KWAME NKRUMAH UNIVERSTIY OF SCIENCE AND TECHNOLOGY, KUMASI

COLLEGE OF ENGINEERING

DEPARTMENT OF CHEMICAL ENGINEERING

CENG 291

TERMITE INFESTATION IN LITTLE LEGON AND THE USE OF ENVIRONMENTAL FRIENDLY CHEMICALS TO CONTROL THEIR POPULATION.

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JUNE 2016

Acknowledgement

First and foremost, I want to thank God for the gift of life he has given me as well as the grace to sustain and endure during this period of exercise. Secondly, to all the residents of little legon who helped me in one way or the other by assisting in the collection of data through response to interviews. Thank you very much for your co-operation. Also, my sincere gratitude goes to miss candra Djitornu, a resident in the community who assisted me in gathering the pieces of information that I needed to write this report.

Summary

One hot afternoon as I strolled down the streets of the little legon community, I happen to come across a lot of termite mounds around almost every home in the community ranging from feet as high as three to six. It was realized that the mounds were just there and they were just growing time after time without harming anyone in the community. But I was wrong, through interviews with a few residents along the way it was realized that those mounds as idle as they were brought major problems to the residents of the little legon community. Different kinds of problems came to light as the termites which live in those mounds could pose certain threats to man and his environment.

Considering the fact that this problem affects the residents of the community there is the need for much to be worried about since the residents have no proper idea of how to curb such situations but with the use of pesticides which could adversely affect human life as a result of certain chemicals they are produced from.

This report is intended to find out how residents in the community cope with the issue of termite infestation, and also ways of controlling them. The report also highlights termite living and conditions that favor their living

The use of environmental friendly chemicals; an easier and convenient way of controlling the termite population in the community was found to be the best option rather than the use of insecticides or pesticides which are harmful to man.

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INTRODUCTION

1.1Background

This course is designed to aid engineering students to make use of the knowledge they gain from lectures and other engineering workshops, to tackle and address the challenges that confront their communities or localities. The course establishes a link between students, problems and their communities. This course is intended to help students acknowledge the fact that the purpose for which they are studying the various disciplines of engineering is to address the day to day needs and challenges people in their community encounter. In general, the public do neither appreciate nor understand the vital contribution that engineers make towards the development of society. One might argue that this lack of knowledge may be as a result of too few engineering role models.

1.2 Aims and objectives

1. To help students identify problems in their society
2. To draw a link between students and their communities
3. To help students solve everyday problems using knowledge from their program of study.
   To help students know aspects of their program of study

This report consists of diverse materials, innovative research and information that provide readers the objectives and activities of the engineering in society course. The report provides insight into the major challenge in my community; termite infestation in my community.

The report begins with an overview of the engineering in society course. The first part reports on the introduction. secondly the report provides the methodology that is, an account on how the problem was identified. It also describes how the map was obtained with a summary of the data used in preparing the report. furthermore 'Discussion of Results analyzes the nature and characteristics of the problem; termite infestation in little legon. It also addresses my area of engineering; chemical engineering. The final section focuses on how the problem of termite infestation could be solved using my field of study. Conclusion and recommendation which comes later covers the findings from my study and provides recommendations. The appendices section displays the questionnaire for interview and a copy of the letter of introduction which was not used. The final part deals with referencing of the report.

2.0 PROCEDURE

The procedure talks about how the problem was identified. It further provides on how the map was obtained and then concludes by giving information on how the data used in preparing the report was obtained.

2.1 HOW THE PROBLEM WAS IDENTIFIED

With the identification of the problem, after investigating the major problems faced by the residents in my community, it brought discomfort to me because the people had not be given the necessary attention to their needs with respect to the problem of termite infestation and the chemicals used in controlling their population which was their major problem. It was deemed appropriate to investigate the need for ways of controlling the termite population with the use of environmental friendly chemicals instead of the harmful chemicals used which could pose a threat to the lives of residents in little legon.

I had a fair idea about the effect of termite infestation to man and his environment which was also a major problem even in some developed countries around the world. There were other problems in the community but upon analysis and research of the effects of each problem it was no surprise that the problem of the termite infestation was to be considered since its adverse effects were many as compared to that of the other problems. The people were asked as to which of the major problems they faced the most; and as it was thought, majority of them chose the issue of termite infestation and the use of environmental friendly chemicals to control them. This is how I identified the problem.

