentioned by Marjory give insight into the qualities demanded by a substance to qualify as a textile fibre. There are other properties apart from the primary and the secondary. Among these is the molecular arrangement of fibres, that is, the pattern of molecules arranged within the fibres, which varies widely. It is stated by Marjory (1986) that "The molecules may be highly oriented, meaning that they are parallel to each other and also to the longitudinal axis of the fibre. High orientation is associated with good fibre strength and low elongation"

Fibres of low orientation also mean that the fibre molecules are at various angles to the fibre axis in criss-cross arrangement with one another. This is further associated with bad fibre strength, high elongation, low moisture regain, absorption and flexibility. Moreover, fibre molecules have associative forces, which are the weak spots in the fibre that breaks easily with a twist.

Another one is cross-linking, meaning that the fibre molecules have strong areas, which affect crease resistance and stability.

2.5 Plant Fibres

These are natural fibres that are cellulosic in nature. They have the irregularities and subtleties inherent in natural things. According to Sewing and Knitting (1993), "fibres naturally have qualities that contribute to their beauty such as absorption, porosity to make them responsive to changes in temperature, humidity and comfort to be used in a variety of climate conditions".

In the above report, fibres are capable of having beauty, absorbency and to be responsive to different climatic conditions. In relation to this research, the identified fibres similarly have beauty, absorbency, porosity, and other properties to qualify as fibres.

According to the morphological classification, plant fibres may be divided as follows: Hairs on the seeds or on the inner walls of fruits (each hair is a potential fibre). Among the fibres of commercial importance are cotton and kapok.

Fibres, which are contained in the inner bast tissue or the bark of the stem are flax, ramie, hemp and jute. These are fibres obtained from leaves of plants, especially in the fibro-vascular system of the leaves. Examples are abaca, pineapple, sisal, henequen and palm. Lastly, these are fibres that are obtained from other parts of plants. Examples are coir from the fibrous husks of coconut.

In Ghana, dry plantain bark, corn husk and raffia are plant fibres of some commercial importance. Plantain fibre is obtained from the bark of the plantain stem and should be classified as bast fibre. Corn husk is the leafy cover of the corn seed. This is traditionally used to wrap corn dough to make *Ga kenkey*. Raffia is from the epidermal strip of peeled leaves of the raffia palm and these are also locally used to make costume skirt for traditional priests. These fibres can equally be classified as fibres obtained from leafy plants.

In relation to this research project, it presupposes that raffia, guinea grass, plantain bark, and sisal would be twisted into cords before being used in weaving the fashion accessories.

2.6 Preparations of Fibres

In order for fibres to be efficaciously used, it is more convenient for them to be well prepared before weaving processes are affected. To this effect, Picton (1979) in Dankwa (2001) has stated that, "In Madagascar and most parts of the Zaire Basin, the leaflet of raffia is divided along its midribs, and each half is stripped back separately, while in West Africa on the other hand, the whole raffia leaflet is treated as one".

This is relevant since a similar task of separating the leaflet is practiced at Apromaasi, a raffia production village near Kumasi, and where the raffia used for the research project was obtained. Picton (1979) further states that, "In Zaire Basin a special comb made from palm mid ribs is used on the dried raffia to split them into strands. The fibre is now virtually ready to be mounted on the loom. However, in Madagascar the raffia fibre is further twisted and boiled in an alkaline medium (mixture of wood ash and water) and then twisted at the ends of individual lengths together to form a long continuous length".

The twisted and boiled fibres would be used in the research since this process will strengthen the fibres and make them more durable for weaving.

"Nearly all yarns are twisted as this protects the filaments from damage. The twist is expressed in terms of turns per cm. Direction of twist is described as "S" or "Z" twist.

Even though the above information given specifically concerns textiles fabric production, it has a lot of relevance to the twisting of the selected fibres, since some of them would be twisted in both directions. Also more pressure is exerted to put strengths on the cord.

The Encyclopaedia Britannica (2013) features two relevant processes of rope making. In the first instance, "S" twisted strands are laid together and twisted in a clockwise direction and an opposing "Z"twist is twisted in an anticlockwise direction to form a 'ply rope' by means of the 'S' and 'Z' twists."

An illustration of the twist is shown in Fig.1.

Figure 1: "S" and "Z" yarn twists.

Source: https/www.google.com.gh

2.6.1 Fibre Twisting

Natural fibres can be twisted as follows:

The mechanical means of twisting natural fibres according to Ofori (1995) involves the use of machinery. An example is the raw spinning device developed to process straw by twisting with machinery to enhance the tensile strength of the strands.

Manual twisting of straw by hand is discussed by Baah (2000), that it can be made by the traditional method by using bare hands or twisting on a piece of rubber sole fixed on a table. In this project, fibre twisting is a very important step in the production of the sample fashion accessories. Some of the twisted fibres used, were finished through scouring, bleaching and dyeing.

2.6.2 Fibre Scouring and Bleaching

Scouring and bleaching prepares yarns or fibres for dyeing. According to Majory (1986), "Bleaching is a chemical finish that makes the fibres white, scouring is much like any washing process which removes foreign matter that may be present as wax, dirt and processing oils".

The scouring does not only remove the foreign materials, but opens up the molecules of the fibres to be whitened and also increase its affinity to dyes. In the same vain some of the yarns to be produced, would be twisted, scoured and bleached before they are dyed.

2.6.3 Fibre Dyeing

Picton (1979) stated that in Madagascar and Nigeria, raffia yarns are dyed with indigo before they are woven. According to this author, the dyes are obtained from several Plants of genus *indigo fera.* This also acts as a mordant serving to fix the dye colour in the yarn. Picton's description implies that the raffia fibres or yarns are dyed before twisting into yarns or woven into cloth. This procedure was adopted to treat the yarns used in the project. In this case, organic dyes were used to colour the yarns before weaving them into the sample fashion accessories.

2.7 Weaving

Weaving is a method of fabric construction. From the new Encyclopaedia Britannia (1968), weaving is defined as, "The production of fabric by interlacing two sets of yarns so that they cross each other normally at right angles. It is usually accomplished with a hand or operated loom". It is evident in the quotation that weaving is the interlacing of yarns from plain, twill, and satin and other weave variations. These weaves are mostly produced on power looms such as the Jacquard, Dobby, Leno, and handlooms. Weave structures can be varied by re-arranging the pattern in which warp and weft are made to intersect. There are three basic weaves - the plain, twill and satin

The illustration on the Satin draft and weave structure are shown in Figs. 6 and 7.

The Reader's Digest describes the plain weave as the simplest of all the weaves in its weave structure. Twills are, however, more durable than the plain weave because it has a closer setting, greater weight and better draping quality. The satin weave produces strong, rich looking and lustrous weave. Illustrations on the draft and weave structure are shown in Figs 5 and 6 below.

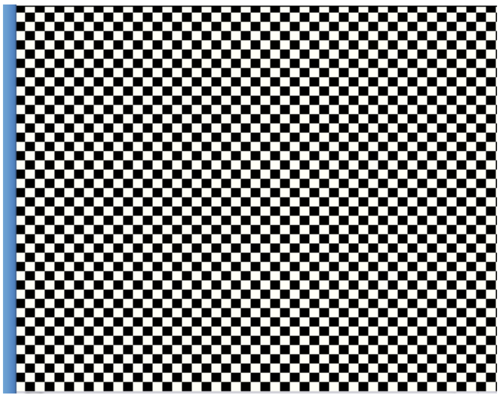


Figure 2: Draft of plain weaves

Source: https/www.google.com.gh

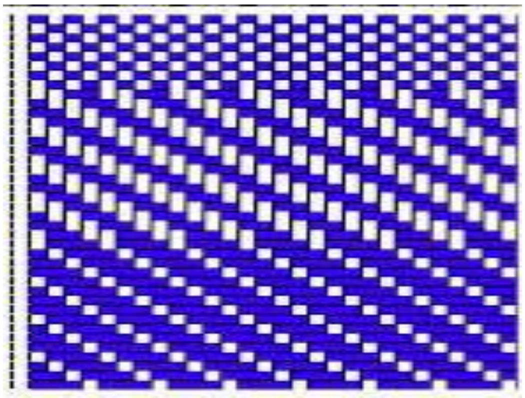


Figure 3: Plain weave structure

Source: https/www.google.com.gh

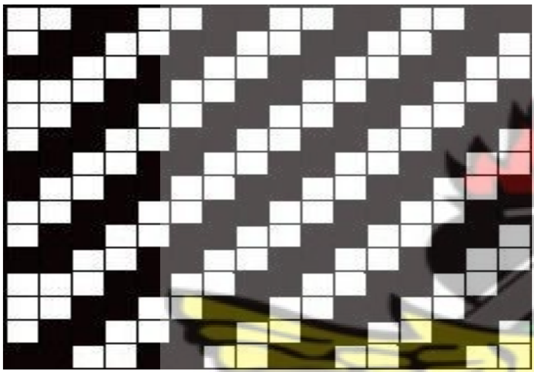


Figure 4: Draft of twill weave.

Source: https/www.google.com.gh

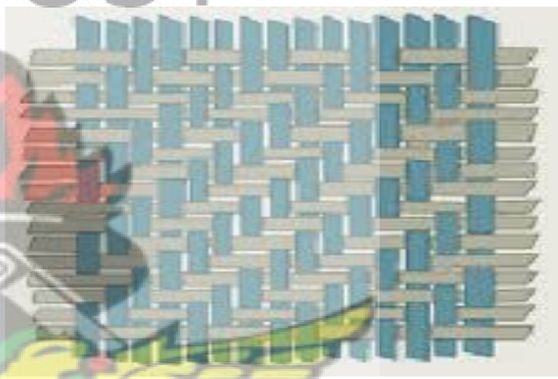


Figure 5: Twill weaves structure

Source: https/www.google.com.gh

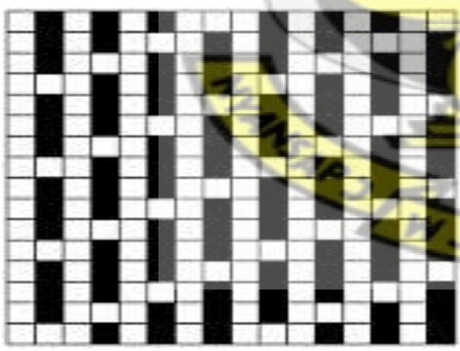


Figure 6: Draft of satin weave.

Source: https/www.google.com.gh

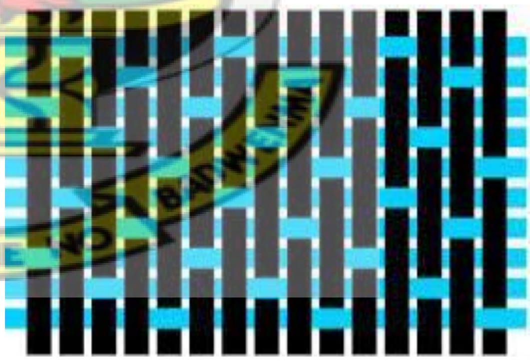


Figure 7: Satin weave structure

Source: https/www.google.com.gh

This primary motion in weaving was applied in the project. The author further states that, these motions are responsible for the interlacing of weft and warp yarns. The primary motions in weaving comprise the shedding, picking, and beat-up motions, which are the same for all looms. He further explained them as follows:

'The shedding motion: This is responsible for the separation of the warp yarns into two sets to be raised and lowered alternately to form a shed through which the weft passes. The picking motion: The main function of this is to propel weft yarns to pass through the opened shed. The beating-up motions: This motion is responsible for the beating or forcing the weft yarns to be closer to each other and be more compact.'

2.7.1 Hand Weaving

This is the means by which yarns are interlaced by hand. Hand weaving is done in most parts of West Africa, notably Ghana, Ethiopia and Zaire, where weaving is done mostly by men. However, in Berber North Africa and Madagascar, women do all the weaving. There are different methods of hand weaving: One method of hand weaving is the foot strap, hand weaving that uses raffia, cotton and other threads. The shedding device of this foot strap, hand loom is composed of a single-handle and counter shedding, which are affected by means of a shed stick that enables the weaver to separate the warps into two groups for weaving to be done.

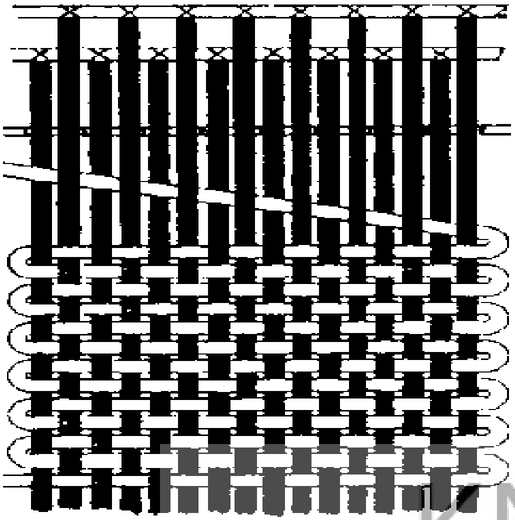


Figure 8a: Linear weaving on one cardboard

Source: https/www.google.com.gh

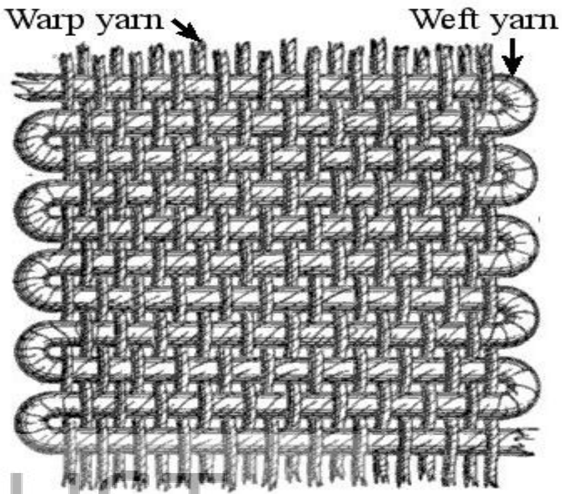


Figure. 8b: Linear weaving of a Side of bag opening

Source: https/www.google.com.gh

According to Simpson and Weir (1963), in producing a linear weaving, holes are pierced through the top and bottom of the cardboard, and the warp, which carries the raffia from the top passed through the holes in the back. From the bottom the raffia is passed through the holes and drawn up to the top, from where it is taken again through and back. The weaving on the cardboard proceeds to the top as illustrated in fig 8a and 8b.

