

## PLANTAIN FIBRES AND IT'S APPLICATION FOR INTERIOR DECORATION IN NIGERIA

**Ngozi k. Okeke**Department of Fine and Applied Arts  
Nnamdi Azikiwe University, Awka**Chinedu C. Chukueggu**Department of Fine Arts and Design  
University of Port Harcourt**Abstract**

Plantain fibre is a natural fibre obtained from the pseudo stem of plantain plant. Usually in Nigeria the pseudo stem constitutes huge waste which poses a great challenge for the farmers to dispose after harvesting the fruits. But these waste pseudo stems can generate useful fibres that are biodegradable. This paper is focused on extraction of fibre from plantain (*musa paradisiaca*) pseudo-stem that fruits have been harvested from. The waste Pseudo stems were obtained from plantain plantations in Anambra state of Nigeria. The fibres were extracted manually without the addition of chemicals and dyed with organic dye to enhance its aesthetic appearance. Thereafter it was braided into long ropes, then with macramé, weaving and sewing techniques these ropes were used in producing different interior decoration accessories such as macramé flower hangers, flower basket, curtain tie backs, table mats and ornamental flower pots. This will help to highlight the different opportunities it presents for the production of interior decoration accessories. Nigeria as one of the largest plantain producing countries in the world has so much waste of plantain pseudo stems. Therefore the use of plantain fibre for the production of interior decoration material will convert these wastes to income generating materials that will provide alternative source of income to subsistent farmers and unemployed youths in Nigeria.

**Key words: Plantain, Fibre, interior decoration, curtain tie back, flower hanger, table mat.**

**Introduction**

There is a growing popularity for the use of natural fibre in place of synthetic fibre even for the production of interior decoration accessories in recent times. Other countries in Asia with high rate of plantain and banana production like India, Nepal and Philippines among others are taking advantage of the valuable fibre content of *musa* species to create eco- friendly products, Manogna (2017) But presently in Nigeria most farmers are not aware that useful fibres can be generated from these waste pseudo stem. Consequently

some of the farmers that own large plantain plantations had to pay labourers extra money to cut out and dispose the pseudo stems that fruits have been harvested from. This is in spite of the fact that the demand for products made with natural fibre are on the increase because of their environmental friendliness. Akubueze et al (2015) citing Koziowski (1996) suggested that the demand for fibres used for clothing is expected to rise from the current 60million tons to about 130million tons per year by 2050. The report further explained that a plantain or banana plantation of about 500,000 acres might yield 100,000 – 200,000 ton of fibre and a fresh pseudo stem yields 1.5% of fibre. Utilizing the waste pseudo stem for the production of interior decoration accessories will not only provide an avenue for farmers to dispose the waste generated after harvesting the fruit. It will also give them opportunity to make extra money from the pseudo stem instead of allowing it to waste away. Fibres extracted from plantain stalk will also provide an alternative natural fibre that will reduce the dependence on synthetic fibre for the production of interior decoration accessories and its negative impact on the environment. This study will focus on extracting fibre from plantain (*musa paradisiaca*), because FAO (2004) report, states that Nigeria is one of the largest plantain producing countries in the world. According to the report, Nigeria is ranked as the fifth highest producer of plantain in the world.

### **Structure of Plantain Plant**

Plantain (*Musa paradisiaca*) is among the categories of plant known as tree – like perennial herb, because the mother stems naturally dies after fruiting. A plantain plant can be surrounded with four or more generations of fruit bearing plantain stems that grows simultaneously, however when the parent stem dies naturally after fruiting they are replaced with new sucker FDA (2003) Structurally plantain plant is made up of a cylindrical structure that looks like a stem rising from the soil which carries the foliage. But it is actually a false stem consisting of overlapping leaf sheaths because the growing tip of the plant remains near the soil level Swennen, (1990) Plantain plant is said to be stoloniferous because it produce underground shoots or suckers that roots at each segment Screenivasa, (2015) Consequently it is propagated mainly through vegetative propagation which is achieved by cutting and transplanting the shoots or suckers.