2.2 HOW THE MAP WAS PREPARED

The picture of the map was downloaded from google maps for windows mobile via the internet

2.3HOW DATA WAS COLLECTED FOR THE REPORT

Data collection became an important part of this report and it would be impossible to make this report without collecting data. The data was collected from many sources such as face to face interviews, reading of books, my own personal views and not forgetting the good use of the

internet. The interview was adopted to get information from people in their individual houses and people walking on the streets in order to know the views of almost all residents. The problem in the community was identified by this method. The interview helped to know roughly the category of people that were affected by the problem that is if children were mostly affected, youth, adults or the old age group. The interview also looked into details the nature and characteristics of the problem.

In addition to that knowledge from several books relating to the problem, the internet played a vital role in preparing this document. The internet aided in investigating how the desired field of study in engineering could be used to solve the problem and it also helped in obtaining the map of the community. Knowledge from books helped in knowing the life cycle and living condition of termite

3.0 DISCUSSION OF RESULTS

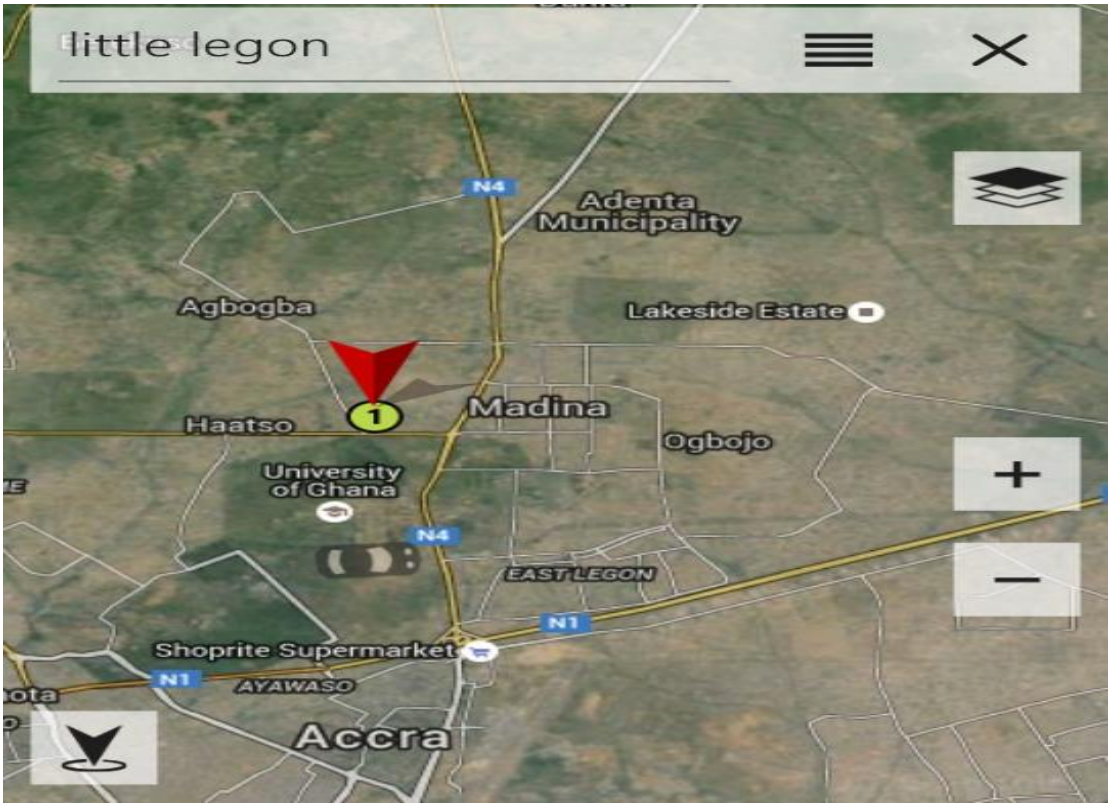
In this section the description of the nature and characteristics of the problem, description of the community, description of the area of engineering and the branches under it together with solutions to the problem relating to my field of study in engineering are addressed.