Fig.8b, round the cardboard to the bottom up and back to until the entire cardboard is covered on both sides. In this case, care must be exercised not to pull the weft too tightly otherwise the opening at the top of the bag will be pulled out. On the other hand, hand weaving on cardboard is also done in a circular fashion. In Figures 9a and 9b, a circle measuring 1.5 cm in diameter from the outer edge is drawn and on this, an odd number of holes are made using a pair of compasses as Fig.9a and Fig.9b. Holes are pierced through the board as shown in Fig. 8b. Weaving starts at the center and leaves an end to be threaded into the work when weaving is complete. Apart from weaving only on one side as shown in Fig.9b, weaving can equally be done.

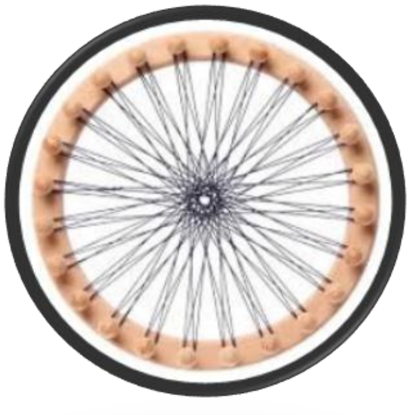


Fig.9a. Circular weaving on both Sides of cardboard

Source: https/www.google.com.gh

Fig.9b. Circular weaving on one side of cardboard

Source: https/www.google.com.gh

Simpson and Weir (1963) have claimed that, circular raffia mats are useful as tea pot stands, lunch mats, and for placing flower vases which are sometimes slightly porous and might mark the top of the tables. These mats may be done in two ways:

- ✓ By weaving on both sides of the cardboard foundation, leaving the inside.
- ✓ By weaving on one side only, the cardboard is removed when finished.

Although holes are pierced on cardboard for both the linear and circular weaving on cardboard, in the case of this research, the fibres would rather be sewn onto the cardboard before weaving is done.

Lastly, the use of a wooden weaving frame (Plate.1) is another method by which raffia is handwoven. Here, the end of the warp may be attached by means of a nail or drawing pin or tied round the frame before weaving is affected. The hand wooden frame technique would be used to produce sample artefacts. This is simple and relatively cheap to use.

Figure 10: Wooden weaving frame.

Source: https/www.google.com.gh

The foot straps handloom could also be used for the weaving fabrics that could be incorporated in the production of some of the fashion accessories. This is what the researcher has attempted to do. Ideas on the cardboard method and the hand wooden frame would be used since they are simple and relatively cheap when used for the production of the sample accessories.

2.7.2 Weave Structures

The structure or the patterns of weaves are determined by the manner in which groups of warp yarns are raised or lowered by the harnesses of the loom to permit the insertion of the filling yarns. Weave structures can create varying degrees of durability in a particular woven material, adding to their usefulness and also to their appearance. Corbman (1983) identifies three basic weaves which are very common in the majority of woven materials. Such weaves are plain weave, twill weave and satin weave, with some variations.

2.7.3 The Plain weave

Corbman (1983) explains plain weave as the simplest type of weave structure and consequently inexpensive to produce. On the loom the plain weave requires only two harnesses. Each filling yarn goes across the width of the woven material. On its return, the yarn alternates the pattern of interlacing. If the yarns are close together, the plain weave will have a high yarn count and the material woven would be firm. The appearance of the plain weave may be varied by differences in the closeness of the weave, by the different thickness of yarn, or by the use of contrasting colours in the warp and filling. Collier (1980) similarly says plain weave is woven on the one up, one down principle and the weft yarn passes over one end, under the next, and over the next end. According to Collier, this principle is repeated in the next pick, but the position of the ends is reversed so that different warp yarns are seen on the surface of the woven material. Tortora and Collier (1997) explain plain weave as the interlacing of warp and filling yams in a pattern of over one and under one manner. According to Tortora and Collier (P.22), the plain weave is constructed this way:

The filling yarn moves over the first warp yarn, under the second, over the third, under the fourth, and so on. In the next row, the third filling yarn goes under the first warp yarn, over the second, under the third and so on. In the third row, the filling moves over the first warp, under the second.

Tortora and Collier (1997) explain that decorative effects can be achieved by using novelty yarns or yarns of different colours. Corbman (1983) and Tortora and Collier (1997) share similar views on the principles of plain weave which is creating over-one warp and under-one warp yarn principle. Kadolph (2007) also says plain weave formed from yarns at right angles passes alternately over and under each other.

Like Corbman (1983), Kadolph says the plain weave requires only a two-harness 100m. The plain weave may be described as one harness down one harness up. The one up, one down describes the position of the harness when forming the shed. In plain weave, all odd-numbered filling yarns have the same interlacing pattern as the first filling yarn, and all even-numbered filling yarns have the same interlacing pattern as the second filling yarn.

2.7.4 Characteristics of the plain weave

Kadolph (2007) mentions some characteristics of plain weave as having no technical face or back due to the weave, many interlacing per square inch; it wrinkles easily and is less absorbent than other weaves. However, Kadolph maintains that interesting effects can be achieved by varying fibre types or by using novelty or textured yarns mentioned by Tortora and Collier (1997), other effects can also be achieved by using yarns of different sizes, high or low-twist yarns, filament or staple yarns and finishes.

2.7.5 Twill Weave

The second type of basic weave is the twill weave and is produced when the weft yarns interlace more than one warp yarn but never more than four, the reason being that strength is required in this type of weave. On each successive line, or pick, the filling yarn moves the design one step to the right or to the left, forming a diagonal line (Corbman, 1983). Similarly, Kadolph (2007) also explains twill weave as a process where each warp or filling yarn floats across two or more filling or warp yarns with a progression of interlacing by one to the right or left, forming a distinct diagonal line.

There are a number of types of twill weave. All use the same principle of crossing more than one yarn at a regular, even progression. Description of twills may be made in terms of the pattern of warp yarns crossing filling yarns. The description of twill weave is notated as 2/2, 2/1, 3/2 and many others. The first digit refers to the number of filling yarns crossed over by the warp and the second digit to the number of filling yarns the warp pass under before returning to cross the filling again.

Tortora and Collier (1997) identify types of twill weaves as: even-sided twill, where the yarns cross over and under the same number of yarns and uneven twill, where warp yarns pass over a larger or smaller number of filling yarns than they pass under the warp yarn. Warp-faced twill, according to Tortora and Collier, has a predominance of warp yarns on the surface of the woven material, with patterns of 2.1.1, 3.1.1, 3.2. Filling-faced twill is also described by Tortora and Collier as having, the predominance of filling yams on the surface of the material.

Tortora and Collier (1997) have analysed the angles of the twill weave based on the manner in which the yarns interlace and say that when the face of a twill woven material is examined, the diagonal of the walls are seen to move at a more or less steep angle, and the steepness of the angle is dependent on two factors in the construction of the material. Thus the number of warp yarns per inch of the woven material and the number of steps between movements of yarns when they interlace. The more warp yarn in the construction, the steeper the angle of the wale, provided that the number of filling yarns per inch remains the same. When the steepness of the angle is the result of the close spacing of warp yarns, the steeper angles may indicate a good strength, and if the angle the walls make with the filling yarn is about 45, the woven material is classified as a regular twill and weaves with higher angles are steep twill, and those with smaller angles classified as reclining twills (Tortora and Collier, 1997).

2.7.6 Characteristics of twill weave

In identifying certain characteristics of the twill weave, Kadolph (2007) says that twill woven materials have a technical face and technical back, the technical face being the side of the woven material with the most pronounced wall. This type of weave is more durable and attractive. Again twill woven material has no up and down as they are woven.

Because a twill surface has an interesting texture and design, printed twills are much less common than printed plain weaves. Twill weaves are often used for sturdy work or durable upholstery because soils and stains are less noticeable on the twill weaves.

2.7.7 Satin Weave

The third type of basic weave is the satin weave which is similar to the twill weave, but generally it may use as many as five to twelve harnesses for its construction. The satin weave may have two faces, warp-face or filling face construction. Warp faced satin weave construction is done such that the warp yarns are seen on the surface of the woven material. For example, in a five-harness example sateen/satin construction, the warp passes over four weft yarns and under one weft yarn. The warp always lies on the surface and interlaces only one weft yarn at a time.

Long floats of warp yarns are seen on the surface of the woven material (Corbman, 1983). Tortora and Collier (1987) also explain satin weave similar to Corbman's as a process of allowing yarn to float over a number of yarns from the opposite direction. Interlacing of yarns is made at intervals such as over four weft yarns under one weft yarn when using five.

2.7.8 Weaving Mechanism

In any type of weaving on the broadloom, four basic mechanisms or operations are involved: shedding, picking, beating-up (battening), taking-up and letting-off (Corbman, 1983). The shedding mechanism is responsible for raising specific warp yarns by means of the harness or handle frame, while the picking operation is to insert filling yarns through the shed. The beating up operation pushes the filling yarns firmly in place by means of the reed. The woven material needs to be wound around a beam. The mechanism responsible for such an operation is the take-up and letting-off motion with the release of the warp yarns from the warp beam (Corbman, 1983). The discussion suggests that most of the authors reviewed have similar principles in constructing the plain and the twill weaves. That is one weft yarn moving over and under one warp yarn. Moreover, to the authors' different plain and weave effects can be achieved by using different yarns and different sizes of yarns. Basketry products can also be done in any environment because materials can be found everywhere.

2.8 Macramé

According to Brown (2002), Macramé is all about knots. It is the art of making things out of knots, things with lanterns. The knots are yarn-based. Macramé is a species of lace work.

Available literature gives various definitions of macramé yet there is a consensus on the terms as representing ways of creating a variety of intricate patterns and forms with knots.

Lampton (1924) defines macramé as the art of knot tying and a creative and satisfying mode that permits one to find personal expression in a work of art.

Walker-Philips (1970) defines macramé as the inter-knotting of yarns to create a variety of forms. Besides describing and demonstrating possibility in creative knotting, the author also includes a description of the cavandoli stitch, a closely worked technique that combines two colours of horizontal and vertical double half hitch knots.

Meilach (1972) who interprets macramé as a creative design in knotting also cites the use of knotting techniques in the production of items like clothing, jewellery, bags, wall hangings, table mats or combined with other art forms such as sculpture, textile, ceramics, glass and leather for decorative purposes.

Pesch (1976) describes macramé as one of the most versatile and potentially exciting art forms, The author provides detailed information on ways of fusing macramé with other processes like wrapping, coiling, weaving, crocheting and knitting.

Blake and Fisher, (1973) describe macramé as knot with decorative purpose. This definition is similar to Westland's (1974) interpretation of macramé as the art of creative and decorative knotting. Westland further describes possibilities in adapting various knotting processes for making macramé belts, pendants, chains, mats, wall hangings and chairs.

Cobblah (1994) provides an illustrative description of macramé sculpture, a technique that combines yarns with other media to create weaving in the round.

Chapman (1978) describes macramé as an elaborate form of knot tying which originated as a decoration for the fringes of woven materials.

The reader's digest association (1981) also describes macramé as the art of ornamental knotting. The digest also describes the cavandoli stitch as a unique means of creating pictures with knots.

All the author cited above agree on a loose definition of macramé as an art form that utilize natural and synthetic yarns that readily yield to knotting in various forms and combination.

2.9 Finishes

Finishing is treatment given to fibres, yarns and fabrics. This is applied before, during or after construction of the design. According to Sewing and Knitting (1993), finishes are classified into functional and decorative finishes.

The functional finishes are as follows: antibacterial: Resists many types of bacteria, including those in perspiration.

Flame resistant: Does not actively support a flame.

Mothproof: Resists attacks by moths.

The decorative finishes are further divided into colour, printing and texture. These are also as follows:

Colour finishes

Bleaching: This removes colour and staining to make fabric, yarn and fibre white. Fibre dyeing: Natural fibres are dyed before spinning into yarn. Yarn (skein) dyeing: It permits penetration of dye into yarn.

Printing finishes

Screen printing: The dye is forced through screens to print the design on a fabric.

Transfer printing: Design is first printed on paper, and then transferred to fabric by mean of heat and pressure.

Transfer finishes

Glazing: It is the application of starch or glue to give fabric sheen.

Napping: The process in which the surface of the fabric is brushed to raise the fibre ends.

According to this source, functional finishes make fibre, yarn fabrics and more versatile for use while decorative finishes make them a pleasure to see and feel. In line with the objectives of the research, the research yarns and strips used in the project were bleached and dyed before they were used to produce the sample fashion accessories.

In this thesis the colour finish technique was employed to beautify the fibres used for the fashion accessories.

CHAPTER THREE

METHODOLOGY

3.1 Overview

This chapter enumerates the various methods adopted by the researcher in probing for the needed information about the project. There are numerous approaches to research, taking into consideration the methodology. However, in this thesis, the following was adhered to. These include the Research, Design, Library Research, Population for the Study, Sampling out of which a sample was selected, Instrumentation or Research tools, Validation of the instruments, Administration of the Instruments, Primary and Secondary sources of data, Data collection procedures and Data analysis plan.

3.2 Research Design

A research design allows the researcher to meet the rationale behind the research. A research design refers to the overall plan adopted by the research to obtain answers to the research questions and for testing the hypothesis formulated (Agyedu, et al 2007).

Generally, two major research designs are available. These are the quantitative and qualitative methods. The choice of any of these designs is necessitated by a number of factors with the ultimate being the characteristics of the variables or population being used or studied. In this thesis, the qualitative approach is largely considered because social as well as cultural phenomena are being studied. This was employed because of its systematic approach in unravelling certain truths as regards events and phenomena. According to Jacob (1988) a qualitative research is a generic term for investigative methodologies described as ethnographic, naturalistic, anthropological, field or participant observer research. Leedy & Ormrod (2005), indicate that qualitative research is a systematic process of describing, analysing and interpreting insights discovered in everyday life. According to Eisner (1991), qualitative research is the search for qualities, the characteristics of our experiences which we translate in qualities through our chosen representation, form and conceptual outlook. Qualitative research emphasizes the importance of looking at variables in their natural setting and how they interact. In a qualitative research, the interviewer forms an integral part of the investigation Tettehfio (2009). This, however, differs from quantitative research which attempts to gather data by objective methods to provide information about relations, comparisons and predictions; and attempts to remove the investigator from the investigation.