Plantain is cultivated mostly in countries with tropical weather. In Nigeria for instance the cultivation of plantain is concentrated in the southern part of the country with hot and humid weather. The International Institute of Tropical Agriculture (IITA) and FAO research use the word plantain (*musa paradisiaca*), to describe *musa* species that are starchier and cooked before eating. Moreover the fruits of plantain are larger, longer and firmer; possess a higher starch content and thicker skin than the fruits of other *musa* species. Plantain fruits are approximately 4 -12 inches (10.2- 30.5 centimeters) PTRI (2005). It further stated that plantain unlike banana exerts apical dominance on its developing suckers; this is obviously why a mature plantain cannot produce more than 4 or 5 suckers around it.

**Description of Fibre and the Emergence of Plantain Fibre**

Fibres have played an important role in human lives right from the time of the caveman. Fibre is defined as a natural or synthetic filament that may be spun into yarn. Colin (2013) seeing it from the angle of thread defined fibre as “any thread-like parts that form plant or artificial material especially those that can be made into cloth, or a mass of such parts twisted together. Legal encyclopedia (2012) describes fibre as a unit of matter which is capable of being spun into yarn or made into fabric by bonding or by interlacing in variety of methods, including weaving, knitting, braiding, felting, twisting or webbing and which is the basic structural element of textile products. Consequent on these definitions plantain fibre is a filament that can be woven or processed into fabric or other textile related products.

The earliest evidence of the use of plantain can be traced to 13<sup>th</sup> century in Japan where it was used in making cloth, Manogna (2017) Probably the discovery of other conventional natural fibres like cotton and hemp, wool and silk brought a decline in the use of plantain fibre. However some of these other natural fibres are treated with chemicals that make it difficult to degrade on their own. For instance Swami (2011) states that although cotton is a natural fibre it is conventionally grown using high level of chemicals and pesticides because of its predisposition to insect attack. The report explains that cotton one of the most widely used natural fibre accounts for 10% of all pesticides and 22% insecticides applied in agriculture. This high level of pesticides and insecticides will definitely have an adverse effect on the environment. Hence the increasing environmental awareness and growing importance attached to eco – friendly fibres. In recent times, plantain fibre has been acknowledged as an eco-friendly fibre that can be used for various applications.

Plantain fibre is a good raw material for the production of some interior decoration accessories, because of its numerous properties. It is easy to access and can be available in sufficient quantity. It has long and strong fibre that can withstand the mechanical operation of twisting, braiding, and weaving, without breaking. It can be processed into a slender filament of sufficient length, strength and pliability to be spun into yarn. It is light weight and it can absorb and drain water easily. It has a smooth shiny appearance, and can be dyed with organic dye. It can be extracted manually without the use of chemicals. The extracted fibres are durable and above all bio-degradable.

**Design; Significance to Interior design / Decoration**

Design as an action is defined by Hornby et al (2010) as “doing or planning something with a specific purpose in mind” Design therefore is an arrangement with intent or goal. Anything that emerges as a result of planning to a large extent is regarded as a design. Design is concerned with how needs are identified, related and in some cases stimulated. It affects the ways in which our materials, energy, skill and other resources are utilized to satisfy these needs. Decoration on the other hand is an activity that involves making something to look more attractive by putting something on it or around it according to Cambridge dictionary. Design is mainly about function, how things work, while decoration is primarily about aesthetics, how things look. But there is usually an overlap between the two because even functional interior accessories are also designed to be aesthetically pleasing. Therefore interior design / decoration can be described as the art of enhancing the interior of a building in order to provide a comfortable and aesthetically pleasing effect. Interior design or decoration deals mainly with the indoor aesthetics of a

building. One of the ways of enhancing the aesthetic quality of the interior of a house is by decorating it with soft furnishings. Furnishings used in decorating a home signify elegance, décor, harmony and grace Kusum et al (2017) Soft furnishing helps to add personalized touch to home, it comes in form of different accessories that are used in a room which adds utility and comfort to it

Some of these accessories can be both functional and decorative at the same time; however there are some that are purely for decorative purpose. For instance curtains and draperies satisfy functional and decorative purpose. Apart from it serving as cover for windows and doors, it is also used to enhance the interior of the home. Throw pillows add aesthetic value to cushions because often they are made to harmonize with colours of cushions but apart from this, they also make the cushion more comfortable. Table mats not only add to beauty of the dining table arrangement, but it is also used to protect the surface of the table from heat impact. Especially those laminated with Formica sheets. Other example of soft furnishing used in the home that serves both decorative and functional roles are curtain tie back, macramé flower hanger. Interior decoration accessories such as ashtrays and waste baskets are example of functional home accessories while ornamental vases, flowers both natural and artificial, paintings and sculpture works are for decorative purposes.

