*Quest Journals*
*Journal of Software Engineering and Simulation*
*Volume 6 ~ Issue 1 (2020) pp: 38-49*
*ISSN(Online) :2321-3795 ISSN (Print):2321-3809*
www.questjournals.org

**Research Paper**

# E-Agriculture Management System

(A Case Study of Aflao Ketu South Municipality in Ghana)

Dr. Egho-Promise EhigiatorIyobor[1], Bamidele Ola[2], Hugah Stephen[3]
[1]*Regional Technical Head, Glo Mobile Ghana Ltd, Tamale, Northern Region, Ghana*
[2]*Technobeacon Consulting Ltd, London, UK*
[3I]*IT Assistant,Nation Builders Corps, Aflao, Volta Region, Ghana*

***ABSTRACT***
*One of the key factors of economy growth in Ghana is agriculture. It is believed that agriculture sector forms a vital part of building resilient economy. E-Agriculture is a farm management system that uses IT or ICT devices to facilitate the production of crops and animals. In this research, a web-based system name e-Agriculture Management System (EAMS) will be designed and developed.*
*The e-Agriculture Management System will enable customers or wholesale buyers to get information about available farm products through Short Message Service (SMS) notifications. The system will provide details information of the farmers and the wholesalers otherwise refer to as customers.*
*Qualitative research approach and interview as research instrument will be adopted in this research. Agile model will be used as software development life cycle model to develop EAMS.*
***KEYWORDS****: e-Agriculture, EAMS, Farmers, Products*

***R****eceived 01 September, 2020;* ***A****ccepted 16 September, 2020 © The author(s) 2020.*
***P****ublished with open access at* ***www.questjournals.org***

## I. INTRODUCTION

The term e-Agriculture can be described as the use of information technology to enhance or improve agriculture with emphasis on innovations to achieve higher productivity [1].

The e-Agriculture is a farm management system that uses IT or ICT devices to facilitate the production of crops and animals.

There is a paradigm shift in the agriculture business from simple production to multifunctional sector. The overall aim is to achieve higher productivity and increase in revenues from farm products and this can only be achieved with the use of IT or ICT in Agriculture.

Aflao Ketu South Municipality is a big town located in Volta region of Ghana. There is no existing farm management system in the municipality. The farmers find it difficult to get frequent access to wholesalers who are ready to buy farm products.

The e-Agriculture management system will capture data of farm products, process them and send information about the products to the wholesalers on a regular basis.

### 1.1 Problem Statement

Agriculture Department of the Aflao Ketu South municipality is characterized with inconsistence and inaccuracy of data from farm due to the use of manual system to process data. There is often a gap between the farmers and the extension officers in the department and this affect farmers productivity.

### 1.2 Objectives of the study

1. To provide reliable, consistent and accurate data on farm products.
2. To provide efficient means for the extension officers to give necessary support for the farmers
3. To improve productivity on farm products
4. To increase revenues from farm products

1.3 **Significance**

The e-Agriculture management system will help to provide adequate, reliable, consistent and accurate data about farm products. The system will enhance farm productivity and thereby increase revenues from farm products.

## II. LITERATURE REVIEW

Several literatures were reviewed accordingly and the challenges faced in the use of manual system in Aflao Ketu South Municipality were revealed.Technological developments and creativity act as tools to exchange information of agricultural activities and improve lives for farmers and the entire society [2].

The use of ICT transforms traditional agriculture to modernized agriculture [3].

World population is expected to surpass the 9 billion mark by 2050, and agricultural production

will need to increase by 60 percent from its 2005/2007 levels to meet this additional food demand and ICT applications can make a significant contribution to meet this future global food needs [4].

Aflao Ketu South Municipality operates a manual system where spreadsheet is used to record and process data about farm products and this leads to inaccurate and unreliable information.

The e-Agriculture Management System (EAMS) will be developed to replace the existing manual system thereby resulting to increase in productivity and revenues for the farmers.

### 2.1 Existing System

The Aflao Ketu South District uses manual spreadsheet to record and process data collected from farm. The district is divided into four zones namely Kpoglu zone, xedzranawo zone, Denu zone and Aflao zone with extension officers managing each zone. Agricultural extension officers operate as facilitators and communicators, they help farmers in their decision-making and give training to the farmers on regular basis.

### 2.2 Proposed System

The proposed system is Electronic Agriculture Management System (EAMS). It is a web- based application which will be designed and developed to replace the unreliable and inaccurate manual system of processing of farm data.

The EAMS application will be hosted on the internet server and can be accessed on a mobile phone or a computer system. The system will capture and process farm products, farmers, buyers or suppliers data such as names, locations, contact numbers, email addresses, etc.

## III. METHODOLOGY

Qualitative research approach will be adopted in this study and is basically an open-ended approach that does not involve hypothesis but gives in depth insight into problems [5]. Interview as a research instrument will be used in this study to collect data.

### 3.1 Data Collection Instrument

Interview will be used to collect data from different farmers and farm products wholesalers. The instrument is chosen to collect data because is a conversation base research method.

### 3.2 Agile Model

Agile is a software development life cycle model and it will be used in developing the EAMS because of its speedy and elastic response to changes.


**Figure 1:** Agile model phases

Agile Model comprises of 6 phases as indicated in the above figure 1.

**3.3 Benefits of Agile Model**

1. Changes in requirements can easily be executed in the system
2. Comparing it with waterfall model, only few planning activities are needed in order to start development of the software.