Leedy and Ormrod (2005) assets that to answer some questions in qualitative research, we must dig deep to get a complete understanding of the phenomenon we are studying; thus qualitative research provides an opportunity to collect numerous forms of data and examine them from various angles to construct a rich and meaningful picture of a complex, multifaceted situation. It also focuses on the phenomena that occur in the natural setting and further has the ability to interpret and make sense of what it reveals in order to understand it. Lincoln and Guba (1988) and Stake (1988) also refer to qualitative research as a naturalistic inquiry, which is a careful study of human activity in its natural and complex state. It is the appropriate research method for collecting detailed data on sources of natural fibres from the local environment and experimenting with their extraction and use as resources for the production of fashion accessories.

According to Korankye (2010), the characteristics of qualitative research are:

1. The natural setting is the direct source of data and the researcher is the key instrument in the qualitative research. This means that the qualitative researchers go directly to the particular setting in which they are interested to observe and collect data

2. Qualitative data are collected in the form of words or pictures rather than numbers. These includes: transcript, field notes, and photographs, audio and video tapes.

3. Qualitative researchers are concerned with the process as well as the product, thus the researchers are especially interested in how things occur.

4. Qualitative researchers tend to analyse their data inductively and tend to "play it as it goes". This means they do not usually formulate a hypothesis before they seek to test it out. They spend much time collecting their data before deciding what the important questions to consider are.

5. Qualitative researchers are also concerned with how people make sense out of their lives. They focus on the perspectives of the subjects of a study, what they are thinking and why they think so.

Best (1981) contends that the qualitative studies or research, is the type in which the description of observation is not ordinarily expressed in quantitative terms but usually based on quality rather than quantity. Thus, qualitative research is cautious, being a systematic process of describing, analysing, and interpreting results discovered in the environment. In this study, natural materials were explored and experimented on as a means to understand the nature of fibre and dye-yielding properties of the identified plants and how the extracted fibre and dyes could be used in manufacturing fashion accessories. According to Kaplan and Maxwell (1994), the goal of understanding a phenomenon from the point of view of the participants in its particular social and institutional context is largely lost when textual data are quantified. Opoku (2005) on the other hand states that "any serious research must have a carefully-thought-out design before data are collected otherwise precious time and effort can be wasted". This thesis focuses on variables from different social and cultural backgrounds. Their reaction to the environment is thus expected to differ even though similar facilities may be inherent in those environments. The location of these communities will adversely influence the kind of fibres which can be obtained and the kind of weaving technique which can be used to weave the fashion accessories.

3.2.1 Quasi - Experimental research method

According to Leedy and Ormrod (2005) when quasi-experiment is conducted the researcher has no control over any variables and therefore whatever result that comes out should be considered. This research method was used by the researcher to find out either it is possible or not to use local fibre materials on the loom and to produce fashion accessories.

3.2.2 Descriptive research method

The descriptive research method, according to Leedy and Ormrod (2005), helps the researcher to identify particular qualities or features of something which is being observed by the researcher. The researcher used the descriptive method to describe the tools, various processes for the preparation of materials and procedures for weaving the structures of the fashion accessories.

3.3 Field Research Conducted

In order for the researcher to know the kind of fibre to use and products to weave, and to study different weave structures and materials used for weaving on the loom and off loom, visits were made to places where off-loom weaving, such as macramé and weaving on the loom are carried out. The researcher also spoke to and observed individual basket makers and sellers in the Kumasi Metropolis and Bolgatanga basket sellers at Adum near Babobazar. At this place the researcher identified materials such as guinea straw for basketry at the site and examined the various ways of processing the material for the products. The researcher was shown finished basketry products and their uses. The researcher interviewed mat weave makers in the Volta region on the types of materials used for production of their mat. Materials such as the *Cyperus Articularus* as well as processes of production were explained to the researcher. Apart from the basket makers located in the Kumasi Metropolis, the researcher visited individual basket makers located at Kenyase Abrem, Okyerekrom, Fumesua and Sekyere in the Sekyere East District in Ashanti about the materials they use for their products.

3.4 Population of the study

The main Target and Accessible population for this thesis constitutes three selected regions. These are purposefully selected and they include the Ashanti, Volta and Northern regions of Ghana. These regions were chosen because they are considered the famous textile regions of Ghana. Adomako (1995, 1997) and Tettehfio (2009) noted that, alongside the production of woven, printed and dyed imported fabrics, the indigenous textile industries are still producing dyed and printed fabrics such as *birisi, kobene*, *kuntunkuni*, *ntiamu* or *adinkra,* especially in the Ashanti. Woven fabrics such as Kente in Ashanti and *kete* in the Volta regions and *fugu* in the northern sections of the country are the well-known indigenous textiles of Ghana. These assertions justify the researcher's choice of these three regions for the research. They are thus considered the three most popular textile regions of Ghana. From the selected regions, textile artisans comprising indigenous weavers, dyers and printers constitute the accessible population. Other constituents of the population are selected students and lecturers of fibres and fabrics and textiles from the KNUST, selected experts from selected Textile Training Centres, Polytechnics and Universities.

In the Volta region, textile communities include Agbozume in the Ketu-South district, Anlo-Afiadenyigba in the Keta district and Agotime-Kpetoe in the Adaku-Anyigbe district. These are predominantly weaving communities. In the Ashanti region, Bonwire, Adanwomase and Ntonso, all in the Kwabre-East district was visited. Other centres within the Ashanti region include Asokwa, Apromaase and the Centre for National Culture (CNC) in the Kumasi district. In the Northern region, textile centres in Tamale, Bolgatanga and Daboya were visited. In the Ashanti region, however, Bonwire and Adanwomase form the nucleus of indigenous Kente weaving, then Apromaase is noted for raffia extraction whilst Ntonso and Asokwa are noted for Adinkra printing, kuntunkuni, nwomu and ntiamu techniques of indigenous dyeing and printing. The Kumasi Centre for National Culture is the core of the region‟s culture and as such all the three indigenous textile techniques under consideration are being practised there.

3.5 Sampling

The purposive sampling method was employed to select indigenous weavers and dyers (Leedy and Ormrod, 2005) and dealers in woven product in the three selected regions, where samples were obtained as research respondents. This enabled the researcher to select specific places where weavers could be located and the identified plants obtained for the research.

Generally, the population that a researcher target may be too large or big to effectively control its variables. In such instance, a sampling technique is employed from which a sample is selected. The sampling technique employed and sample selected is usually influenced by the type of population being studied. Due to the heterogeneous nature of the population, the accessible population was sampled by simple randomized stratification.

3.6 Data Collection Instruments

The instruments used by the researcher were interview and observation. These instruments were used to obtain the necessary data from respondents concerning local fibres, preparation of plant for fibres and weaving, weave structures and techniques for the production fashion accessories.

According to Leedy and Ormrod (2005), there are common tools of research that the majority of researchers regardless of the field of enquiry use. These are the library and its resources, the computer and its software, techniques of measurement, the human mind and language. Qualitative research allows the use of interview, observation, visual recordings and photographs to collect data. The authors say that in any single study, qualitative researchers generally use multiple forms of data obtained through observation, interview, objects, written documents, audio-visual materials, electronic documents such as e-mail and websites. The research should, however, record any potentially useful data thoroughly, accurately and systematically using field notes, audio tapes, sketches, photographs or any suitable means. Thus, the kind of data a researcher collects tends to be descriptive or narrative. The data collected engages activities that seek to answer questions.

3.6.1 Interview

Interviewing is the careful asking of relevant questions of selected individuals. It is an important way for a researcher to check, verify or refute impressions gained through observation. The method provides a means to gain information about things that cannot be observed directly (Fraenkel and Wallen, 1993). Interview involves the researcher gathering data directly from others through face-to-face or telephone contact. The interview is superior to other methods of data gathering devices. After the researcher gain rapport or establishes a friendly relationship with the subject, certain types of information an individual might be reluctant to put into writing may be obtained.

An interview is a technique that the researcher used to collect data which involves questioning individuals or groups of respondents orally Corlien (2003). In this study the unstructured interview technique was used. This was important because apart from observation, it was another valuable means for the researcher to collect data for the study. Apart from the discussions that were facilitated by the researcher's interview guide, the answers provided by the respondents led to new information that was beneficial to the study. The researcher conducted the interviews with respondents in all the places visited for the study using a digital camera for taking pictures and tape recorder for recording the interview conducted with respondents. To create conducive atmosphere for the study, respondents were given the chance to express themselves in English and their local dialect.

The researcher employed the informal interview technique in collecting data on existing knowledge of plant fibre and how they are produced. Individuals with expertise on fibre extraction, dyeing and weaving were also consulted, as well as indigenous dyers at Ntonso who willingly provided important information concerning dye yielding plants that they use.

3.6.2 Observation

Observation underlines all research; it plays a particularly important part in the survey procedure. Experimentation is simply an observation under controlled conditions. Observation is a more natural way of gathering data. Data collection through observation may yield more real and true data than by any other method. Best (1981) states that observation has been a prevailing method of inquiry and continues to be a character for all research, be it experimental, historical or ethnographic. As a scientific tool, observation may range from the most casual to the most scientific and precise, involving modern mechanical and electronic means (Sidhu, 1984:158). The degree of observer participation can, however, vary considerably. In its simplest form, observation consists of measuring and counting material objects as used in this project. Thus, observation was a key factor in gathering data through direct examination.

According to Corlien (2003), observation is a technique that involves systematically selecting, watching and recording behaviour and characteristics of living beings, objects or phenomena (p. 145). At the various weaving centres, the researcher observed different weave structures on the loom and the processes of achieving those weave structures. The materials used on the looms were also identified. At the basket making centres, materials and methods for basketry of different types were also identified. The researcher documented these activities, using the camera and tape recorder.

3.7 Data Collection Procedure

According to Creswell (1994) and Miles and Huberman (1994), the main aim of qualitative research is to select informants or documents or visual images who or that will best answer the research questions or meet the objectives of the study. Hence, the researcher must be present in a setting where the research will take place so that he or she can observe the actors (who will be observed or interviewed), the events (what the actors will do), and the processes (the evolving nature of the event undertaken by the actors within the setting) on which data is to be collected. In this study, field work involved visits to some local textile weavers, the KNUST Botanical Gardens, University of Ghana Botanical Department, the CSRPM Herbarium, and the Kumasi Centre for National culture to observe the relevant raw plant materials and fibre colourants. Additionally, the informal interview with the respondents enabled the researcher to ask follow-up questions to obtain more clarification on the data obtained on the raw materials, fibres, dyes and weaving techniques.

3.7.1 Samples of plant yielding fibres

Samples of eleven fibre-yielding plants were collected through assisted visits to the three regions of Ghana, sorted and photographed before the extraction process. This enabled correct identification and classification. The researcher's interest in the listed plants was strictly to obtain their fibre yielding properties; however, the fact could not be over-ruled entirely that, these plants listed below have medicinal properties other than their functional values. A discussion of this appears in the subsequent chapter. Plates 1-11 are illustrations of the plants that were used in the experiment.

Plate 1: Raffia Palm (Raphia farinifera arecaceae)
Source: https/www.google.com.gh

Plate 2: Jute Plant (*Corchorus oltorius*)

Source: https/www.google.com.gh

Plate 3: Sisal Plant (*Agave sisalana*)

Source: https/www.google.com.gh

Plate 4: Cyperus reed (*Cyperus articulatus*)

Source: https/www.google.com.gh

Plate 5: Guinea grass (*Veta vera*)

Source: https/www.google.com.gh

Plate 6: Plantain (*Musa paradisiaca*)

Source: https/www.google.com.gh

Plate 7: Corn Plant (*Zea mays*)

Source: https/www.google.com.gh

Plate 8: Spear Grass (*Imperata cvlindrica*)

Source: https/www.google.com.gh

Plate 9: African fan palm (*Borassusaethiopum*)

Source: https/www.google.com.gh

Plate 10: Wild date palm (*Phoenix reclinata*)

Source: https/www.google.com.gh

Plate 11: Cat - tail (*Typhadomingensis*)

Source: https/www.google.com.gh

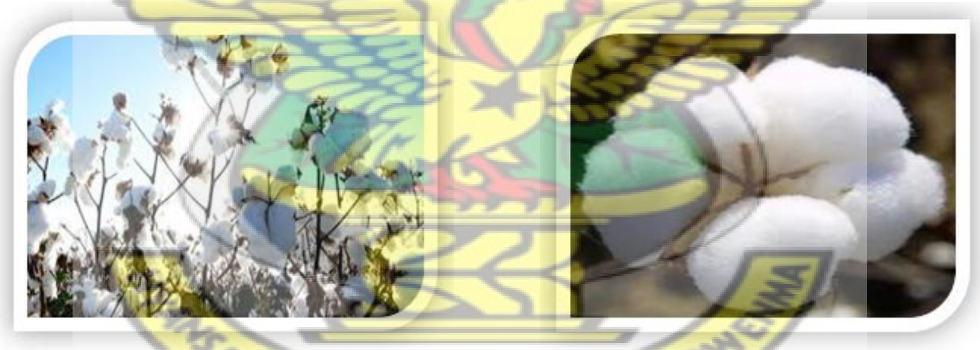


Plate 12: Cotton (*Gossypium hirsutum*)

Source: https/www.google.com.gh

3.7.2 Extraction of the fibres from identified plants

Fibres produced from natural materials are processed mainly by mechanical ways like beating, crushing, or steeping in water. In extracting plant fibres under art studio conditions, it is advisable to wash all the stem, root, seed, fruit and leaf samples first, before the extraction process begins.

The plants from which fibres were extracted in the experiments and their local and botanical names were outlined as follows. (See Table 1) For the purpose of easy identification of each plant sample, a coding system of labelling based on the first letters of the botanical names of the plants was adopted. This helped in sorting, describing and recording fibre changes that occurred in the fibre extraction and dye samples during the extraction process within the predetermined duration of the experiment.