In recent times interior designers and decorators have come to realize the importance of using eco-friendly materials for the production of interior design accessories in order to promote a healthy environment. With the increased awareness of the negative impact of synthetic products on the environment, the interior designers now try to strike a balance between aesthetic and functionality with the type of materials that will be used to ensure a healthier environment. Kusum et al (2017) Plantain fibre extraction and usage for the production of interior decoration accessories is geared towards satisfying the human need of finding an alternative fibre to the nonbio-degradable fibres. In order to avert the negative impact of synthetic materials and the pollution they bring to the environment.

### **Extraction of Fibre from Plantain Pseudo stem**

The extraction of fibre from the pseudo-stem of plantain is usually done carefully in order to avoid breaking or damaging the fibre. The extraction was carried out manually following the procedures described here.

#### **Steps**

Step 1. The plantain trunk is cut down from the corm region after the fruits have been harvested.

Step 2. The first outer layer of sheaths is removed and discarded because it is coarse. Then the remaining sheaths are desheathed or separated one after the other until the core with pulpy matter is reached.

Step 3. The sheaths will be arranged on a flat table or flat wooden board according to their position in the stalk because the position of the sheaths in the plantain trunk determines the texture of the fibre extracted from it.

Step 4. Then with blunt knife scrap the sheath until the pulpy cellulosic tissue is removed to ease out the fibres.

Step 5. The strands of fibre will be gathered and washed in clean water to remove dirty and broken fibres.

Step 6. After washing, the fibres will be combed to detangle any tangled fibre.

Step 7. It will then be spread under a shade but airy place to dry and it is ready to receive dye if so desired.



Plate 1: Drying of Extracted Plantain Fibre: Okeke (2020)



Plate 2: Dyed Plantain Fibres. Okeke (2020)

### Observations

In the course of extracting fibres from the pseudo-stem of plantain the following observation were made.

- i) The fibres are positioned mainly adjacent to the outer surface of the sheaths.
- ii) The trunk is made up of a pulpy fibreless central core that extends along the entire length of the trunk.
- iii) The first two outer sheaths are purple green or a bit brownish in colour, while the inner most sheaths are white.
- iv) The fibres extracted from the outer sheaths are coarser and shorter, while the fibres from the inner sheaths are longer and softer.

### Adaptation of plantain fibres for the production of various interior design / decoration accessories.

Varieties of interior design or decoration accessories that are environmental friendly can be made using plantain fibre. However the fibres have to be converted into yarns before it can be used in creating interior design accessory. Converting the fibre into yarn is regarded as rope making. Mohiuddin et.al (2014) quoting Manadhar 2010 states that 'rope is a length of fibres, twisted or braided together to improve strength for pulling and connecting. Therefore the fibres were braided into long ropes before it was used for the production these interior design accessories.

### Macramé Flower Hanger

The macramé flower hanger was made with dyed plantain fibres of two colours following these procedures;

- i) Strands of plantain fibre were braided into long ropes to improve strength for pulling.
- ii) The braided ropes were cut into ten pieces (6 colours of green and 6 colours of yellow) of the same length.
- iii) The ropes were tied alternatively on a ring and then hanged on a nail attached to a frame.
- iv) Then the ropes were knotted into a band of 9 inches by two inches using macramé technique.
- v) At this stage the ropes were separated into three different parts, with four ropes of two colours on each part.
- vi) The bowl that will contain the flowers was fixed on top of the ropes and ropes were tied into knots underneath the bowl.
- vii) The excess ropes were cut out with scissor and the macramé flower hanger is then ready for use.



Plate 3a: Production of Macrame flower hanger Plate 3b: Macrame flower hanger produced with dyed plantain fibre Okeke (2020) with dyed plantain fibre Okeke (2020)

### **Macramé Curtain Tie Back**

The macramé curtain tie backs were made with dyed plantain fibres of different colours following these procedures;

- i) Strands of plantain fibre were braided into long ropes to improve strength for pulling.

