

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,  
KUMASI**



**COLLEGE OF ENGINEERING  
DEPARTMENT OF CHEMICAL ENGINEERING**

**CENG 291**

**PRESERVATION OF PALM FRUITS IN WOE COMMUNITY**

**BY KPORXAH FREEMAN GENIUS**

**9398917**

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## **ACKNOWLEDGEMENT**

I give thanks to Almighty God for giving me the strength to write this report and to my supervisor Mrs. Emmanuella Kwao- Boateng. I would also like to thank Dr. Lawrence Darkwah, Head of Department – Chemical Engineering for the advice and support. Not forgetting the farmers who took time off their busy schedules to be interviewed and for their co-operation during the time I spent there working on my report. My deepest thanks to my family for their support in writing this report

## **ABSTRACT**

Woe is blessed with many palm trees, grown by farmers and or some birds. History has shown that these palm trees borne more palm fruits than needed by farmers for their consumption and the rest go bad. Palm fruits has so many uses and these are: oil- two different types of oil are extracted from palm fruit: palm kernel oil (PKO), from the seeds and palm oil (PO), from the monocarp (reddish pulp).The edible oil contained in the monocarp of palm fruit can be extracted using different methods, with the most common known as wet or dry processes. These oils are good source of vegetable oil for food industries and they contained nutritive values such as vitamin A, vitamin E, vitamin K, antioxidants and carotenoids. Palm oils and fats are good source of income to most developing nations like Nigeria, Thailand, Colombia, Cote d'Ivoire, India and Brazil. It is against this background that I stood to preserve palm fruits in my community.

## **DECLARATIONS**

I wish to declare that **CEng 291/18** is prepared by Master Kporxah Freeman Genius, a BSc Chemical Engineering Student of Kwame Nkrumah University of Science and Technology; and this report has not been submitted to any other institution for any award but for the exception of references listed below. The project work was supervised by Mrs. Kawo Boating Emmanuella- a lecturer and project supervisor at the Department of Chemical Engineering.

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## **CHAPTER ONE**

### **1.0 INTRODUCTION**

#### **1.1 Background of the course**

The Engineering in Society (CENG 291) course also known as the Provost's Special Initiative was introduced by College of Education but now known to be Kwame Nkrumah University of Science and Technology-Kumasi. The course is geared towards equipping engineering students with the required skills needed to identify problems in the surrounding and how to approach and help fix them. It also post a challenge to draw a link between the chosen field of engineering and the applications to issues that confronts day to day lives of the people in the society.

#### **1.2 Objectives.**

To preserve red palm fruits in Woe community.

To sensitize the farmers on other relevance of red palm fruits.

## CHAPTER TWO

### **2.0 PRECEDURES**

The procedure talks about how the problem was identified, how the map of the community was obtained and ends by providing information on how data was collected and used in preparing the report.

#### **2.1 PROBLEM IDENTIFICATION**

It was identified that many scattered palm trees in Woe community produced or borne more oil palm fruits than required by the farmers for their consumption. This situation is an eye sore as a promising engineer. One of the most important tasks of the palm oil producer is to produce high quality oil and this aim is archived when the palm fruits are well protected.

During harvesting, and especially when the palms get older and taller, the fruit bunches may suffer some bruising on falling to the ground. The damage may rupture the membranes which leads to the lipase gaining access to the fats. In a bruised and crushed fruit, the free fatty acid (ffa) content reaches 60% within a few hours, since the lipase starts acting as soon as the cell equilibrium is disturbed. The fungi not only attack the bruised or damaged the fruits but also they grow on ripe harvested ones. As it is with most crops produced in the tropics, the fruits deteriorate within a few days after harvesting. The average shelf-life of ripe palm fruit is about 3 days. The problem is worst at the milling stage where the fruits are usually piled up for several days while waiting for processing.

#### **2.2 Preparation of the Map**

The following items were employed in the preparation of the map. These were the mobile data, GPS and Google Map; where the map was screenshot via mobile phone to obtain a satellite view of the study area. The maps fig1 and fig2 show important land marks, principal streets, the sea of Woe community and its environs.