Table 1 Botanical and local names of plant used for fibre extraction

NAME OF PLANT	BOTANICAL NAME	LOCAL NAME	CODE
African fan palm	Borssusaethiopum	*"Mmaakube"* (Akan), "*Agotsi*" (Ewe)	Ba
Cat tail	Typhadomingensis	*"Avu" (Ewe), "Vaa" (Dangme)*	Ty
Cotton	Gossypium hirsutum	*"Asaawa"* (Akan), "*Gumdi"* (Dagomba), "*Detifu"* (Ewe)	Gh
Corn	Zea mays	*"Aburo hono"* (Akan),"*Eblitso"* (Ewe),"*Agoboba"* (Dangme)	Zm
Plantain	Musa paradisciaca	"*Borodoba"* (Akan), "*Blabzo"* (Ewe), "*Mudaa"* (Dangme)	Mp
Guinea grass	Vita vera	*"Kenkaa-hi"* (Frafra), "*Nkyenkyenna"* (Akan), "*Betso"* (Ewe)	Vv
Cyperus reed	Cyperus articulates	*"Kyakya"* (Akan), "*Keti"* (Ewe), "*Jiiji"* (Hausa)	Ca
Raffia	Raphia farinifera	*"Abobe"* (Akan), "*Tlati"* (Ewe, "*Hlowetso"* (Dagbani)	Rf
Jute	Corchurus olitorius	*"Petekuku"* (Ewe), "*Duakankan"* (Akan), "*Dekaobir"* (Dagaari)	Co
Sisal	Agave sisalana	*"Atagbi"* (Ewe), "*Kotuketrema"* (Akan)	As
Wild date palm	Phoenix reclinata	*"Ayede"* (Ewe), "*Nkeresia"* (Akan)	Pr

3.7.3 Tools and Equipment used for the fibre extractions

The following are the list of equipment needed for the experiment and a brief explanation of their use.

i. Cutlass- was used to cut the bark and branches of the plant which was used for dye extraction it was also used to cut the sisal plant for extraction.
ii. Mortar and pestle- was used to pound the bark of the plant into powdered form before soaking it for extraction.
iii. Gas cooker- This was used as the source of heat for heating dyes for dyeing the fibres.
iv. Weighing balance- was used for obtaining correct quantities of ground plant as needed in the recipe.
v. Plastic bowl- The plastic bowl was used for washing the fibres and straining the liquid off the dyestuff in the dye bath
vi. Hand Gloves – A pair of gloves was used to protect the hands from touching the chemicals in the dyes used to colour the fibres.
vii. Plastic comb – An ordinary plastic comb was used to comb the sisal fibres after beating and washing to remove the outer tissues remaining in the fibre as well as broken fibres that were not needed.
viii. Beating stick – This was a cylindrical wooden tool prepared by the researcher for beating the sisal plant to tease out the fibre.
ix. Beating board – It is a wooden board with 30cm by 30cm square. It was used along with the mallet for the preparation of the sisal fibres.
x. Gas cylinder – supplied liquefied petroleum gas to the gas cooker for boiling and heating dyes for the hot dyeing operations involved in the research.
xi. Kitchen knife – It was used to cut the guinea straw and the dry raffia leaves.

xii. Sewing Machine – It was used to sew the lining of the bags and also used to join the woven Volta straw to the leather fabric.

xiii. Scissors- It was used to trim and cut the ends of the fibres whiles weaving. It also aids in cutting out of the lining.

3.7.4 Flower stalks of Guinea grass (*Veta vera)*

Veta vera is a perennial, tufted grass with a short creeping rhizome. The stem of this robust grass can reach a height of up to 2cm.The leaf sheaths are found at the base of the stem and are covered in fine hairs. The leaf blades are up to 35mm wide and taper to a long fine point. The inflorescence is a large multi-branched, open panicle with loose, flexuous branches. The lower branches of the inflorescence are arranged in a whorl. Guinea grass prefers fertile soil and is well adapted to a wide variety of conditions. It grows especially in shaded, damp areas under trees and shrubs and is often seen along rivers. If it receives adequate water, it grows rapidly and occurs in abundance in veld that is in good condition.

In Ghana, guinea grass can be found in all the regions except the Northern, Upper East and Upper West, however the people from Bolgatanga are the ones who use this fibre the most to weave a shopping basket which are popularly known as Bolga basket.

Plate 13: Guinea grass. A-Inflorescence B-Flower stalk

3.7.5 Extraction of the guinea grass (Vita Vera)

The fresh stalks are pulled out and dried in the sun for three days to one week depending on the condition of the weather. Each of the dried stalks is split into two and placed on the laps and twisted as illustrated in Plate 17.

Plate 14: Freshly harvested grass

Source: Field Research

Plate 15: Guinea Grass spread out to sundry

Source: Field Research

The flower stalks were split into two using a small knife by the local craftsman, and rolled on the lap with the palm of the hand.

Plate 16. Splitting the silk of guinea grass

Source: Field Research

Baah (2000), again, shares the same idea of preparing straw where it is put on the thigh for twisting.

Plate 17: Twisting a guinea grass stalk by the traditional method

Source: Field Research

Another alternative means which can avoid the use of the thigh is explained in Baah (2000) where he used synthetic rubber pad placed on the table for twisting.

Plate 18: Twisted guinea grass stalk

Source: Field Research

The drying process made the straw a little harder; in view of this the hardened property of the straw needs to be moistened with water before twisting. The water for twisting should not be too much in order not to break the fibres.

3.8 Sisal fibres

Sisal is one of the materials used for weaving fashion accessories. According to Willson (1971), it is one of the most extensively cultivated hard fibres in the world. It accounts for half the total production of the textile fibres, and at the same time used as a basketry material (Willson, 1971). The plant is composed of numerous elongated fusi-form fibre cells that taper towards each end of the leaf.

3.8.1 Extraction of Sisal Fibres

The leaf of the sisal plant was harvested using a cutlass. The leaves were retted in a container to soften the tissues, making it ready for a beating. The retted leaves were placed on the mallet board and beaten gently with a wooden mallet in order not to break the fibres (Plate 19).

Plate 19: Beating of the sisal leaves

Source: Field Research

The mass of fibres was then washed using the eco-wash washing detergent. (Plate 20).

Plate 20: Washing of sisal fibres

Source: Field Research

After beating, washing and drying, the fibres were combed to get rid of unwanted matter and broken fibres, and to get the fibres aligned.

Plate 21: Collection of sisal after washing

Source: Field Research

3.9 Raffia

It is a light film obtained from the raffia palm leaves. The young leaves are harvested any time of the year either in the cone-budded state or after four to five days after the bud breaks open. Raffia is removed from the leaves or the film is slightly pulled away from the leaves in the forest and then sent home for the rest to be removed.

See Plate 22.

Plate 22: A collection of leaves having the raffia partly pulled off.

Source: Field Research

The film of raffia is removed from the leaves by rubbing slightly to make a fold at the apex. A cut is made at the apex and then the light film is carefully pulled off from the leaf. The raffia fibres are sun-dried for a week for it to be properly dried.

Raffia is found in all regions of Ghana except the Northern and Upper Regions. A large number of raffia palms are found around fresh water bodies, riverbanks and swampy areas. Locally, raffia is used for tying sacks, fabric in tie - and - dye fabric production, wrappers and also the production of native skirt called "*adoosuo*" of the Akans. Raffia production is also an occupation that some Ghanaians engage in to earn a living, this is the case at *Apromaasi*, a raffia production village near Kumasi.

Plate 23: A collection of raffia

Source: Field Research

3.9.1 Properties of raffia fibre

Microscopic properties: Dry raffia fibre has striations along the longitudinal axis of the fibre and plain surface. However, the wet specimen is also plain with slight striations.

3.9.2 Physical properties of raffia

Appearance: It is linear with smooth surface light.

Length: It ranges between 40cm and l00cm long

Colour: It is creamy when dried

3.9.3 Chemical properties of raffia

Effect of Alkaline: Raffia fibre is resistant to alkaline when used in the finishing process of the fibre. It is not damaged by caustic soda.

Effect of sunlight: It is resistant to sunlight.

Effect of organic solvent: Raffia fibre is also resistant to stain removal such as parazone, and sodium hypochlorite.

3.9.4 Biological properties of raffia

Effects of micro-organism: Raffia fibre is damaged by mildew, due to decay fibre, moist, dirt conditions.

3.10 Twisting of raffia fibre

Almost all the research fibres were subjected to twisting or plaiting before they were incorporated into dyeing and weaving. With the exception of the leather, which were cut into strips for weaving and Cyperus Articulates which was flattened before weaving on the broadloom. Fibre twisting gives sufficient strength to the yarn to make it desirable and durable.

3.10.1 The process of fibre twisting

Materials:

(a) The guinea grass was split into strips and then depending on the desired thickness use twisted into yarns.

(b) The raffia fibre was also split into strips and then depending on the desired thickness twisted into yarns.

(c) Bundles of raffia were also twisted into different thickness of yarns.

Equipment:

(a) Bowl of water

(b) Pair of scissors

3.10.2 Method of Fibre Twisting

1. A bunch of fibre is moistened with water. After, a knot is made at one end of the bunch of fibres as shown in Plate 24.
2. The moistened bunch is divided into two as shown in plate 25
3. The right fingers are used to twist on each, a separated bunch of fibre supporting with the left fingers.
4. The separated fibres are further twisted behind each other in an ‘S’ twist clockwise direction.
5. The yarn is intermittently tensioned with the finger for the twist to be firm (see plate 26)
6. When the twisting fibres gets finished, a new fibre is slipped under the old ones held by the left figures for the right fingers to add the old ones to that of the new ones.
7. When a required length has been twisted; it is trimmed with a pair of scissors for the yarn to appear smooth. (Plate 27).
8. Twisting then continued until a desirable length is achieved.

Plate 24: A knot is made at one end of a bunch of raffia fibre

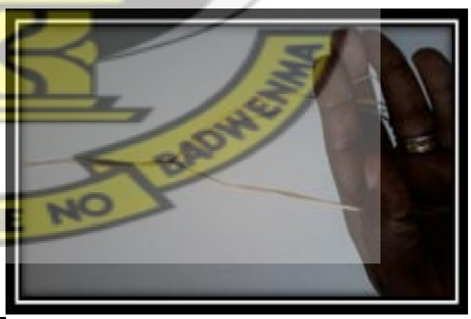


Plate.25: The moistened bunch is divided into two

Plate.26: A new fibre is joined by slipping it under the old fibre and twisted

Plate.27: The twisted fibre is trimmed and twisting continued to a desirable length

Hands twisting of Guinea straw and raffia are also shown in Plate 24 - 27. After twisting some of the yarns and strips were dyed.

3.11 Bleaching of yarns and strips

The process of bleaching is meant to remove the natural colour in the yarn by chemical means to make them whiter than their original colours. In this project samples of the research yarns were bleached in a solution of a liquid parazone for 15 minutes for cotton, sisal and five minutes for jute and one hour for the raffia and guinea straw.

Materials: Twisted yarns in circular mass.

Equipment: Bowl for the bleaching solution and hand gloves.

3.12 Plantain *(Musa sapientum)* fibres

There are varieties of plantain species, some have very long stem whiles others are quite short. According to Unternehmensberatung (1971), the stem of different varieties can grow up to the height of 2-7m and have a diameter of up to 40cm. When the stem is critically observed, 11-15 closely layered leaf sheaths can be found. The part of the plant which contains the fibres is the trunk. The diameter of the trunk consists of vertical channels and these channels are filled with sap and air.

3.12.1 Fibre extraction of plantain

Since the fibres form an integral part of the sheath, there was the need for the researcher to remove them for use. The layers had to be first separated from the main stem. The extraction of the fibres was done by beating the fibres out of the stem sheath (Plate 28).

Plate 28: Beating a sheath layer of trunk plantain

After beating of the layers using the mallet and the mallet board, the fibres were combed using a domestic comb to remove unwanted materials and shorter fibres. Washing was carried out to remove dirt and other particles inherent in the fibres.

Plate 29: Washing the plantain fibres

Drying of fibres was the last stage of this manually extracted fibre from the plantain stem (Plate 30).

Plate 30: Drying of plantain fibres

3.13 Spear grass (<u>Imperatacvlindrica</u>)

The spear grass is one of the most dominant because it is very difficult to control (Okpattah (2010).

Plate 31: Spear Grass

Source: Field Research

3.13.1 Preparation of the leaves of spear grass

The grasses after cutting them from the field were dried under a shade. Drying under the shade helped to maintain the greenish brown colour of the grass.

Plate 32: Freshly harvested spear grass

Source: Field Research

3.14 Borassusaethiopum (African fan palm)

Borassusaethiopum is one of the six species of fan palm, a major <u>Borassus</u> palm in Africa with such common English names as African fan palm, African Palmyra palm, deleb palm, ron palm, toddy palm, black rhun palm, ronier palm (from the French) and to name a few. Borassusaethiopum palm in the South Tongu district.

The *Borassusaethiopum*, the Africa fan palm or Palmyra palm is indigenously called in Ghana among the Ashanti Twi as *Kube*, Brongs as *Twie,* the Fantes call it *Makube*, and the Nzemas *Malɛkwe (‘woman’s coconut’).* Among the Gas it is known as *Wiedzo*, the Adas variously refer to it *AgƆ, NagƆ, Wio, Gbegbe-gƆ* and the Ewes call it *AgƆti, AgƆtsi, AgƆda* (Irvine, 1961). In this study, the word AgƆtsi (local name in Ewe) is used to identify the palm ‘Borassusaethiopum’ from the Borassus family.

*“AgƆtsi” (*Borassusaethiopum) is described as a tall tree that grows up to a height over 30 metres (100ft.). With a swollen stem or trunk near the top or in the middle. The swelling of the trunk is at 12-15 metres above the ground (at $^{2}/_{3}$ of the height) and one metre in diameter at the base. According to Irvine (1961:774) “the swelling takes place after fifty (50) years or so, then narrowing to form a second and even a third swelling in old age, thus making the tree hard to climb”. The top of the tree is crowned by enormous large grey-green or blue-green leaves, fan-like shape, up to 2 to 3 meters long which are carried on 2 metres petioles (leaf stalks), (Irvine, 1961; Borrasussaethiopum: Palmyra palm, 2008 *author unknown). The petioles are marked with sharp black thorns along the margins.