- ii) The braided ropes were cut into eight pieces equal length of two colours.
- iii) The ropes were then held from the centre, tie a ring with the ropes in the centre and suspend the ropes downward.
- iv) Thereafter, the ropes were knotted alternatively to get a band of 15 inches by 1½ inches. The length of the curtain tie back, is to be determined by the thickness of the curtain.
- v) A wooden bead may be attached at the edge to hold it in place before knotting it finally. And it is ready for use.



Plate 4: Curtain tie back made with plantain fibre. Okeke 2020



Plate 5: Curtain tied to the wall using tie back made with plantain fibre. Okeke (2020)

#### **Flower basket**

The flower basket was made with dyed plantain fibres according to these procedures;

- i) Strands of dyed plantain fibres of two colours were braided into long ropes to improve strength to for pulling.
- ii) The braided ropes were sewn into a rectangle shape of 4 inches by 3 inches to form the base of the basket.
- iii) Two rectangular shapes of 4 inches by 2½ inches and two of 3 inches by 2 inches were formed and stitched to the base to form the basket.
- iv) The handle of the basket formed with braided band of plantain fibre were stitched to the basket.
- v) The basket is ready for use.



Plate 6a: Flower basket made with dye Plate 6b: Flowers in a basket made with plantain fibre Okeke (2020) plantain fibre Okeke (2020)

### **Ornamental woven Vase**

The ornamental pot was made with dyed plantain fibres and recycled aluminum wires according to these procedures;

- i) Recycled aluminum wires were used to form the frame of the ornamental vase.

- ii) Strands of plantain fibre in its natural colour and dyed plantain fibres were interlaced in between the aluminum frame starting from the base until the whole body was covered
- iii) The same process was used on the rim of the vaset, until it was covered with interlaced plantain fibre.
- iv) Scissor was used to trim off rough extruding fibres and the ornamental vase is ready for use.



Plate 7: Ornamental flower vase made from recycled aluminum and plantain fibre Okeke (2020)

#### **Tablemat**

The tablemats were made with both plantain fibre in its natural colour and dyed plantain fibre following these procedures;

- i) Strands of plantain fibre mainly obtained from the outer sheaths of the plantain trunks with more coarse fibres were braided into long ropes to improve strength to for pulling.
- ii) The braided ropes were coiled into a circular shape of 4 inches in diameter each and stitched together.
- iii) It takes five circular shapes of the stitched braided plantain fibre to form each table mat. Five circular shapes of each colour formed, were then stitched to each other at the edge to form a flower shape with an opening in form of star at the centre.



Plate 8: Table mat produced with plantain fibre. Okeke (2020)

### Conclusion

Plantain is widely cultivated in southern part of Nigeria because its fruits rank third among the starchy staples after cassava (*Mahihot esculenta*) and yam (*Dioscorea spp*). It is a major source of carbohydrate for many families in Nigeria. Akinyemi et al (2015) Nigeria is rated as one of the leading plantain producing country in the world, therefore the huge waste pseudo stem generated after harvesting plantain fruits can be harnessed to provide alternative source of income for farmers. However most farmers in Nigeria are not yet aware that apart from the sales of plantain fruits, its waste pseudo stem can also yield valuable fibre from which they could earn extra money. By highlighting interior decoration accessories that can be produced with plantain fibre, this study creates the needed awareness. The results of this study will also be a motivation to the unemployed youths in Nigeria to take advantage of the numerous opportunities plantain fibre could offer as a source of income. If the use of plantain fibre is properly harnessed it could bring a reduction in the rate of unemployment in Nigeria. This is because of the various entrepreneurial potentials it offers. For instance extracting and selling the fibres to manufacturers working with eco-friendly fibres. The fibres can also be extracted and worked with to produce eco-friendly interior decoration accessories that can be sold directly to end user. It would therefore be necessary for government at the states where plantain is predominantly grown to sensitize the youths about the enormous opportunities presented by the use of plantain fibres for the production of interior decoration accessories. This could be done at local government levels through the different skill acquisition centres as a means of

empowering the unemployed youths. Because small scale extraction of plantain fibre is not capital intensive, extraction can be done on an individual bases or small groups can be formed and with division of labour the extraction and processing can be carried out faster. Plantain fibre presents enormous opportunities for creative output in the area interior design or decoration. If these opportunities are properly harness, it will go a long way in providing source of livelihood to the unemployed youths as well as extra income for plantain farmers.

