

THEME: SCIENCE AND TECHNOLOGY FOR SUSTAINABLE DEVELOPMENT

HOW TO MAKE PAPER OUT OF WASTED OKRA STEM

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COUNTRY- KENYA

TABLE OF CONTENTS

Name	PAGE NUMBER
Theme	1
Modes of presentation	1
Background information	2
Introduction	3
Statement of objectives	5
Statement of originality	5
Equipments	6
Procedure	7
Observations and data	8
Problem statement	10
Advantages	12
Disadvantages and solutions	13
Relevance to theme	14
Link with emerging issues	15
Parameters and adjustments	16
Effects of change of parameters	17
Constraint	17
Efficiency	17
Conclusion	18
Commendations	19
Recommendations	19
References	20

STATEMENT OF ORIGINALITY

Our project is completely original because:

- It has never been widely known in Kenya.
- It has never been implemented in any east African countries.

STATEMENT OF OBJECTIVE

Our objectives are as follows:

- To improve our countries sustainability through the use of our project.
- Helping Kenya to move one step closer towards the goals of the vision 2030
- To slow down the rates of global warming as trees will not be cut down to make paper with the help of our project.
- To decrease the amount of trees cut per year to save our environment and have a brighter future.

BACKGROUND INFORMATION

The main problem facing Kenya today is drought, lack of food and water. Cutting down trees is why we do not have any rainfall as trees play a very important role in the water cycle. Our increasing demand of paper is what leads us to cutting down trees.

This project will explain how Kenya can be released from these problems because it does not use trees to produce the paper.

We came up with this project when we realized how bad our environment conditions of Kenya have become. This project on making paper out of okra stems is very efficient as it does not waste any environmental resources and it reuses waste products to make paper.



PROBLEM STATEMENT

A few problems we faced while preparing this project include:

- Because we are children, we were not able to get okra stems very easily; we had no contacts with people who own farms that grow okras.
- The okra stems were very rough and burnt out our blenders as we put many stems in it at once.



INTRODUCTION

Okra is a [flowering plant](#) in the [mallow family](#) (Malvaceae, or the mallow family, is a family of [flowering plants](#) containing over 200 genera with close to 2,300 species). It is valued for its edible green seed pods. Originating in [Africa](#), the plant is cultivated in tropical, subtropical and warm temperate regions around the world.

Abelmoschus esculentus Okra flower bud and immature seed pod

[Scientific classification](#)

Kingdom: [Plantae](#)

Division: [Magnoliophyta](#)

Class: [Magnoliopsida](#) (unranked):

Rosids Order: [Malvales](#)

Family: [Malvaceae](#)

Genus: [Abelmoschus](#)

Species: A. esculentus



APPARATUS

- Okra stem.
- Blender
- Plain wooden frame, slightly larger than the paper you want to make.
- Window screen, large enough to fit over the frame.
- Staple gun.
- 14 gallon plastic bin.
- Soda ash.
- Wooden spoon.
- Large sponge.
- Old newspaper.
- Piece of felt or wool fabric the same size as your frame.

PROCEDURE

Create the Pulp

- Cut the okra stems into 2- to 3-inch pieces and soak in water for 2 to 3 hours.
- Fill a large stainless steel cooking pot with water and add the stems. Add 1 tbsp. of soda ash for each quart of water in the pot and stir to combine using a wooden spoon.
- Simmer the stems for up to 3 hours (until they are thoroughly tender). Drain and let cool, rinsing well.
- Put a handful of the stems into your blender and fill with water. The stems are tough to blend, so be careful not to put too many stems in at once, as you can burn out the blender's motor. Pulse for 12 to 15 seconds at a time, until the stems are thoroughly blended with the water. Repeat with the rest of the stems.
- As you blend each batch, add it to your plastic bin.

Build the Paper Mould

Cut the window screen to size; it should reach over the edges of the wooden frame.

Using a staple gun, staple the screen to the wooden frame.

Rotate the frame as you staple; making sure the screen is as tight as possible.