The tree “AgƆtsi” (Borassusaethiopum) belongs to dioecious species, with male and female flowers produced on separate trees. In male plants the flower is small and inconspicuous; while the female plants have large flowers about 2 cm which produce yellow to brown fruits resembling the coconut. It is only the female palms or trees that bear fruit (Hyde & Wursten, 2009). The tree or palm grows in tropical and southern African savannah and open forest. Geographically, the palm is distributed in these localities; Benin, Burkina Faso, Cote D'Ivoire, Democratic Republic of Congo, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Mali, Mozambique, Nigeria, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, and Zimbabwe.

The palm has been known to be a useful tree. Each part of the palm from the trunks, flowers, roots, fruits and leaves has a role to play in human use, for food, shelter, and medicine to name a few. Thus, in Tamil Culture the tree is highly respected, and as a result, is naturally referred to as “karpaha”, celestial tree. It is used extensively in the locality where it is found by the indigenous population. In Cambodia and India the tree has been used in over 800 different ways.

The trunks of the palms serve as wood for posts, examples are telegraph poles; and for construction works, including bridges, shower cabin, wharf piles, roof beams, door frames and drums in Kenya (Irvine, 1961). In Mozambique, people use the trees to make dugout canoes. The fruits, the flowers and roots are consumed raw or cooked. Oil can be extracted from the fruit-pulp. According to Irvine (1961), a yellow dye extracted from the rinds of ripe fruits is used for dyeing mats. He also made mention of products made from tree leaves for domestic and other purposes. The dried leaves are made into larger market hats, bags, baskets, mats, fans, sieves, umbrellas, thatching, and traps. In Indonesia the leaves were formerly used in the ancient culture as papers, known as *Lontar*. The leaf veins are used to make brooms, fish traps and nets, as well as binding fibres.

Similarly, the people of South Tongu make large sunshade hats known as “gbɛdzɛ”, “*papa”* (local fan), from the leaves, traps and baskets. The local people identify one species of Borassus called “*Etsyo”* found in groups or clumps. The leaves and the leaf stalks are used in making mats, bags and baskets.

3.15 Phoenix reclinata (Wild date palm)

"Ayede" or "*Nyede"*, *(Ɛ) "Yid"* as called in Ewe language is referred to in the English language as wild date palm, botanically named *Phoenix reclinata*. In the other Ghanaian local languages, among the Akans the tree is called "*Nke-resia"*, Fantes "*Nkyeresia"*, Gas "*AmitsrƆbi"* or "*AmɔtrƆbi"*.

Phoenix reclinata (wild date palm) "*Ayede"*, (wild date palm) is identified by Irvine (1961) as a dioeciously clumping palm reaching up to a height of 1,524cm, though the trunk is most often 91cm- 122cm high. The leaves are pinnate, linear and acute, and folded over (in duplicate) growing 366cm in length. The leaf colours are bright to deep green. The palms are found in the Savannah Forest and Coastal areas, near beach, river banks and swamps and grow in groups (gregarious).

Irvine (1961) further stress on the usefulness of the leaves for various needs such as sleeping mats, hats, baskets (in Uganda and Kenya). Strips of young unopened fronds and their midribs are used to weave fine mats, sieves, baskets, bags, hats, brooms and waistbands. In South Tongu in the Volta region of Ghana, strong ropes are made from the leaves and used for constructional work such as tying of hut posts together. They were earlier used as belts or waistbands, animal chains, and ropes for tying other things as firewood and foodstuffs.

3.16 Cyperus articulatus (Reed)

Cyperus articulatus commonly identified as a reed, is locally known among the Akans in Ghana as "*Kyakya"* or "*Tutukɛtrɛma"*; the Ewes call it "*Keti"*. It is known as "*Jiiji"* in Hausa and "*Ngɔwu"* in Dangme. The *Keti* (reed) plant '*Cyperus articulatus'* belongs to the sedge family *Cyperaceae*. Keti is a herbaceous perennial plant that grows well in salty marshes and fresh water areas as well as around the edges of lagoons near the coast, forming extensive patches that cover several acres (Hall, 1971).

Reed plant (*Keti*) is found growing in low damp places (in moist soil) near water or in shallow water including ponds, marshes and lakes in the South Tongu district.

The plant is found in about twenty villages in the district. *Keti (Cyperus reed)* is also found in the swampy areas of Ketu and Keta; grows wildly in clumps, around the Keta and Avu lagoons along the lower Volta region. The people of these areas use the plant for various things. The sedge that thrives in salt marshes is locally known as "*Ayike"* by the locality and "*Keti"* is identified as the sedge plant that grows in fresh water. The stems of this grass-like sedge as Hall (1971) describes, are green, cylindrical and leafless, rising one meter or more above the ground. The vertical stem rises from the rhizome (the thick underground stem) that creeps horizontally below the surface of the soil. At the top of each erect stem is the branching inflorescence that carries clusters of seeds called spikelet. The stem as he further explains, contains soft white pith that is divided up by cross partitions which appear as ridges when the stems are dry. They can be visibly seen if the stem is split open.

The local people describe the grass-plant as 'root plant' because of the absence of the leaves thus the name "*Keti"*. The "Keti" plant reaches the height of 180cm and above and of a thickness about five to ten millimetres, depending on soil and the climatic conditions under which the plant grows. "Keti" (*Cyperus articulatus*) has a very long history of use by humans. Data that was made available to the researcher on Cyperus concentrated much on the medicinal uses of the various parts of the plant, from the root through the stem to the seeds. Besides, there were brief statements on the plant, especially the stems as used in making mats, local mattresses and bags.

Avemegah (1997) cites Dalziel who concludes in his discussion on the medicinal values of the root of the plant, that the stem is commonly used for weaving mattresses and mats for native beds, and sacks. Other unpublished theses made mention of the use of "Keti" for making mats and bags (Ahiable, 1984; Akpaide, 1970).

The people of *Larve* and *Agave-Afedome* area councils in the South Tongu district use "Keti" for a traditional bag known as *kevi*, local mattresses called "*atsatsa*" and mats locally called "*afetɔgo*" used as bedding, blinds, partition and carpet (floor covering).

3.17 Typhadomingensis (Cat-tail)

Another wetland plant also used by the people for mat making known as "Avu" is scientifically called *Typhadomingensis* from the family, *Typhaceae*. "*Avu*" is commonly known as cat-tail. Although the plant looks like a grass it is also classified botanically as sedge. The plant has a creeping stem (rhizomes) that spreads horizontally beneath the surface of muddy or marshy ground to start new upright growth. It has leaves that are very long, often exceeding two metres and are above one to two centimetres wide. The leaves are strap-like, starchy and spongy especially towards the base, without a midrib, alternate and held almost vertically above the ground base. It is these leaves that serve as a raw material used by the people in South Tongu for weaving mats.

Typha plants are monoecious, bear unisexual flowers (both male and female flowers on the same plant) developing dense complex spikes. The male flower spike of the cattail plant development at the top of the vertical stem above the female flower spike. The researcher has discovered the growth of the cat-tail plant at *Ɔfankor* in Accra.

The leaves, leafstalks, rachis and branches of the plants discussed are the raw materials used in producing the off-loom products. They are the physical matters which make up the products. The *Borassusaethiopum, Phoenix reclinata, Typhadomingens* and *Cyperusarticulatus* all belong to the monocot classes.

3.18 Jute

Jute is a rain-fed crop with little need for fertilizer or pesticides. The jute fibre comes from the stem and the outer skin of the jute plant. The fibres are white to brown and 1-4 metres (3-13 feet) long.

3.18.1 Extraction of Jute Fibre

The fibres are first extracted by retting. This process consists of binding jute stems together and immersing them in slow running water

Plate 33: Retting of jute plant

Source: Field Research

Stripping Process

In stripping non fibrous matter is scraped off, then dig in and grabbing the fibres from within the jute stem. After the stripping process the extracted fibres are then washed, combed to remove the broken fibres and then dried in the sun.

Plate 34.Washed and sundried

Source: Field Research

3.19 Cotton

3.19.1 Extraction of Cotton

In spinning, great deftness and skill are displayed Spinning of raw cotton is done on a spindle "jeni". Unspun cotton is held on the distaff in the left hand, the stick of the spindle wetted with spittle, a strand of cotton is then stuck upon it, and the spindle sets revolving with a twist of the thumb and forefinger. Before spinning however, the unspun cotton is fluffed up with the help of a bow "*guntobu"* in order to ensure a uniform spinning process.

3.19.2 Spinning of cotton in the North (Dagomba and Gonja)

It is quite uneasy to trace the origin of weaving as to when exactly it was introduced and first practised in the Gonja and Dagomba. The local weaving, known as "*wugbu*" in Gonja and Dagomba is the reserved of the male sex, and is done on vertical looms made from four upright posts locally known as *dasara*, while spinning and processing of the raw cotton (*gumdi*) was done by their female counterpart. Woman's share in the art of weaving starts with the planting of the cottonseed and ends with spinning of cotton into thread. In spinning, great deftness and skill are displayed. It is quite interesting to watch an old woman at work. Spinning of raw cotton is done on a spindle (*Jeni*). Unspun cotton is held on the distaff in the left hand, the stick of the spindle wetted with spittle, a strand of cotton is then stuck upon it, and the spindle sets revolving with a twist of the thumb and forefinger. Before spinning however, the unspun cotton is fluffed up with the help of a bow (*guntobu*) in order to ensure a uniform spinning process. (See plates 35 &, Plate.36). An old lady fluffing up raw cotton using a bow-like gadget.

The spindle usually revolves upon a smooth surface such as broken calabash or a piece of leather. The thread is teased out and twisted into a uniform thickness by the revolving spindle assisted by the finger of the right hand, which runs deftly up and down the teased out cotton. The action of the revolving spindle first twists the cotton and then winds the spun thread onto it. (See plates 37 - 39).

Plate 35: Fluffing up raw cotton using a bow – like gadget
Source: Field research

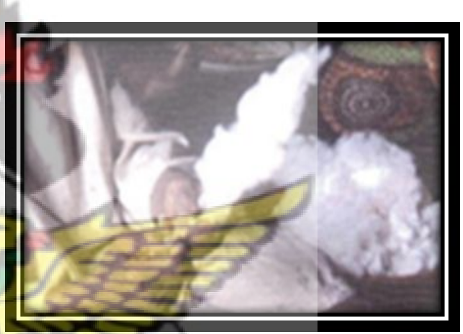


Plate 36: Holding cotton on the distaff ready for spinning.
Source: Field research

The spindle usually revolves upon a smooth surface such as broken calabash or a piece of leather. The thread is teased out and twisted into a uniform thickness by the revolving spindle assisted by the finger of the right hand, which runs deftly up and down the teased out cotton. The action of the revolving spindle first twists the cotton and then winds the spun thread onto it. (See plates 38 – 39).

Plate 37: Attaching a strand of cotton onto the spindle
Source: Field research

Plate 38: Setting the spindle
Source: Field research

Plate 39: Spinning of cotton aided by the revolving spindle and the right hand
Source: Field research

Plate 40: Wound spun cotton yarn
Source: Field research

3.20 Weaving Equipment and Accessories

Equipment

The main equipment used for the project was the broadloom and its accessories which are:

- Reed
- Raddle
- Shuttles
- Reed hooks
- Bobbin winder
- Healds

- Warping mill
- Cross sticks / beaming stick

Broadloom

This equipment Plate 9 was used for weaving the Volta straw fibre materials.

Plate 41: Broadloom
Source: Field research

Reed

This particular type of reed consisted of closely set strips of peelings of raffia fronds (about 15cm each) fitted to two horizontal bars, one at the top and one down. The vertical spaces between the strips take the warp ends. It was used to separate individual warp ends from Cris-crossing during weaving and also for beating the weft into the fell of the woven material.

Plate 42: Reed
Source: Field research

Raddle

This comb-like structure was used in spreading the warp yarns on the loom to obtain the required width of the woven materials.

Plate 43: Raddle

Source: Field research

Shuttle

This accessory was used to insert the weft yarns through the shed to facilitate interlacing.

Plate 44: Shuttle

Source: Field research

Reed Hook

The reed hook was used to draw warp yarns through the dents of the reed

Plate 45: Reed Hooks

Source: https/www.google.com.gh

Bobbin Winder

This accessory, made of wood, was used for the preparation of the weft yarn, which was used as a binder in some of the works; especially the twill weaves

Plate 46: Bobbin Winder

Source: Field research

Heald

The Heald (Plate 47), made of nylon, was used to suspend warp yarns in the harnesses which raise and lower the yarns during weaving.

Plate 47: Heald

Source: Field research

Warping Mill

This large piece of apparatus, consisting of a skeleton reel, turns freely on its axis like a turnstile. It was used for the preparation of the warp yarns, which needed to lie parallel in the loom to avoid entanglement.

Plate 48: Warping Mill

Source: Field research

Beaming Sticks/Cross Sticks

The beaming sticks were about 4cm by 90cm long used to tension the warp yarns. The cross sticks were also used to secure the crosses of the warp yarns on the loom.

Plate 49: Beaming sticks

Source: Field research

Bobbin

The bobbins used in this research measured 1.5cm in diameter and a length of 9cm with a hole inside. The material used as weft such as cotton and sisal fibres was wound around it and fixed inside the shuttle for picking (Plate 50).

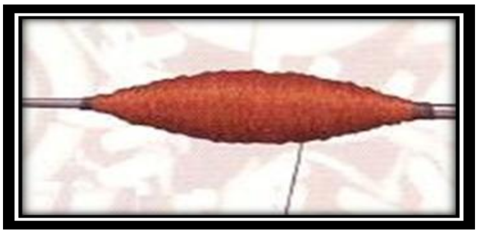


Plate 50: Bobbin

Source: Field research

3.21 Materials used for the project

These materials were used for producing fashion accessories using the on-loom and off-loom techniques.

- Raffia yarn
  Sisal and Sisal-like fibres
- Flower stalks of Guinea grass *(veta Vera)*
- Volta straw
- Natural leather
- Bleaching agent (parazone)
- Washing agent (ecowash)

3.22 Samples of plant yielding dyes

Colour is noted to be the first element of an artefact that attracts the attention of the observer. To make the sample fashion accessories, some of the fibres and yarns used in the research were dyed before being woven.