### **2.3 Data collection**

Data gathering and collection was very crucial aspect of this whole exercise. Data was gathered and collected through many ways as: face to face interaction with the farmers on farms, my own observation of the situations and the help of the internet. The internet played a vital role on how my desired field of study could be used to minimize this situation if not completely eradicated.

### **2.4 DISCUSSION OF RESULTS**

The description, the nature and the characteristics of the problem in Woe community were discussed. And the discipline of the engineering program to arrest the situation were also considered.

## CHAPTER THREE

### 3.0 DESCRIPTION OF WOE COMMUNITY

**Woe** community is one of the major towns in Keta Municipal Assembly in the southern part of Volta Region of Ghana. It is found between Keta Lagoon in the north and Gulf of Guinea (sea) in the south. In the east is Anloga and Tegbi at the west are the neighboring towns of Woe. The prominent land marks are Cape St. Paul Lighthouse on the beach side to guide ships away from a mythical underwater mountains, Woe Market, E.P Church, Roman Catholic Church and Rhemaful Gospel Church and eight basic schools. The main occupations of inhabitants are fishing and vegetable farming. Few grows plantations such as coconut and oil palm. Here are some examples of farm produce: shallot, okra, pepper and tomatoes. Fishes harvested are: tilapia, crabs, anchovies (Keta school boys), lobsters and many more. Woe has a population of about 12,500 people by 2010 Ghanaian census. Refer to figure 1 and 2 below showing the maps of Woe community.

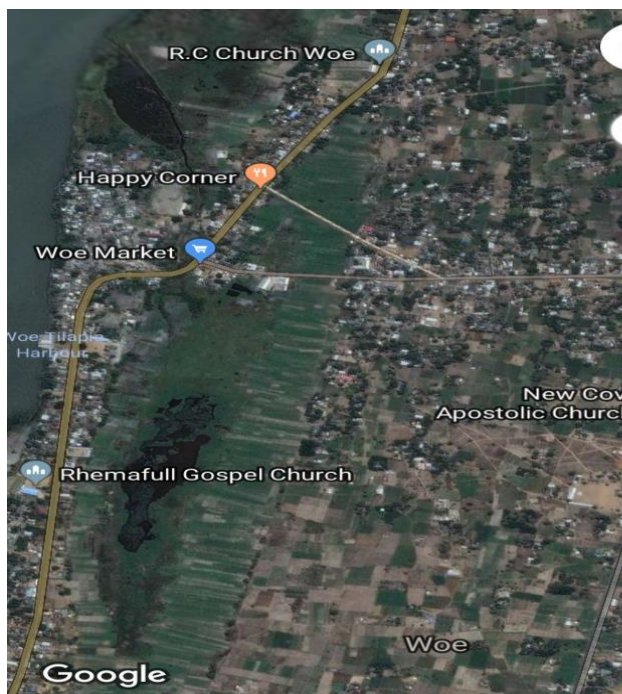


Figure 1; Map showing Woe community



Figure 2; Map showing the location of Woe



*Figure 3; over ripen oil palm on the tree*



*Figure 5; red palm ready for processing*



*Figure 4; harvested oil palm fruits*



*Figure 6; palm fruit showing mesocarp and kernel*



*Figure 7; the red palm plantation*



*Figure 8, over ripen palm fruit left unattended to*

### **3.1 THE PRESERVATION TECHNIQUES OF RED PALM FRUITS**

#### **3.1a APPLYING RADIATION TECHNIQUES**

The red palm fruits contain beta carotenes which is responsible for producing reddish yellow coloration and free fatty acids. The free fatty acid reduces the quality of the palm oil and this reduces the market value as well.

These carotenoids are very sensitive to radiations; hence radiations by gamma rays is one main ways to minimize to spoilage of palm fruits.

#### **3.1b APPLYING SOME CHEMICALS**

Micro-organism species; as a general rules it is possible to take the following facts as the basis:

Sulphur dioxide and its derivatives can be considered as universal preservative; and have antiseptic action on bacterial, yeast and moulds.

Benzoic acid and its derivatives have preservative action which is stronger against bacteria than yeast and moulds.

Formic acid is more active against yeast and mould and less on bacteria.