3.1 DESCRIPTION OF LITTLE LEGON COMMUNITY

Little legon is a small town within the university of Ghana which is the largest and one of the best universities in Africa. Little Legon is a suburb of the Ghanaian city Accra and is situated about 12 kilometres north-east of the city center in the Accra metropolis district, a district in the Greater Accra region of Ghana. legon as a whole is also home to a few known institutions in Ghana like Achimota school and Ghana Institute of Management and Public Administration. legon is adjacent to one of the most prestigious residential suburbs of Accra-East Legon and only about twenty minutes driving distance from kotoka international airport. The town has an elevation of 318ft approximately equal to 97 metres above sea level with coordinates:5 ˚39 N 0˚11W.surrounding towns are ogbojo, haatso, madina and East Legon. The town has a population of about 700 people who are mostly into teaching and small scale businesses, furthermore the town has an average

humidity level between sixty to seventy percent and lies within latitudes 5.65083˚ to the north and longitude -0.18694˚ to the east.

3.2 THE MAP OF LITTLE LEGON COMMUNITY



DESCRIPTION OF THE PROBLEM OF THE NEED FOR ENVIRONMENTAL FRIENDLY CHEMICALS TO CONTROL THE TERMITE POPULATION.

This section starts by analyzing the problem of termite infestation in the community of little legon. The results through investigation indicated that the termites have become a long term problem for the community and controlling them effectively will tend to solve the problem.

The use of pesticides(termicides) which contains chemicals that could pose threat to human life was a major finding in the investigation through interview with the residents. The residents complained about the scent of the chemicals and how it affected their breathing especially the asthma patients in the community. They went on to say that they had to deal with it even though it

was very tough to handle because as much as the scent was irritating to them the termites never failed to infest their homes.

One resident in an interview said: "*we wished there was another way out but information reaching us is that we have to comply with the use of the pesticides for now or suffer the infestation of the termites in our homes and neighborhood. she went on to say that one fumigation of the pesticides in a house does not totally get rid of the termites because they tend to find their way back into the neighborhood and build their mounds, furthermore the irritating smell could last for as long as two weeks."*

Termites are eusocial insects that are classified in the order of isoptera which means same wing order or as termitoidae within the cockroach order. termites were once considered in a separate order from cockroaches but through studies it is said that they evolved from ancestors of the cockroach through the Jurassic or Triassic era.

Termites practice the caste system where there is division of labour consisting of sterile male and female workers, winged reproductive and nasute or mandibulate soldiers. All termite mounds that is where the termites dwell have fertile males called kings and one or more fertile females called queens. Termites feed on cellulose and dead plants generally in the form of wood, leaf litter and animal dung hence are classified as major detritivores. Their colonies have sizes from some hundred individuals to several millions of individuals. termites undergo incomplete metamorphosis that proceeds through egg, nymph and adult stages.

Termites leave their colony only when a nuptial flight takes place. the termite pair do not mate until they find a cool damp place where they can dwell. with the nuptial flight the male and female that is the king and the queen mate after which the male dies and the queen(female) survives since she has a life span of about fifty years in order to reproduce termites to start another colony in a new termite mound.