Samples of 10 dye-yielding plants were collected through assisted visits to some communities (Daboya and Ntonso). The plants were sorted and photographed before the extraction process. This enabled correct identification and classification. The researcher's interest in the listed plants was strictly to obtain their dye yielding properties; however, the fact could not be over-ruled entirely that, these plants listed below have medicinal properties other than their aesthetic values. A discussion of this appears in the subsequent chapter. Plates 1 are illustrations of the plants that were used in the experiment

Plate 51: Mango tree (*Mangifera indica*)

Source: Field research

Plate 52: Mango tree (back)

Source: Field research

Plate 53: Mahogany (*Khaya senegalensis*)

Source: Field research

Plate 54 Mahogany tree

Source: Field research

Plate 55: Nim tree (*Azadiracha indica)*

Source: Field research

Plate 56: Nim tree (*Azadiracha indica)*

Source: Field research

Plate 57: Dried "Sobolo" (Hibiscus sabdariffa)

Source: Field research

Plate 58: *Hibiscus sabdariffa*

Source: Field research

Plate 59: "*Kyenkyen*" (*Antiaris africana)* plant

Source: Field research

Plate 60: *"Kyenkyen" (Antiaris african)*

Source: Field research

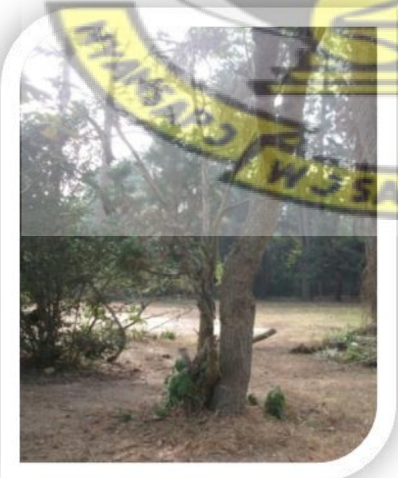


Plate 61: *"Akonkodea"* (*akata*)

Source: Field research

Plate 62: Pawpaw *(Carica papaya)*

Source: Field research

Plate 63 Bixaorellana *"annatto"*

Source: www.usda plant.com

Plate 64 "Kramankote"

(*Sphenocentrum jollyanum*)

Plate 65: Mango Bark

Plate 66: Pounded Mango Bark

Plate 67: Pounded Neem

Plate 68: Pounded Kyenkyen

Plate 69: Sorghum bicolor

Plate 70: Tefashia"

3.23 Extraction of dyes from identified plants

Dyes produced from natural materials are processed mainly by mechanical ways like grinding, crushing, or steeping in water. In extracting plant dyes under art studio conditions, Korankye (2010) advocates washing all the root, seed, fruit and leaf samples first, and cutting them into pieces before mashing or boiling them. She recommends adding water or alcohol to the stuff and then leaving it to stand for about 24 hours. Salt is added only to fix the dye. She mentions the need to collect assorted open tins and cans, sieve of 120 mesh, knives, stove, clean water, alcohol, cartridge paper, and salt as the materials required. The plants from which dyes were extracted in the experiments and their local or botanical names were outlined as follows: For the purpose of easy identification of each plant sample, a coding system of labelling based on the first letters of the botanical names of the plants was adopted. This helped in sorting, describing and recording colour changes that occurred in the dye samples during the extraction process within the predetermined duration of the experiment.

3.23.1 Materials and methods used for the dye extraction

Materials: Empty tins, cans, a sharp knife, water, barks, roots, leaves, plant samples, stove for boiling.

Method: After securing the various materials needed for the experiment, the containers to be used were coded according to the first two letters of the name of each plant. This was and thereby ensures accuracy and total control of the research environment. The plants studied were coded as shown in Tables 2.

Table 2 Plants used for dye the extraction

Name of Plant	Botanical Name	Code
1."Sobolo"	Hibiscus sabdariffa	Sb
2. Lalle	Lawsonia inermis	Le
3.Sorghum	Sorghum bicolour	Sg
4.Fresh mango	Mangnifera indica	Fm
5. .Dried mango	Mangnifera indica	Dm
6.Indigo	Indigo fera	In
7.Bixaorellana	*Annatto*	An
8.Tefashia	Tefashia	Tf
9Kramankote"	Sphenocentrumjollyanum	Sj

3.23.2 Extraction of dyes and dyeing of fibre samples

After the plant samples were collected, the empty containers were made ready for the experiment to proceed. This began by sorting the plant materials for the dye extraction into the respective parts: leaves, bark, seeds, and roots – and arranging them nicely into the respective labelled containers, adding just enough water to cover the samples and then boiling each one for a maximum of 30 minutes. Thirty minutes were chosen because the researcher realized in the preliminary stages of the experiment that when a plant sample was boiled for 10 minutes or less, the dye produced had neither the expected deep colour of a dye nor could it stain fabric well as any dye should. This lack of ability to dye led to an extension of the boiling time to 30 minutes for all the plants collected. This, however, does not mean that the time frame gave the best of results for all plants. After boiling, each dye was poured out of its container into another labelled container and the test fabric immersed in the dye solution and left in it to enable the dyeing process go on. This procedure notwithstanding, some of the test fibres were dyed while the samples were still on fire as a way of checking the effect of higher temperatures on the dyeing quality. The results obtained proved that, higher temperatures aid fast absorption of dye molecules to the fibrous regions of the fibre thus giving darker shades of colours or dyes. In other words, the higher the temperature the higher the dye absorption. When the fibres were dyed on fire it took less time for the fibres to get dyed as compared when the dye was poured and allowed to cool. Either way, after dyeing, the fibre samples were hung on a drying line to allow dripping of excess dye, one set in direct sunlight and the other inside the room. After drying, the researcher collected all the samples and recorded the observed results of both samples: dried in sunlight and under normal room temperature. The researcher also tested for wash fastness by washing the dyed samples with traditional laundry soap (Key soap) and realized that some dyed samples showed major differences in their wash and light fastness by either fading grossly, slightly or in some cases rarely. Almost all the listed plants were tested on textiles but a selected number of them were tried or applied to the fibres. The results of the experiments are provided on page 86 of the study.

3.23.3 Materials and methods used for the dye extraction

Materials: Empty tins, cans, a sharp knife, water, barks, roots, leaves, plant samples, stove for boiling.

Method: After securing the various materials needed for the experiment, the containers to be used were coded according to the first two letters of the name of each plant. This was done to prevent placement of samples into wrong containers and oversight of right matches and thereby ensure accuracy and total control of the research environment.

3.23.4 Extraction of dyes and dyeing of textile samples

After the plant samples were collected, the empty containers were made ready for the experiment to proceed. This began by sorting the plant materials for the dye extraction into the respective parts: leaves, bark, seeds, and roots – and arranging them nicely into the respective labelled containers, adding just enough water to cover the samples and then boiling each one for a maximum of 30 minutes. Thirty minutes were chosen because the researcher realized in the preliminary stages of the experiment that when a plant sample was boiled for 10 minutes or less, the dye produced had neither the expected deep colour of a dye nor could it stain fabric well

Materials - Empty containers; mordant (Soda ash, common salt, lime, alum and baking powder etc.) Bark, roots and leaves of the plants (the dye extracts).

Method - The dye extracts were poured into mordant coded containers, and mordant added. Test fabrics were immersed in dye baths and observed. The results of the dyed samples were recorded and conclusions drew.

Result - See Table 5 which shows the samples of colours obtained and subsequent mordanting with the various mordants.

3.24 Mango tree bark (dye extraction)

Collect bark of mango from the tree by using a cutlass, with the help of cutlass cut out the quantity you think will be needed. (One pound was used for this project.)

1. The bark is loosened by pounding in a mortar with a help of a pistil.
2. It is soaked in 1 litres of water for 3 days to soften it for easy extraction of dyes.
3. The water turns brown on the third day.
4. It is poured into a pot and boiled for 1hour, water is replaced when needed.

5. The dye bath is not completed until liquid is dark in colour.
6. Let cool and strain out the bark from the dye bath.
7. It is heated for a few minutes until becoming concentrated.

3.24.1 Dyeing

Dyeing is carried out in three different ways to test and investigate the potency of the dye extracted. The three methods used in dyeing to investigate the dye include.

1. Dyeing with extracted dye solution only.
2. Dyeing with a solution of dye and alum.
3. Dyeing with a solution of dye and salt.

3.24.2 Dyeing (dye solution only)

1. Place the pot back on stove and bring is to boil.
2. Soak fibre in water for it to be fully wet (wet out).
3. The level of dye solution should be evenly distributed to ensure even shade.
4. Let it simmer for about 30 minutes and stir from time to time with a rod.
5. Let it stay in the dye bath for 2hours to ensure even distribution of dye into the fibre.
6. Remove dyed fibres with a rod, then let it drip over the dye bath.
7. Hang and dry in the shade.
8. Wash to remove excess dye.
9. Dry again in the shade.

3.24.3 Mordanting with alum and dyeing

1. 10mls of alum is poured in a litre of water socked with cotton/ jute fibre and boiled for 25mins.
2. It is stirred from time to time.

3. It is removed after 25mins with a rod. The water is made to drip and it is kept in the dye solution.
4. An even level of dye is maintained for even distribution of dye.
5. It is stirred from time to time and removed after 2hours minutes.
6. It is dried in the shade and washed to remove excess dye.
7. It is pressed to give a better finish

3.24.4 Mordanting with salt

10mls of salt is poured into 1liter of water socked with guinea grass.

1. It is stirred from time to time.
2. It is removed after 30mins with a rod. The water is made to drip and it is kept in dye solution (dyeing is done hot).
3. An even level of dye is maintained for even distribution of dye.
4. It is stirred from time to time and removed after 30 minutes.
5. It is dried in the shade and washed to remove excess dye.
6. It is pressed to give a better finish

3.25 Extraction of Dyes from Morinda Lucida (Konkroma)

1. Soak 1 pound of dry bark in 1 litter of water, leave it in water for 3days to enable it become soft for easy extraction of dyes.
2. Pour into a pot, add more water and boil.
3. Boil for 1 hour, add more water when the water has drained off.
4. Let cool and strain out the bark from the dye bath.

3.26 Extraction of dye from the bark of Nim tree.

1. Collect bark from a tree with the help of cutlass, sort them out to the quantity required. (1pound will be needed for this project.)
2. The bark is loosened by pounding in a mortar with a pestle.
3. It is soaked in five litres of water for 2 days to soften it for easy extraction of dyes.
4. On the third day it was poured into a pot and boiled for 1 hour water is replaced when needed.
5. The dye bath is not completed until liquid is dark in colour.
6. Let cool and strain out the bark from the dye bath.
7. It is heated for a few minutes until becoming concentrated.

3.27 Extraction Dye from Sobolo (*Hibiscus Sabdariffa* plant)

1. 2 pounds of dried hibiscus plant are soaked in 2liters of water overnight.
2. It is poured into a pot and boiled for 30 minutes.
3. It is left to cool, strain and heated for 30 minutes to get the solution concentrated.

3.27.1 Dyeing Of fibre Samples (*Hibiscus Sabdariffa*plant)

1: Dyeing is carried out when extracts are hot.

2: Dyeing was carried out in different stages using different mixtures, they include;

3: Dyeing with extracts only

4: Dyeing with a mixture of extracts and alum.

5: Dyeing with a mixture of extracts and salt.

3.28 Extraction Dye from Mango (Mangnifera Inidica).

1. 1pound of mango bark was pounded into pieces.
2. It is poured into 2liters of water and boiled for 1hour.
3. It is left to cool and strain to separate particles from extracts.

4. It is boiled for 1hour, ready for dyeing.

3.29 Extraction of dye from Bomdas "*Akata/akonkodee*"

1.1 pounds of flowers *akata* were soaked in water overnight.

2. It was boiled for one hour.

3. It was left to cool, strained and boiled to get it concentrated and ready for dying.

3.29.1 Use of mordant Materials

Empty containers; mordant (Soda ash, common salt, lime, alum and baking powder etc.) Barks, roots and leaves of the plants (the dye extracts).

3.29.2 Method

The dye extracts were poured into mordant coded containers, and mordant added. Test fabrics were immersed in dye baths and observed. The results of the dyed samples were recorded and conclusions drew.

3.29.3 Result

See Table 2 which shows the samples of colours obtained and subsequent mordanting with the various mordants.

Plate 71: Mordanting with Salt

Plate 72: Mordanting with Allum

3.29.4 Safety Measures

- Wear an apron or lab coat to protect your dress from staining.
- Use gloves to protect hands since most of the chemicals are poisonous.
- Work should be carried out in a place with good ventilation since dye extraction can be messy or contain strong odour.
- The dyeing pans used should be numbered to avoid oversight.

3.30 Dyeing of jute fibre samples

; see plate 74-76.Dyeing began with the preparation of the dye bath, see plate 73. After that the jute fibres were immersed into the sorghum dye stuff for thirty minutes. Six spoons full of common salt were added as a mordant. After dyeing, the jute fibre was washed and dried in the sun to test wash and light fastness; see plates 77 and 78.

Plate 73: Preparing bagaruwa dye bath

Plate 74: Jute fibre soaked in sorghum bicolour dye bath

Plate 75: Freshly dyed jute fibre which yielded red

Plate 76: Re-dyeing of the jute with "bagaruwa" dye bath

Plate 77: Washing to test wash fastness

Plate 78: squeezing excess dye out of the jute fibre before drying.

Plate 79: Drying in the sun to test light fastness

3.31 Dyeing of the strips of cotton fibres

3.31.1 Dye mixing and Cotton Yarn dyeing in Gonja

Yarn dyeing is a predominant practice among the Gonja especially in Daboya. Daboya is a town located in the west Gonja district, just beyond the White Volta Lake about 65km away from Tamale, the Northern regional capital. Mud dye, locally referred to as "*gara*" is the substance used in dyeing the yarns. Leaves (*gara fata*) of the "*gara*" plant are harvested from the bush by women. Processing the leave to extract its dye involves pounding, drying and soaking. The "*gara*" leave after harvest is crushed and dried for about seven days and then soaked in a container overnight. The mixture is thereafter poured into a basket to strain the water. The mixture of crushed *gara fata* is kept in a basket and covered for a maximum period of four weeks. At times the mixture can be used after being kept for three (3) days; however, the duration determines the potency of the dye. During this period the *gara* mixture decomposes and begins to generate heat emitting smoke. (Refer to plates 80 and 81).