Make the Paper

- Add enough water to the plastic bin to fill it. The okra pulp will float to the top and form a coating on the water.
- Shake out any clumps in the pulp by submerging your hands just below the water line and gently swishing them, stirring the top few inches of water.
- Hold the frame vertically and lower it into the water. Once it is below the water line, slowly tilt it horizontally toward you and begin to lift it toward the surface of the water.
- Slowly lift the frame out of the water, gently shaking it back and forth, and picking up the okra pulp. Let the frame drain over the bin for 15 to 20 seconds, then set aside.

Remove the Paper from the Mould

- Lay the piece of felt or fabric on a flat surface and place one edge of your frame mould on the side of the fabric. Gently ease the mould down, making sure the paper is in direct contact with the fabric.
- Use a sponge to press out the excess water, wringing it out into the plastic bin between pressings.
- Once most of the excess water is removed, hold down one corner of the fabric and slowly peel off the mould. The paper should remain on the fabric. If it sticks to the mould, you have either pulled too fast or didn't remove enough water. Simply place the mould back down and repeat the process with the sponge to remove more water.

- As you pull the mould from the okra paper, leave the sheet to dry for several minutes. Once it is dry enough to pick up, transfer it to a stack of clean, dry newspaper to finish drying.

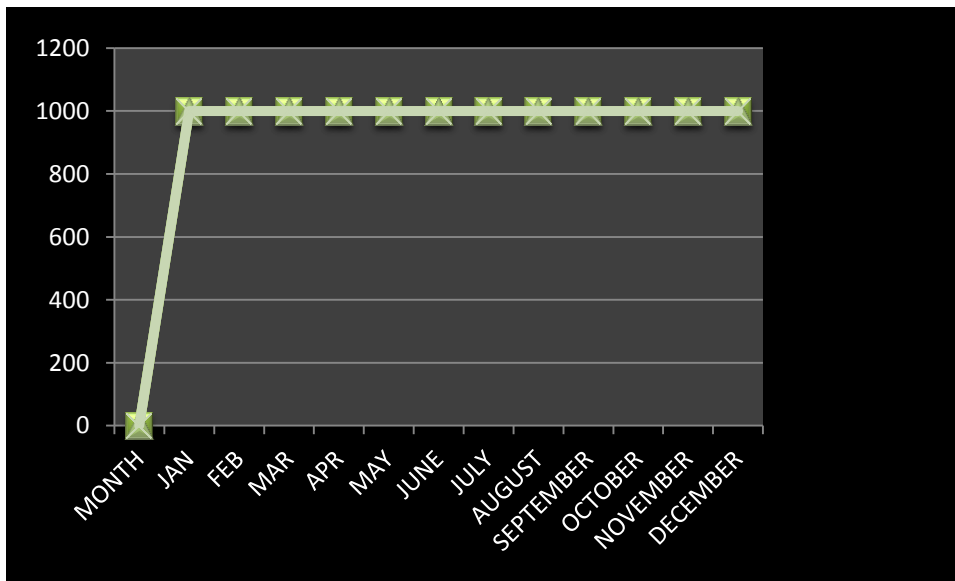
PRECAUTIONS

- Take care when removing the okra stem from the farm.
(where gloves to prevent any accidents)
- Make sure when children dealing with glass or any dangerous item have an adult to help so no injuries are caused.
- The stems are tough to blend so be careful not to put too many in your blender at once or it will burn out the blade.

OBSERVATIONS AND DATA

Our observations are:

The graph shows the current approximate number of trees cut down every month throughout the year:

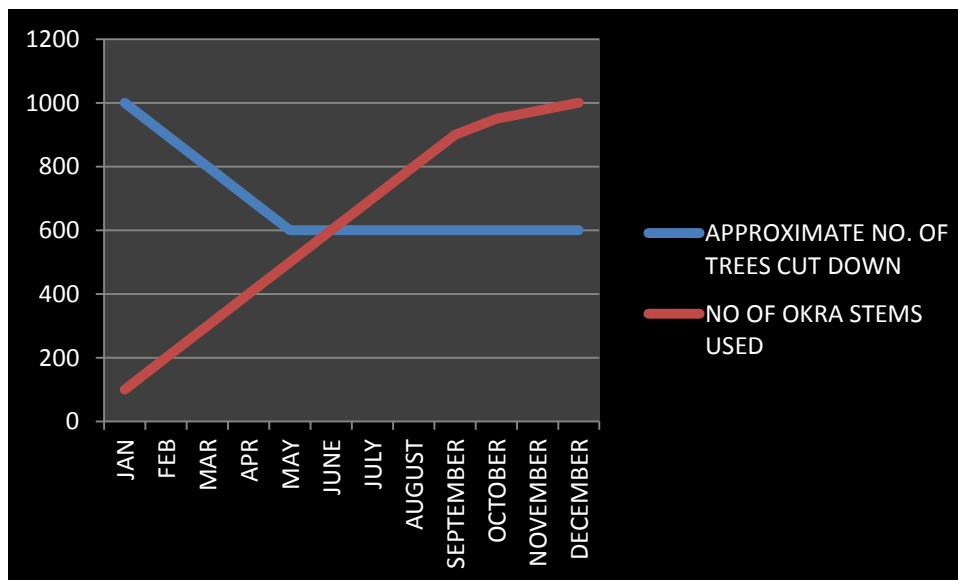


This graph shows us that approximately the same numbers of trees are cut down every month.

As more trees are being cut down everyday, the sizes of our forests are decreasing rapidly. This is not good for our environment.

If we use the okra stems to make paper it will surely reduce the amount of trees cut down to make paper.

The following graph shows the number of trees being saved if okra stem will be used to make paper.



This graph shows that as we use more and more okra stems to make paper more trees are saved

Farmers can also earn a little extra money by selling the stems which they otherwise burn and releases carbon dioxide into the atmosphere causing global warming.

ADVANTAGES

- Simple and easy to make.
- Does not use okra itself but uses its remains which are otherwise burnt leading to increase in the carbon footprint in Kenya.
- Trees will not be cut down so the environment will be preserved.
- Okras grow very fast (4 weeks)
- Farmers will earn a little extra money
- Because the okra stems are cheap to buy and the paper making process does not require much money to be used either, the paper will sell cheap and the low income groups can also afford the paper