## CHAPTER FOUR

### **4.0 CONCLUSIONS AND RECOMMENDATIONS**

#### **4.1 CONCLUSION**

Radiation may be used for preservation of palm fruits since doses for this purpose have no significant effect on free fatty acids f.f.a and carotene contents of palm oil. It is not suitable for sterilization of palm fruits if carotenes are desirable. However, if radiation is used for this purpose on an industrial scale, it is important to find doses which minimize carotene losses but produce a high quality oil

#### **4.2 RECOMMENDATIONS**

At present, the factor(s) responsible for the destruction of carotenes is not known. So I recommend that further researches are carried out to find the factors responsible for destruction of carotene. I recommend food scientists, food processing engineers and dietitians to carry out more researches on this topic and bring the best solutions to this nuisance.

My researches have revealed that oil palm has so countless uses and so should not be allowed to get waste.

### 4.3 References

#### 4.31 Preservation of Oil Palm Fruits: Nonoxidative Effects of Ionizing Radiation on Palm Olein and Crude Palm Oil [Pertanika 12(3) 377-385 (1989) ]

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#### 4.32 Biological and Nutritional Properties of Palm Oil and Palmitic Acid:

##### 4.33 Effects on Health

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## 4.4 QUESTIONNAIRE

### ENGINEERING IN SOCIETY SURVEY QUESTIONNAIRE

Age group:

Below 18 ☐

35-50 ☐

Above 50 ☐

Community of Residence: .....

District: .....

Region: .....

Occupation: .....

Sex: Male ☐ Female ☐

Highest Level of Education:

Primary/JHS ☐ SHS ☐ Tertiary ☐ NONE ☐

What challenges do you face in your community?

Please be brief and specific. Examples our perishable farm produce (red palm fruits, tomatoes etc) go bad, the sea is reclaiming our land, bad mobile networking.

1.....

2. ....

3. ....

4. ....

From the challenges stated above, which do you consider to be the most pressing need in your community?

☐ 1. ☐ 2. ☐ 3. ☐ 4.



## 4.5 APPENDIX: Introduction letter



### COLLEGE OF ENGINEERING

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

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Our Ref: CoE-PO/CENG291/

Date: May 28, 2018

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

#### LETTER OF INTRODUCTION

The bearer of this note is a First year Engineering student of the College of Engineering conducting a project in a course titled "Engineering in Society".

The overall aim of the course is inculcate in students, an appreciation of the fact that the purpose of Engineering is to solve societal problems. This course is aimed at encouraging students early in the programme of study to draw a link between their chosen field of Engineering and the application of this field to the issues that confront the day to day lives of people.

We should, therefore, be most grateful if you could facilitate his data collection and provide any other assistance that he/she may need.

Counting on your usual cooperation.

Ing. Prof. Mark Adom-Asamoah, FGhIE  
Provost, College of Engineering

**PROGRAMMES:** BSc Agricultural Engineering ■ BSc. Chemical Engineering ■ BSc. Petrochemical Engineering ■ BSc. Materials Engineering  
BSc Metallurgical Engineering ■ BSc. Mechanical Engineering ■ BSc Aerospace Engineering ■ BSc. Geological Engineering ■ BSc. Geomatic Engineering  
■ BSc. Petroleum Engineering ■ BSc. Civil Engineering ■ BSc Computer Engineering ■ BSc. Biomedical Engineering  
■ BSc. Electrical/Electronic Engineering ■ BSc. Telecommunication Engineering  
**RESEARCH CENTRES:** The Energy Centre Technology Consultancy Centre.

## 4.6 GLOSSARY

Bruising; peeling off the skin of the fruit, damaging fruit's skin

Carotene; an orange-yellow or red pigment (substance which gives color) contained in some fruits.

Confronts; challenges or forces

Lipase; any group of enzymes which breaks down fats and oil.

Mersocarp; a fleshy reddish pulp, the edible layer of fruits.

Nutritive; food nutrient

Radiation; waves use to prevent action of microbes

Reclaiming; taking land back

Woe; a fishing and farming community where the project was carried out.

PKO; palm kernel oil

PO; palm oil