Plate 80 Pounded "*gara*"

Plate 81 Decomposed "*gara*" leaves emitting

A clay pit kept over generations is the stimulating substance in the dyeing process. The muddy clay locally known as "*zata*" is made into balls and dried. This may last few days and at times a week, after which the dried balls are baked. (See plates 82 and 83)

Plate 82 Balls of "*zata*" being

Plate 83 Baked "*zata*"

A deep vault (referred to as "*kegaramang*") is created on the ground and filled with water to the brim. After this, potash "*Kedi*" is poured into the vat and then some amount of the decomposed "*gara*" added. The baked "*zata*" balls are ground, made wet, mixed with potash and then poured into the vat as well. The mixture is then stirred for about thirty minutes until a homogenous state is reached. About two litres of this homogenous mixture are fetched and a stronger concentrated solution made by adding granulated dye referred to as "*balba*" to it and then again poured into the vat and adversely stirred for about five minutes. The vat is now ready to be used in dyeing yarn. (See plates 84 and 85).

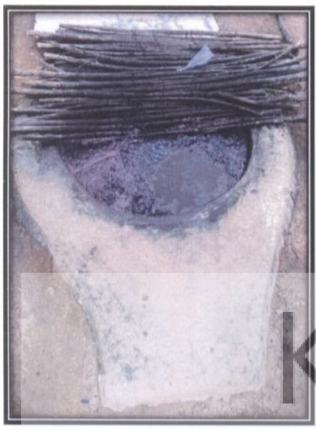


Plate 84 "*Gara*" vat dye ready for

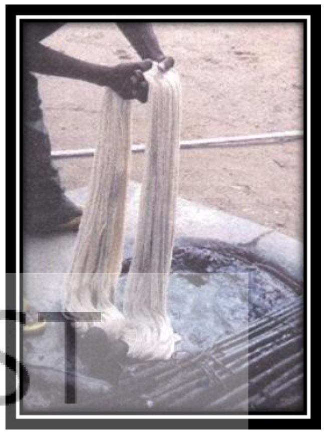


Plate 85 Dyeing yarn in the "*gara'* vat

It is worth mentioning that, before the yarns are dyed, they are warped to the required length and crosses created for weaving. The crosses are tied to secure them from entangling during dyeing. In some instances, parts of the yarn are resisted before dyeing to create patterned effects. Plates 86 to 87 demonstrate the warping, resist dyeing and the resultant yarn after dyeing. Occasionally, dry dye is put into the vat to increase the concentration of the dye.

Plate 86 Warping yarns prior to dyeing

Plate 87 Yarns prior to dyeing

Initially after immersing the yarn into the vat, it assumes a somewhat greenish colour. However, after continuous immersion for about 15 to 30 minutes, a deeper shade is obtained. After dyeing, the yarn is removed, squeezed and hanged to oxidize turning deep blue. Refer to plates 88 and 89 below. If a black colour is required, the blue yarn is dyed over and over again until a black shade is achieved. A resist-dyed yarn is referred to as "*Kpalto*"; a piece-dyed yarn known as "*Jesinio*"; while the un-dyed yarn is called "*Balsu*" among the Gonja.

Plate 88 Dyeing yarns by immersion

Plate 89 Dyed yarns hanged for oxidizing and drying

Table 3: Results of extracted dye applied to fibre

This section shows the colours obtained from the sampled plants on fibre.

PLANT	PART USED	STATE	COLOUR OBTAINED
"Tefashia"	Bark	Dry	Yellow
Pawpaw	Leaves	Fresh	Yellow
Mango	Leaves/ bark	Fresh	Yellow
Bixa orellana	Seeds	Fresh and Tender	Red
Khaya senegalese	Bark	Dry	Red
Bixa orellana	Seeds	Dry	Orange
"Siriga"	Bark	Dry	Orange
Hibiscus sabdariffa	Leaves/Stalk	Dry	Pink
Lawsonia innermis	Leaves	Dry	Brown
Cola nuts	Fruit	Dry/Fresh	Brown
Khaya senegalese	Inner Bark	Dry	Brown
'Kuntunkuni"	Bark/Roots	Dry	Black
Nim tree	Leaves	Dry	Cream
Sorghum	Stalk	Dry	Red

3.32 Designing and Production of Sample Fashion Accessories

In producing the woven fashion accessories, preliminary design in rhino rendition were made before weaving commence see fig.11-16

3.32.1 Rhinoceros Models Rendered with Key shot

Fig.11 Modelled Veta vera

Fig.12 Modelled Veta vera hand bag

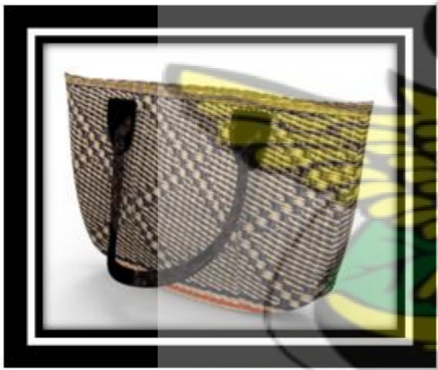


Fig.13 Modelled Veta vera shoulder bag

Fig.14 Modelled Veta vera bag

Fig.15 Modelled cyperus purse

Fig.16 Modelled Veta vera hat

3.33 Weaving of the Fashion Accessories

Fourteen-sample fashion accessories are hand woven and these are; The accessories from guinea grass is ladies handbags, purse, also from *Cyperus Articulatus* are the ladies bag and clutch purse from cotton is bag, slippers and a sandals form jute is a bag and sandals then finally accessories produced from raffia is an occasional hat and a purse.

3.33.1 Using Guinea Grass (Veta vera) to Weave a Bag

The linear hand weaving technique was employed to weave the *Veta vera* bag See plates 90-99.

Plate: 90 The skeletal framework of the Guinea grass bag

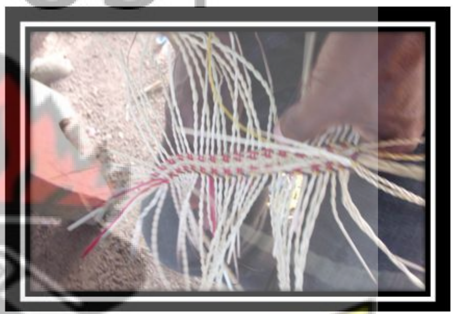


Plate: 91 Adding on more fibres to widen the base

Plate: 92 Putting on flesh to make the base of the Guinea grass bag

Plate: 93 Already made base for the guinea grass bag

Plate: 94 Adding more fibres for the body of the bag

Plate: 95 Half woven guinea grass bag

Plate: 96 Pulling the loop fibres to fasten the edge of the bag

Plate: 97 Looping the fibres to finish the edge of the guinea grass bag

Plate: 98 trimming the tightened edge with scissors

Plate: 99 Neatly trimmed Veta vera bag

3.33.2 Using Raffia To Weave A Hat

The circular weaving thechnique in fig.9a adopted to weave the raffia hats with macrame knots See plates100-105.

Plate: 100 Moistening of the raffia fibres with water before weaving commences

Plate: 101 Start-up circle for the crown of the hat

Plate: 102 The woven crown of the raffia hat and 1/3 of the brim

Plate: 103 Raffia hat attached with a piece of marbled leather

Plate: 104 Joining of the raffia purse

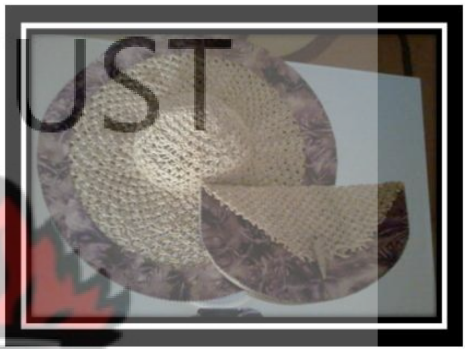


Plate: 105 Finished raffia hat and purse

3.33.3 Using Cyperus Articulatus

Particulars Used For Weaving Plain Weave for *Cyperus Articulatus* Bag

Warp yarn used............................ Cotton yarn

Weft yarn used .... Cyperus reed

Proposed width of weaves.......... 15 inches

Reed size .... 5 dents per cm

Heddling order 1,2,3,4

Treadling order ....…… Treadle one and treadle two

Plate: 106 Weaving the cyperus on the broad loom

Plate: 107 Woven cyperus

Plate: 108 Measuring to put various parts to scale

Plate: 109 Measurements transferred onto leather

Plate: 110 Cut out patterns

Plate: 111 Sewing the leather parts to the woven cyperus

Plate: 112 Stitched leather and cyperus parts

Plate: 113 Bag being lined after joining the leather and cyperus parts

Plate: 114 Joining the base to the body

Plate: 115 Finished cyperus bag.

3.33.4 Using Sisal

Particulars Used For Weaving Plain Weave for *Agave Sisalana* Bag

Warp yarn used............................	Cotton yarn
Weft yarn used	sisal
Proposed width of weaves..........	15 inches
Reed size	5 dents per cm
Heddling order	1,2,3,4
Treadling order ....……	Treadle one and treadle two

Plate: 116 Cotton yarns warped on the broadloom

Plate: 117 Interlacing of the sisal fibres with the laid warp

Plate: 118 Half woven sisal and cotton fabric

Plate: 119 Completed woven sisal and cotton fabric

Plate: 120 Cutting the finished cotton and sisal fabric from the broadloom

Plate: 121 Shaving of woven sisal fabric

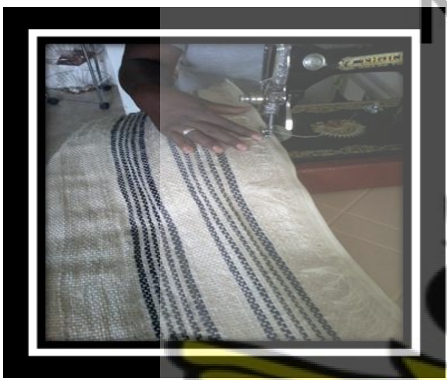


Plate: 122 Sewing of the sisal bag.

Plate: 123 Moulding of base of sisal bag

Plate: 124 Finished sisal bag

CHAPTER FOUR

RESULTS AND DISCUSSION OF FINDINGS

4.0 Overview

This chapter discusses the results of the experiment and findings of the field studies in relation to the objectives and the research questions outlined for the project, taking into account the selected fibres and materials identified for the project. This chapter also contains the implications of the findings.

4.1 Objective (1) (one): To identify some plant from which fibres and dyes can be derived.

- The research identified various natural plants which abound naturally in the environment suitable for the project.
- Natural plant for both fibres and dyes were identified for the project.
- Many natural plant fibres were identified; and among those recognised, the following were utilised for the project-Raffia, Sisal, flower stalk of guinea grass, banana trunk fibre, Cyperus articulates (Volta straw), Jute, Corn plant, spear grass, wild date palm, cat-tail and cotton.

It was realized that not all of the identified fibres could produce a very attractive fashion accessories due to their stiffness and shorter length. The selection was based on flexibility, workability and attractiveness of the fibres. In this respect the fibre materials that were found suitable for weaving the selected fashion accessories were Raffia, Jute, and flower stalk of guinea grass, Cyperus articulatus, cotton and sisal.

The natural dye yielding plant identified were Mango tree, Mahogany, Nim tree, Hibiscus Sabdariffa, Kyenkyen, Sorghum bicolour, *Badie* and Indigo fera, Bixa Orellana, Krannan Kote (Sphenocentraum jollyanum), Bombax brevicuspe.

It was also realized that all of the identified plant yielding dyes could produce dyes which has the potentials of being used to dye; the extracted plant fibres were selected based on its attractiveness. The extracted plant fibres were subjected through colour fastness and wash fastness due to the nature of fashion accessories needed to be produced.

4.2 Objective two (2): To ascertain the properties of these relevant plant fibres for its adoption into other weaving techniques.

1. **Raffia**

   The research revealed that Raffia fibre is strong and less absorbent. It has poor affinity for dyes and bleach. Raffia can also be destroyed by acid and weakened by extensive exposure to sunlight. The raffia yarn has moderate tensile strength.

2. **Flower stalks from guinea grass (veta vera)**

   Flower stalks obtained from guinea grass were also identified as one of the fibre materials. It is not flexible unless soaked in water. It breaks when working with it in its dry state. It has a natural rich cream colour which makes it appropriate to use without dyeing. It has good affinity to dyes organic dyes such as "kuntunkuni", Bixa orellana.

3. **Cyperus-articulatus (Volta Straw)**

   The stem obtained from the cyperus was also identified as one the fibre materials. It has a rich cream colour when dried. Just as the guinea grass, it can easily break when dry. It is therefore flexible when wet as such, it is always appropriate to continually wet it whiles working with it to weave. It has good affinity to dyes. Cyperus articulatus can be destroyed by acid.

4. **Plantain/Banana Fibres**

   Banana and Plantain fibre was found to be quite strong and absorbent. It has a smooth appearance. It also has a good affinity to dye and bleach. It disintegrates in caustic soda and can be destroyed by acid. The yarns are destroyed by mildew and weakened by extensive exposure to sunlight. The fibres are highly flexible and could be controlled.

5. **Sisal Fibres**

   The experimental work carried out in the research indicated that sisal contains fine fibres which could be used for weaving fashion accessory on the loom. It has high tensile strength. It can be twisted. The fibres bleached well using liquid parazone or Eco-wash washing powder for washing them. They were successfully dyed with *badie* plant dye.

6. **Jute Fibre**

   Jute is one of the fibres. It is a long, soft, shiny fibre in appearance. It can be twisted. It has high tensile strength, and ensures better breathability. It is environmentally friendly. It has low thermal conductivity and emits fluffy particles when working with it so it is advisable to always cover the nose with a nose mask. It has good affinity for dyes and can be bleached, but can easily be destroyed by acids.

7. **Cotton Fibre**

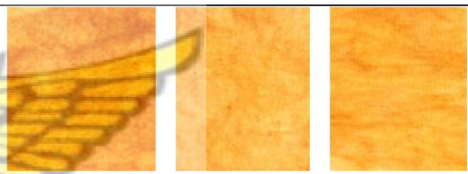
   Cotton is a moderately strong tensile strength fibre. Cotton does not stress easily. It cannot be stretched or it is inelastic. There is a gradual loss of strength when cotton is exposed to sunlight and turns yellow. It is not affected but can be destroyed by mildew. Cotton can be attacked by fungi and bacteria.