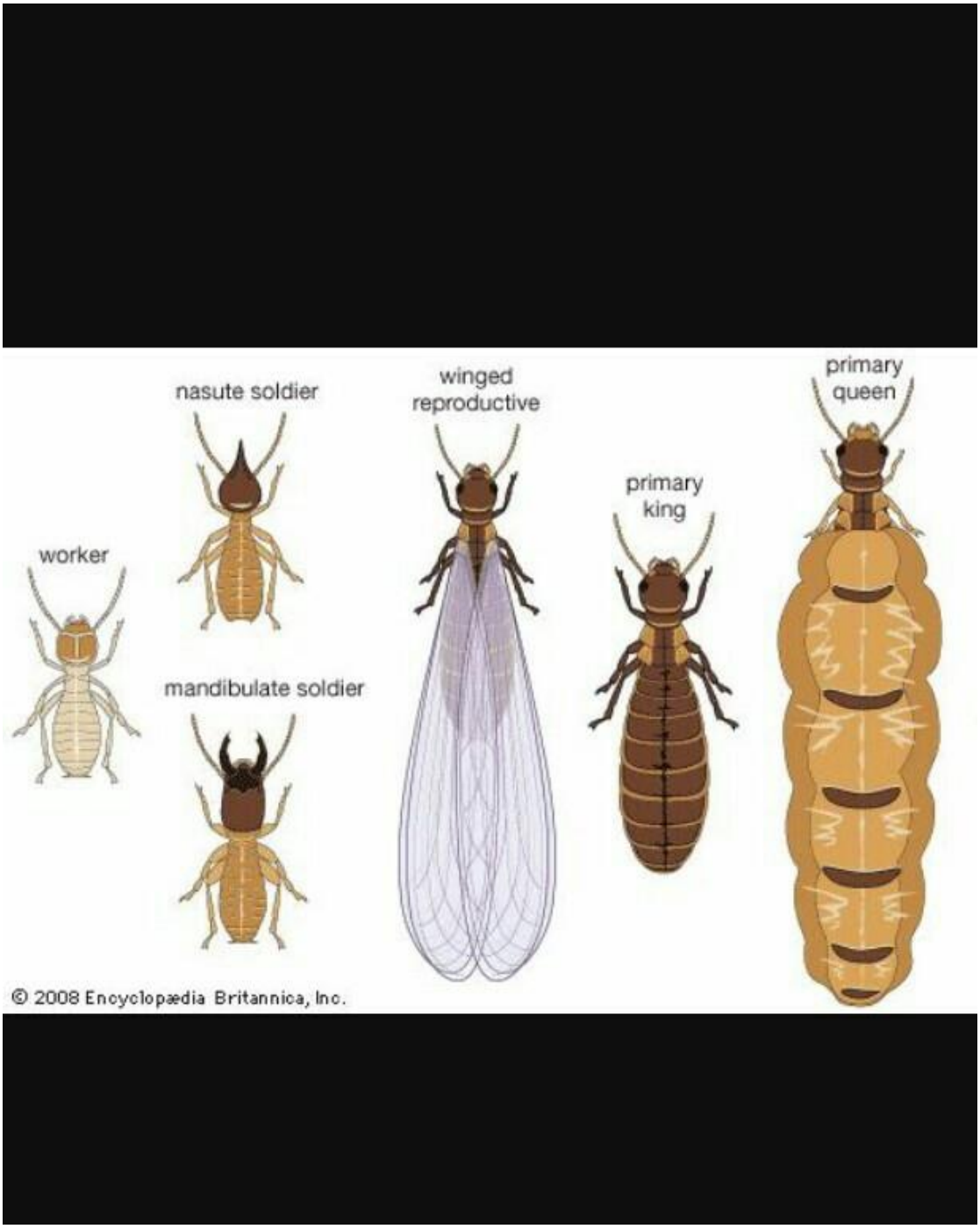


Fig 1. Showing the caste members of termites

Surprisingly though termites are considered harmful and pose certain threats to humans and their homes, they also tend to have some advantages. some of them tend to aerate the soil which is necessary to support plant life. They also serve as a source of food to humans in certain parts of

the world. from the above it can be noted that termites seem to be a bit useful however their disadvantages outweigh their advantages and through observation and analysis, it was noted that:

1.The use of pesticides

The indigenes or inhabitants of little legon have failed to use environmental friendly pesticides in an attempt to destroy the dwelling places of the termites and reduce their infestations. Thus the pesticides used by the exterminators employed by the residents have been able to pose a great threat to the inhabitants since their irritating smell coupled with their dense nature has the effect of destroying the quality of air inhaled by the inhabitants especially with asthmatic patients at risk as they stay in the atmosphere over days spanning a little over two weeks. The cycle continues since the termites continue to breed in the community. So the spraying continues thus continually putting residents at a risk of contracting respiratory infections.

Fig 1.1 showing some of the pesticides used in controlling termites

2.The mounds created by the termites have the effect of creating huge issues with respect to dust control. The mounds which are primarily made up of compact sand or clay particles grow as high as three feet tall. These mounds spread sand particles especially during the dry season or dry humid conditions when the winds blow. When these dust particles blow they end up affecting the ventilation systems of the homes of the inhabitants.

Fig 1.2 showing a termite mound in a home

3. After a series of interviews I conducted, I was prompted of the fact the inhabitants of little legon have continued to live in utter disgust of the termite situation. They bitterly complained of the fact that the mounds raised by the termites have managed to give the community a disgusting outlook. They also made mention of the fact after the weeds are cleared the mounds tend to stand out prominently. Thus their grievance is that their surroundings have been altered and negatively affected by the existence of the mounds.

Fig 2.0 showing three different termite mounds in one area of little legon.