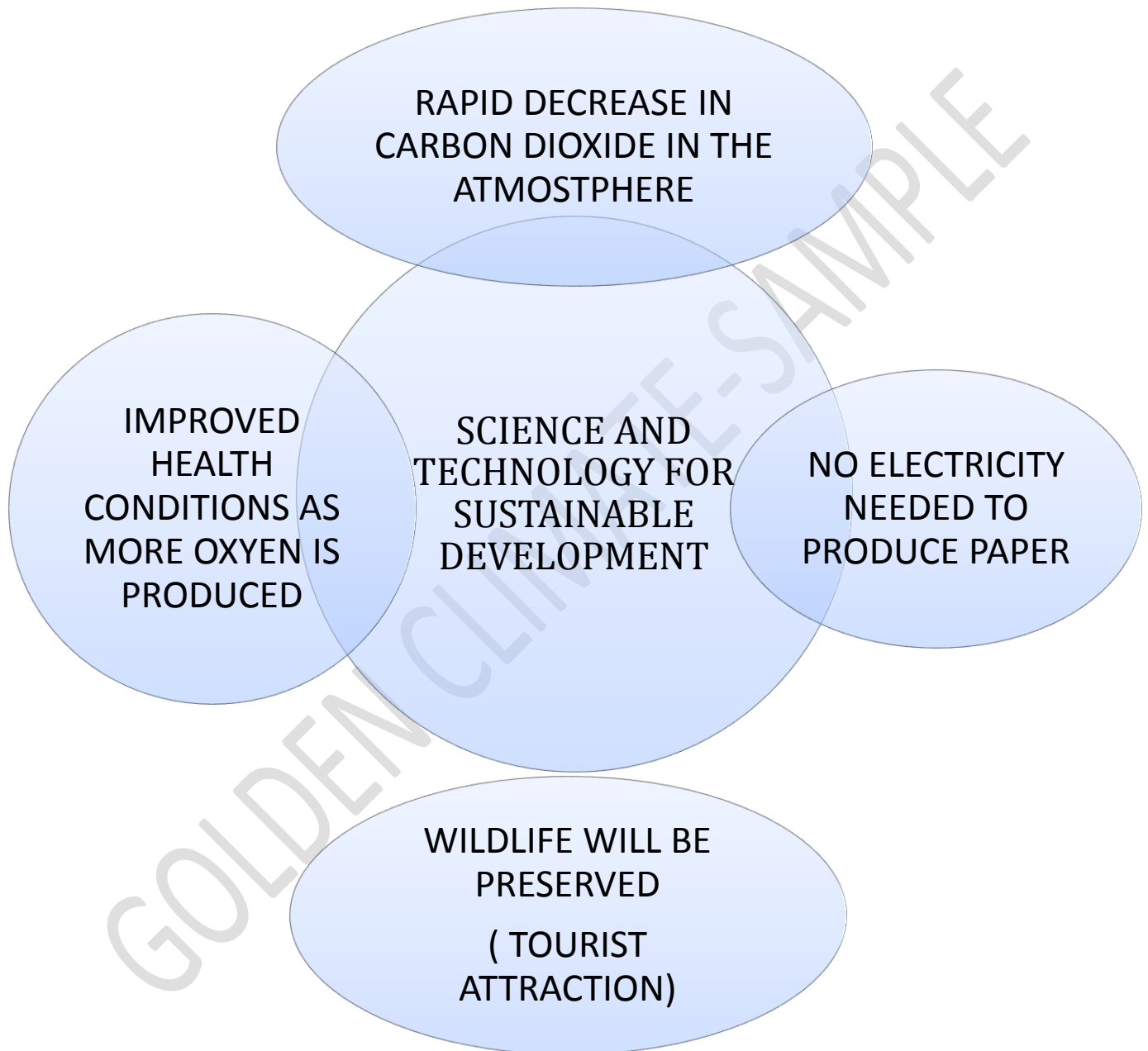
DISADVANTAGES

- During cold seasons the okra's grow slower than hot seasons.
- Takes a lot of time to produce the paper.

SOLUTIONS

- If we use machinery (science and technology) to produce the paper, a lot can be produced.
- The crops grow slow but still grow, we can use the little that we get during cold seasons and during hot seasons we can try and produce as much as possible, even to last throughout the cold season.

RELEVANCE TO THEME



LINK WITH EMERGING ISSUES

There is a link with emerging issues as the current issue in Kenya is the absence of rainfall due to cutting down of trees for paper and other reasons resulting in drought, famine and people dying.

PARAMETERS AND ADJUSTMENTS

Parameters	Adjustments
• Temperature	The cooler the water for soaking the better the okra stems will be to produce paper.

EFFECTS OF CHANGE OF PARAMETERS

Temperature- The hotter the water the fibres of the okra stem will be ruined, the colder the water the better the okra stems will be to produce paper

CONCLUSION

We would like to conclude that :

This project will contribute in preserving the environment. Trees will remain standing and food supply will remain constant (rainfall). Rivers that help in production of other forms of energy, e.g. HEP will keep flowing. So it will help protect the environment.

Our wildlife will also be preserved and this as well as saving lives acts as a tourist attraction.

No electricity is used to make the paper which is good because the power stations are the main producers of greenhouse gases

That this project will take Kenya ahead as Kenya is mainly known for its nature and wildlife.

Note: the okra paper is tough to wright on, but makes wonderful wrapping paper and can be used for arts and crafts.

CONSTRAINT

Our constraints are:

- The crop grows slow during cold seasons so we get the stems late - they grow slow but still grow we can use the little that we get and during hot seasons we can try and produce as much as possible.
- The stem may be damaged before reaching the industries by insects (caterpillars) so paper cannot be made with those stems – we can use insecticides within a range of plants to kill the insects and protect the stems

EFFICIENCY

This project is very efficient because:

- It is a very eco-friendly solution.
- The paper is produced cheaply.

APPLICABLE IN REAL LIFE

This project is applicable in real life because it has been tried out in Egypt and has proved to be very successful there.

COMMENDATIONS

We would like to commend the following organisations:

- The government for their effort trying to improve and conserve the environment of Kenya.
- The United Nations in their effort to improve the environment of Kenya.

RECOMMENDATIONS

We would like to recommend the following:

- The government of Kenya to give out funds towards this worthy project.
- People of Kenya to support this project and protect our environment instead of destroying it so that we can have a better future.

- An international donor to sponsor this project. (The donor can be the UN or any international community.)

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GOLDEN CLIMATE-SAMPLE