The production of interior decoration accessories with plantain fibre does not only offer economic empowerment, but will help in reducing the impact of pollution, which comes with disposing synthetic fibre material by burning. This is because interior decoration accessories produced with plantain fibre could break down on their own after sustained usage.

These pseudo stems should not be allowed to waste away, particularly now that the awareness of the devastating effects of non degradable fibres on the environment has increased. With the ripple effects of the global pandemic that have seen many people out of their jobs, it is expedient that Nigerians embrace the opportunities presented in using plantain fibre for interior decoration accessories as an additional source of income.

## Reference

- Akinyemi, S.O.S., Aiyelaagbe, I.O.O., and Akyeampong, E., (2015) Plantain (*Musa spp.*) Cultivation in Nigeria: a Review of Its Production, Marketing and Research in the Last Two Decades. *Acta. horticulturae* November 2010 DOI:10.17660/ActaHortic.2010.879.19 <https://www.researchgate.net/publication/267428957>
- Akubueze E.U, Ezeanyanaso C.S., Orekoya E.O., Ajani, S.A., Obasa, A.A., Akinbode, O.A., Oni F., Muniru, O.S., Affo, G., Igwe, C. C. (2017) "Extraction and Production of Agro Sack from Banana (*Musa Sapientum*) and Plantain (*Musa Paradisaca I*) Fibres for Packaging Agricultural Produce. *International Journal of Agriculture and Crop Sciences*.
- Colin, M. (2013) Cambridge Advanced Learner's Dictionary; Cambridge University Press; 4<sup>th</sup> edition (August 6. 2013) Food and Agriculture Organization AGROSTAT Database (2004): FAO (2004) <http://www.fao.org> (02/2008)
- FDA (2003) Techniques/ Methods of Plantain and Banana sucker Propagation. Plantain and Banana Development Programme, Federal Department of Agriculture, National Seed Service (NSS) Complex, P.M.B. 5517, Ibadan
- Hornby, A.S., and Turnbull, J. (2010) Oxford Advanced Learner's Dictionary. 26<sup>th</sup> April 2010 Oxford University Press, USA

- Kusum, R., and Surender, S.D., (2017) Interior Decoration CC Haryana Agricultural University Hisar Pg13-16 <https://www.researchgate.net/publication/315835473> April 2017 Dol:10.13140/RG.2.21797.09443
- Manogna, A. (2017). *A study on Banana Fibre Clothing*: Dissertation Project Report. Masters of Design space Thesis. National Institute of Fashion Technology, Mumbai. 2017.
- Nigel A. (2018) "The world's leading-plantain producer" World Atlas <https://www.worldatlas.com/articles/the-worlds-leading-plantain-producer>
- PTRI. (2005) Banana: Development of the technology on Processing Banana fibre as an Investment Opportunity; indigenous Fibres for Textile Application. Textile Development (4) Philippines Textile Research Institute (2005)
- Okeke, N. K. (2014) *Fiber Art Among The Igbo Of Anambra: A search for New Indigenous Fiber* Unpublished MFA Thesis Nnamdi Azikiwe University Awka.
- Simpson, M., (2018) Press Kit-Green Banana Paper, <https://greenbananapaper.com>pages> Retrieved on 26<sup>th</sup> February 2020
- Sreenivasa H.V., (2015) Introduction to Textile Fibres. Revised Edition, Woodhead Publishing India Pvt. Ltd 2015
- Sumathi, G.J., (2010) Elements of Fashion and Apparel Design, New Age International Limited, Publishers, New Delhi
- Swami, C. (2011) Textile Design Theory and Concept, New Delhi: New Age International Publishers
- Swennem, R. (1990) Plantain Cultivation under West African Conditions. A Reference Manual, Amarin Printing Group Co., Bangkok.