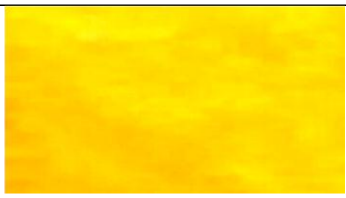
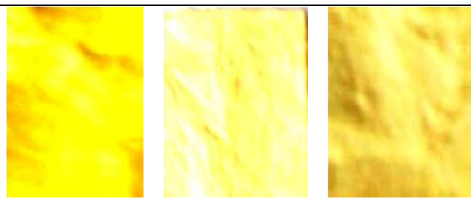
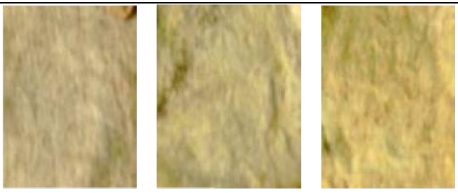
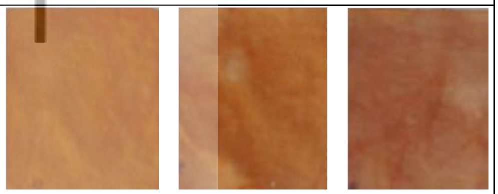
It was discovered that most of the fibres such as corn husk, plantain and raffia have less usage in our environment except for its use as wrapping material in the case of by acids, corn husk and plantain bark and as tying materials in the case of raffia and jute. However, the results of the study indicated that these natural plant fibres can be used as a means to generate income towards poverty reduction in Ghana. A venture to create jobs and employment for the youth.

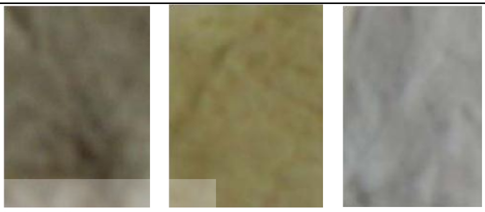
4.3 Results of extracted dye applied to fabric.

This section shows the colours obtained from the sample plants and with a mordant.

Table 4: Results of extracted dye applied to fabric.

Name of plant	Original dye colour	Colour with mordants (A)-Alum, (B)- Lime, (C)- Salt
Bixa orellana		 A B C
Kraman kote (Sphenocentrum jollyanum)		 A B C
"Sobolo" (Hibiscus sabdariffa)		 A B C
Nim tree (Azadirachta indica)		 A B C

"Tefashia"		 A B C
"Onyame dua" (Alstonia booni)		 A B C
Sorghum leaves (Sorghum bicolor)		 A B C
Fresh Mango leaves (Mangifera indica)		 A B C
Dry Mango leaves (Magnifera indica)		 A B C
Morinda lucida		 A B C
Mahogany (Khaya Senegalensis)		 A B C

Cola nuts (Cola acuminata)		 A B C
Fresh Pawpaw leaves (Carica papaya)		 A B C
Dry Pawpaw leaves (Carica papaya)		 A B C

4.4 Objective three (3). Designing and utilizing macramé techniques and other traditional weaving techniques for the production of selected fashion accessories

The sample fashion accessories produced from the selected plant fibres and described in the report are photographically documented and discussed in the following sections to help readers appreciate the kinds of resources these raw materials can be used for.

4.4.1 A Clutch purse made from Raffia fibre

The sample raffia purse was produced from twisted raffia yarns, which were woven using the macramé technique. The sample was combined with natural leather obtained from the goat skin. The natural leather was marbled with rich pink colour from Hibiscus sabdariffa. The raffia fibres were woven in their rich natural cream colour without dyeing.

The sample purse was thong to trim the edges using the thonging technique known as double cordovan stitches.

Plate: 125 Front view of raffia purse

Plate: 126 Side view of raffia purse

The inside of the purse was lined with a cotton fabric lining. The front view was decorated with beads, to enhance its beauty.

4.4.2 A Hat Made from Raffia

The sample raffia hat was made with twisted natural colour of the fibres. The crown of the hat was woven using the macramé technique. Whiles $^{2}/_{3}$ of the brim was woven one $^{1}/_{3}$ is made up of leather to design it.

Plate: 127 A finished fashionable raffia hat

Raffia Hat

The edge of the Leather portion of the brim was thronged using the double cordovan stitches. The joint of the brim and the Crown was decorated with a twisted raffia cord and beads to match the purse. The fashionable raffia hat and purse can be used for an occasion such as weddings, outdooring, party and church services.

Plate: 128 A finished fashionable raffia hat and purse

4.4.3 A Bag Made from Jute

The jute bag was made with bleached jute yarns and dyed with a combination of sorghum bi-colour and *bagaruwa* dye extracts to attain a coffee brown colour. The treated natural yarns were woven using the macramé techniques of square knots and blanket stitches. The front part of the bag was divided into three (3) sections and woven with the blanket stitch to create five (5) triangular patterns at the top and the bottom of the bag. The middle portion which created five rows of designs was woven using the square knots. The handle was designed with a metal buckle to enhance its beauty. The bag can be hung on the shoulder or hold in the hand.

Plate: 129 A finished fashionable jute bag

4.4.4 A Slippers Made from Jute

The ladies jute fibre slippers were made with its natural colour and its dyed yarns. The slippers were woven using the Josephine technique in macramé to weave the upper portion and the sole was made by the board and bona. The slippers came out in rich cream and coffee brown. It can be used as a casual wear.

Plate: 130 A ashionable casual jute slippers in a plastic last

4.4.5 A Purse Made from Cyperus articulatus

The plain weave structure was first used to weave the Cyperus reed on the broad loom before using it to produce the fashion accessories. The Cyperus was used as a weft whiles cotton yarns were used as a warp. The woven reed was combined with brown leather to make a purse.

Plate: 131 Front view of finished cyperus purse

Plate: 132 Back view of finished cyperus purse

4.4.6 A Bag Made from Cyperus articulatus

The bag was made with the natural rich cream colour of the Cyperus-articulatus fibre and natural leather. The natural leather was used to make the base which forms $^{1}/_{3}$ of the bag, to create a re-enforcement. The handle of the bag was also made with natural leather. The inside of the bag was lined with a brown cotton lining and with an inside phone pocket and a zip fastener.

Plate: 133 Finished fashionable Cyperus bag

4.4.7 A Purse made with Guinea Grass

The flower stalk of the guinea grass was dyed and also left in their rich cream colour before weaving the purse. Two purses were woven in all. They were all woven using the off-loom method. One was woven in a rectangular shape and the other in a circular shape. They were both lined with cotton lining. The inside of the purse has a pocket opening for safe keeping and handling of money and other documents. It can be used for any festive occasions.

Plate: 134 Front view of guinea grass (veta vera) purse

Plate: 135 Back view of guinea grass (veta vera) purse

Plate: 136 Finished guinea grass (veta Vera) purse

4.4.8 Guinea Grass Bags

The Guinea grass bag is made of treated natural fibres and dyed with *bixa Orellana* to attain the red colour. The yellow fibres were dyed with fresh mango leaves, indigo and black. The treated natural fibres were mixed with the dyed fibres to weave interesting plain weave pattern using the off-loom technique to achieve a simple weave which appears like a draft board pattern. The second bag was also woven using the *kuntunkuni* dyed fibres mixed with the natural cream colour to achieve a rhythmic diamond designs on the surface.

Plate: 137 Finished fashionable guinea grass bag

Plate: 138 Finished fashionable guinea grass bag

4.5 Implications of Findings

The results of the experiment show that some of the sampled plant fibres and dyes are suitable for the fashion industry. Where the importance of fibres is not restricted to rapping and tying materials but can be used as a means to produce fashionable accessories. It also shows that some of the sample plant dyes are suitable for the textile industry where the importance of a dye is not only its ability to remain colourful but also colourfast. In this connection, sorghum bicolour, Hibiscus Sabdariffa, *Kuntunkuni*, Indogofera, Sphenocentum jollyanum (Kraman Kote), Bixaorallana, Pawpaw and others are suitable for use in the dyeing of fibres.

Finally, it can be inferred from the literature, field data and the interesting results of the experiment that all the plants studied do not only yield viable dyes and fibres that can be used to produce fashionable fashion accessories, but they also have potent medicinal properties as Irvine study (1961) of woody plants of Ghana indicates. This information was confirmed by research material and information from the Centre for Scientific Research into Plant Medicine (CSRPM) at Mampong Akuapim where all the plants studied have been used in the production of several medicines for fever, malaria, diabetes, hypertension, sexual weakness and many other tropical ailments.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Overview

The end of a thing is more important than the beginning, thus, a summary of the relevant points and findings revealed by the study, the informed conclusions and beneficial recommendations are important elements that could convey the relevant materials derived from the study to promote discussion on using organic dye traditional fibres for the production of fashion accessories.

5.2 Summary

The main focus of the research was to use organic dyed traditional plant fibres to produce selected fashion accessories. The experiments and extraction process were therefore conducted with identified plant fibres to produce woven fashion accessories. Fourteen woven fashion accessories were produced in the project and the following observations were made:

The harvesting of raffia plant does not endanger its existence. Both the old and freshly harvested raffia fibres gave stronger yarns suitable for weaving. Raffia fibres dyed did not yield good results, As a result of that the raffia used for the project was used in its natural cream colour. The natural raffia yarns were turned into (creamy brown) Khaki when boiled. Twisting of raffia fibre requires frequent moistening to ensure smooth yarn twisting.

The harvesting of guinea grass also does not endanger its existence, since the stalk is only pulled leaving the base intact. The straw had a great affinity to dyes. In weaving, the moistened warp interlaced beautifully, creating a wonderful float. Care was taken to avoid over moistening to prevent the straw from breaking, however, moistening should be done in moderation. Sewing the lining of the bags and purses had been a challenge since turning the inside of these compact woven bags and purses became cumbersome during sewing.

Whereas, in joining the various parts of the *Cyperus articulatus* bag together with the edges were wetted to avoid breaking.

The *Cyperus articulatus* and guinea grass fibres have similar characteristics except that the Cyperus were much longer and broader than the straw.

It was tedious extracting some of the fibres such as banana, plantain and sisal because the individual fibres had a tendency to break, and was not possible to obtain long yarns and to achieve this, the fibres had to be twisted together to obtain the required length of yarn. Fibres like plantain and sisal after processing for weaving resulted in materials which have similar characteristics like woven fabric with short floats. Other fibres like the Cyperus and guinea straw resulted in long floats and a coarse fibre surface. Collection of the plantain bark did not interfere with the plantain plant. The newly sheet of dried plantain bark was stronger than the older bark. Weaving with the jute fibre emits particles that can block the nose, and therefore required the use of the nose mask. The length of the jute was cut in accordance with the length sufficient for the work, in the same way as the cotton fibre. This is very necessary when using the macramé technique in weaving.

Natural fibres such as Cyperus, guinea straw and corn husk became creamier, after boiling with alkaline (potash) while raffia turned into creamy brown.

The jute and cotton were bleached. Jute when bleached resulted into a rich cream colour. Both fibres were dyed to achieve good results using the natural dyes, but was realised that the jute fibres when bleached for more than 10 minutes got destroyed.

Twill weave was woven on the broadloom using processed *cyperus articulatus* and sisal fibres. The same heddling orders (121,434) were used for all the selected weave structures for the project. The treadling order 4 and 3and the plain weaving orders 1 and 2 were used to raise and lower the warp yarns during weaving to achieve all the structures woven.

All the Natural dyes selected for the projects were able to dye the fibres used with the exception of *hibiscus sadariffa* dye which did not achieve good result on guinea straw.

5.3 Conclusion

1. The purpose is to design an innovative way of processing organic, natural fibres and dyes for the production of selected fashion accessories by adopting other unconventional weaving techniques. This task was accomplished by undergoing through the following objectives

(a) Objective (one) (1): To identify some plant from which fibres and dyes can be derived.

(b) Objective two (2): To ascertain the properties of these relevant plant fibres for their adoption into other weaving techniques.

(c) Objective three (3). Designing and utilizing macramé techniques and other traditional weaving techniques for the production of selected fashion accessories

Assisted visits to various localities in Ashanti, Volta and Northern Regions helped to identify, photograph and collect samples of the plants for the experiments. Some indigenous weavers and dyers were interviewed and observations of traditional processing techniques made. Experiments were conducted on the plant fibres identified to explore their potentials of deriving fibres and dyes under basic art studio conditions. Their suitability for weaving will expand the raw material base to sustain the fashion industry; making indigenous knowledge available to the producers of fashion accessories and the textile industry at large. This will create awareness on the potentials of the natural fibres and dyes in our environment

5.4 Recommendations

Having critically explored fibre and dye potential plants and weaving the sample fashion accessories the following recommendations have been made for implementation as an added advantage to the fashion industry in Ghana:

1. Fibre and dye extraction should be introduced in the school curriculum so that teachers can encourage students to use natural plant fibre materials in their environment for weaving. This will help promote the patronage of local fibres.
2. Other forms of retting processes should be experimented on some of the materials for fibre extraction to reduce the rate of breakage of the fibre which results in wastage. Again, care should be taken in the beating, washing and combing process of fibre processing. Indigenous spinning processes should be encouraged to achieve continuous yarns for weaving on the loom.
3. The Ministry of Environmental Science and Technology together with the Ministry of Agriculture and other research institutions such as The Council for Scientific and Industrial Research should come together to improve upon the cultivation of plant yielding fibres and dyes, fibre and dye extraction and improved local dyeing processes. It is also essential that research institutions come

out with scientific research on how to improve upon the fastness of local dyes in Ghana.

4. For the cause of domestication, a commission of textiles composed of other boards must be established by government to encourage dyers on the use of organic dyes and its effects on the economy. Indigenous weavers must also be encouraged on the importance of using local fibres. This will help dyers and weavers transform their products into more marketable and less harmful apparel.
5. Researchers must be encouraged to explore more on the use of plants as organic dyes. Whiles considerable research effort should be directed to improving Ghanaian fibres, rather than constrain. This is a potentially fertile area for further research into the extent to which natural fibres can be cheaply produced in Ghana.
6. The application of the results of the study should inform the local fashion industry on the need to rely on these products because of their ability to produce aesthetically pleasing fashion accessories so as to promote products of the local fashion industries.
7. The university should make available this document to students who would want to research further in this area as a reference material.

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