4. Another problem occurs when the termites undergo nuptial flight. This phenomenon occurs especially at night after rainfall. During nuptial flight the winged reproductive are exposed to allow mating to occur. After these species mate with their queen new colonies are created thereby gradually increasing the termite problem in the community. Again the termites after mating shed of their wings all over the surroundings thus making chores like sweeping very difficult. During nuptial flight the inhabitants are forced to switch off their lights in order to ward off the termites who are greatly attracted to light sources. Aside warding off the termites their vision is obstructed thus exposing the inhabitants to other equally harmful creatures of the dark. Drivers of vehicles

such as motorbikes and bicycles are also often destructed by the termites during the nuptial flight phenomenon thereby obstructed their vision which may lead to accidents.

Fig 2.1 showing the shed wings of termite after nuptial flight.

5.lastly termites have serious chewing abilities that is they feed on materials that contain mainly cellulose like dead trees, fallen limbs, stumps and wood. They return the nutrients from such cellulose materials listed above into the soil and the atmosphere but such activities can affect the properties of man. Through an interview with one of the residents it was realized that all her firewood that she uses for her chop bar business were destroyed by the activities of the termite and without required quantity of wood she is not able to work early and efficiently.

Also through an interview with another resident who works at the maintenance yard of university of Ghana primary school it was realized that among the desks that were broken and destroyed some of them were as a result of the chewing activities of the termite especially the desks that were close to the sandy damp area of the school that is the primary block. These problems are evident in images as shown below:

Fig 2.2 showing some firewood destroyed by termites.

Fig 3 showing desks of school children that have been destroyed by termites.

CHEMICAL ENGINEERING AND HOW IT AN BE USED TO CONTROL THE TERMITE POPULATION.

Chemical engineering is a branch of engineering that makes use of physical and applied sciences together with applied mathematics and economics to produce and efficiently make use of chemicals, materials and energy. The chemical engineering course entails brewing, manufacturing of products, oil and gas refining, mineral extraction, pharmaceuticals, paper and pulp production, petrochemical products, chemicals for food processing, biotechnology and polymers among others. The skills of an engineer in this field can also be linked to the field of a chemist.

Chemical engineers also produce and work in industries that are involved in the production of products such as fertilizers, fuels, plastics, paints, lye, textiles, concrete, cement etc. from the above it can be noted that the chemical engineering course is based on the use of mathematical knowledge and scientific knowledge mainly chemistry to tackle societal challenges. Some engineering branches under chemical engineering or related to this field are petrochemical engineering and petroleum engineering.

With the termite problem in the little legon community, an environmental friendly chemical like vinegar mixed with water can be adopted. Vinegar consists of about five to 10 percent of acetic acid, water and other trace chemicals and it is environmental friendly since it is used in homes for cooking as well as medical and industrial use. Its environmental friendliness and cheaper cost as compared to the pesticides in use which can cause health problems is advantageous in controlling the termite population when mixed with some amount of water since it is the easiest option. every resident can adapt to this method easily with some form of sprayer or a knapsack. The mixture can be applied to growing mounds at their early stages and even though it has some amount of acetic acid that amount is very low and would return soil PH to normal after application. This is a very good method which when adapted by residents of the little legon community can help eradicate or control the termite population. It can be sprayed or applied on wood materials or furniture exposed to environment, moreover it is less tiring.

4.0 CONCLUSION AND RECOMMENDATION

4.1 CONCLUSION

From the above findings the conclusion that can be drawn is that termites have become a major problem to the residents of the little legon community. Although the termites have some advantages it can be concluded from the study that the disadvantages outweigh the advantages, some of their advantages are source of feed for insects, aeration for soil and humus whereas the major disadvantages are the use of pesticides with irritating smell, the chewing abilities of the termites, spread of dust particles from their mounds among others.

With the problems stated above we can see that the termite infestation is a major headache to the residents of my community since it affects the residents adversely in so many ways.

It is therefore recommended that a more environmental friendly chemical may be adapted to effectively control the termite population.

4.2 RECOMMENDATION

It is suggested that environmental friendly chemicals should be used in controlling the termites effectively and the mounds can then serve as

1. source of clay for making materials like wall tiles, earthenware, floor coverings and bricks among others since it is made up of mostly clay and other wood materials together with the saliva of the termites.

2.the termite mounds also contain elements like magnesium and iron which can be used with some amount of sand to form loam which supports plants and crop growth.

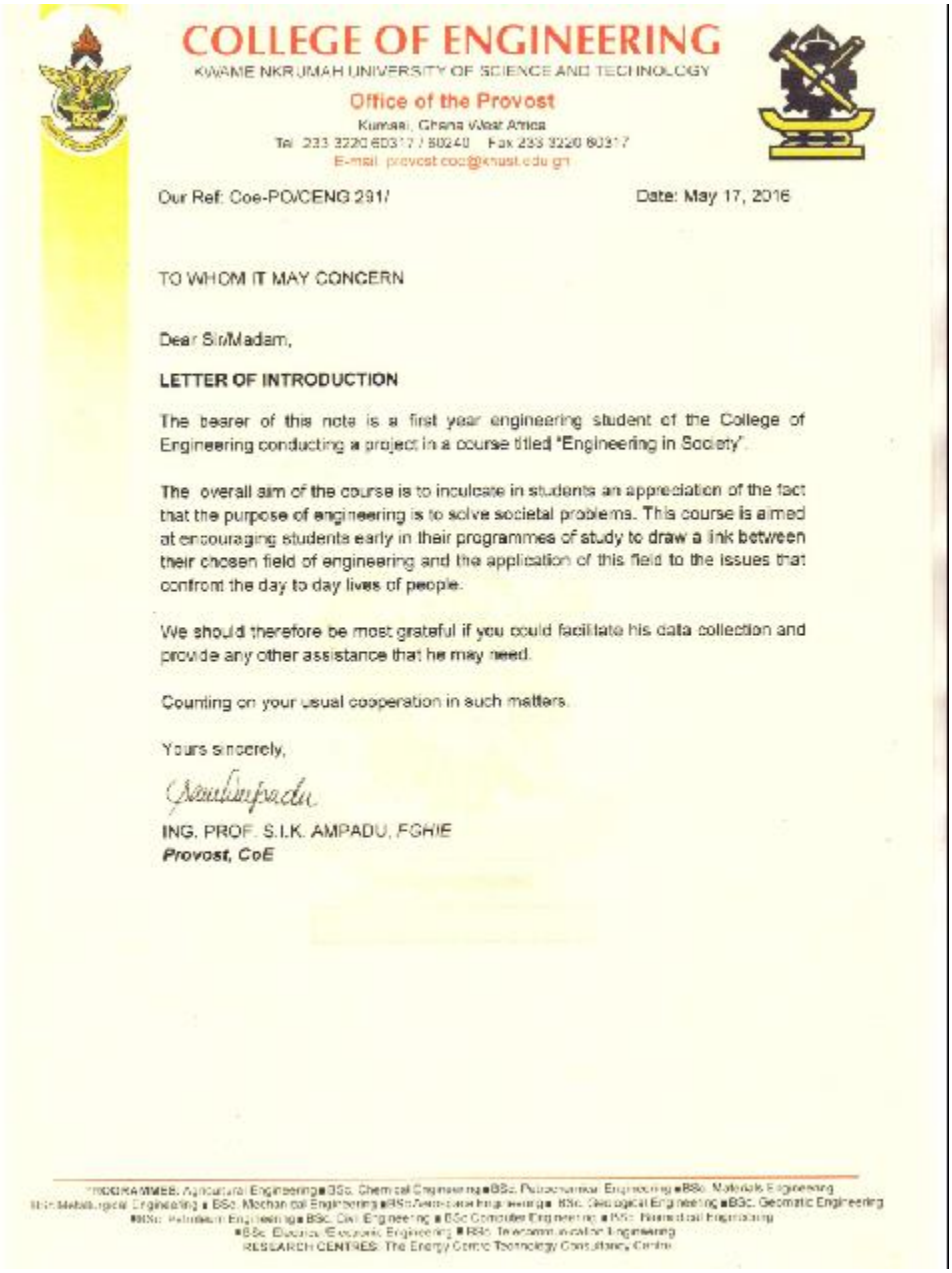
3. the termites themselves can serve as a source of humus to the soil after they have been controlled.

APPENDIX

Questionnaire for interview

1. How long have you been living in little legon?
2. What is the major problem residents face in this community?
3. How are residents coping with the problem?
4. In what way is the problem being solved?
5. Is the solution to the problem effective?
6. What do you think is the most appropriate way of handling the problem?

LETTER OF INTRODUCTION



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Our Ref: Coe-PO/CENG 291/ Date: May 17, 2016

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 to 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 their programmes 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 may need.

Counting on your usual cooperation in such matters.

Yours sincerely,

ING. PROF. S.I.K. AMPADU, FGHIE
Provost, CoE

PROGRAMMES: 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

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