**3.4 Use Case Diagram**

The use case diagram below illustrates the interaction between the proposed system and the users.

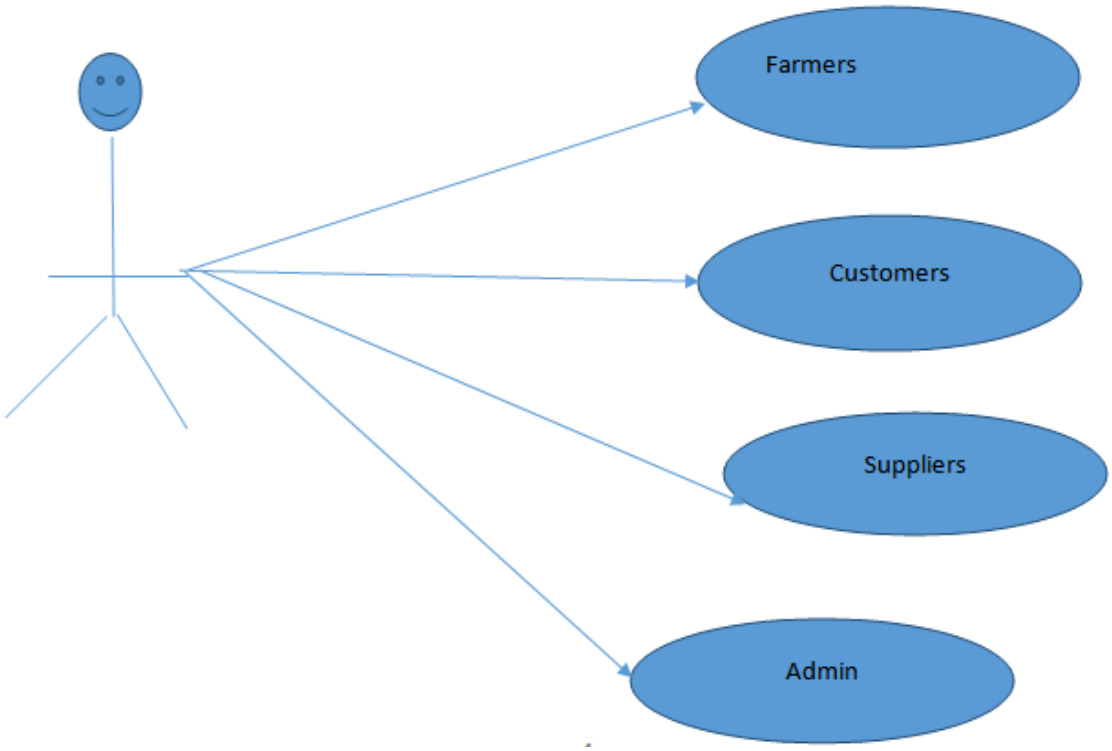



**Figure 2:** Use case diagram

**3.5 Software Design Tool**

Flow chart tool will be used in the design of the proposed EAMS. The below flowchart shows the logical and pictorial representation of the proposed system.

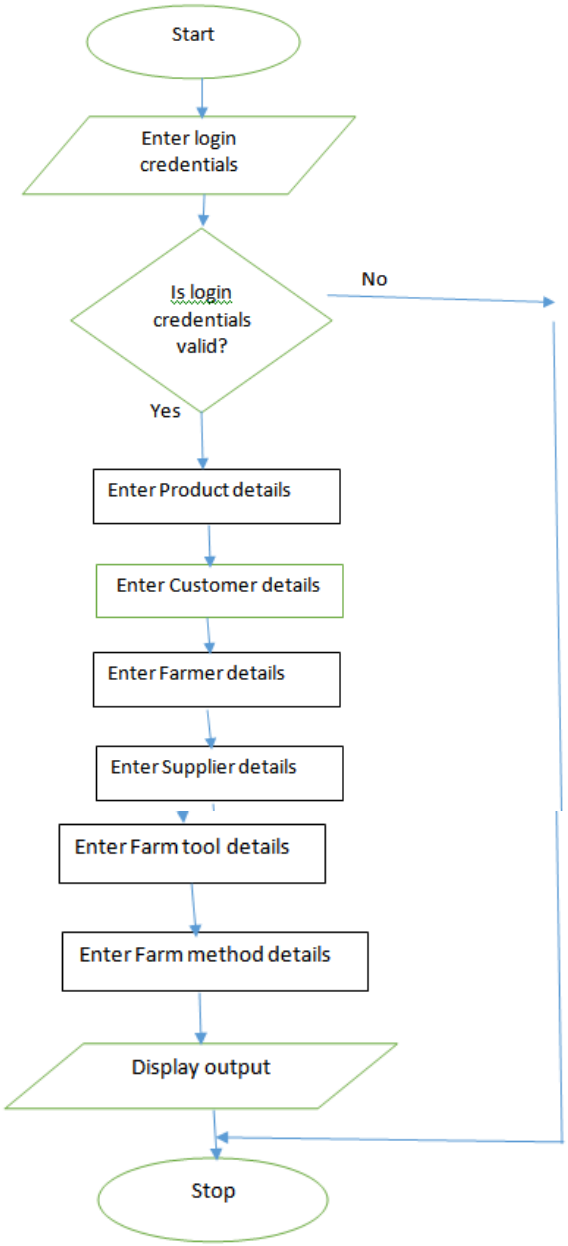


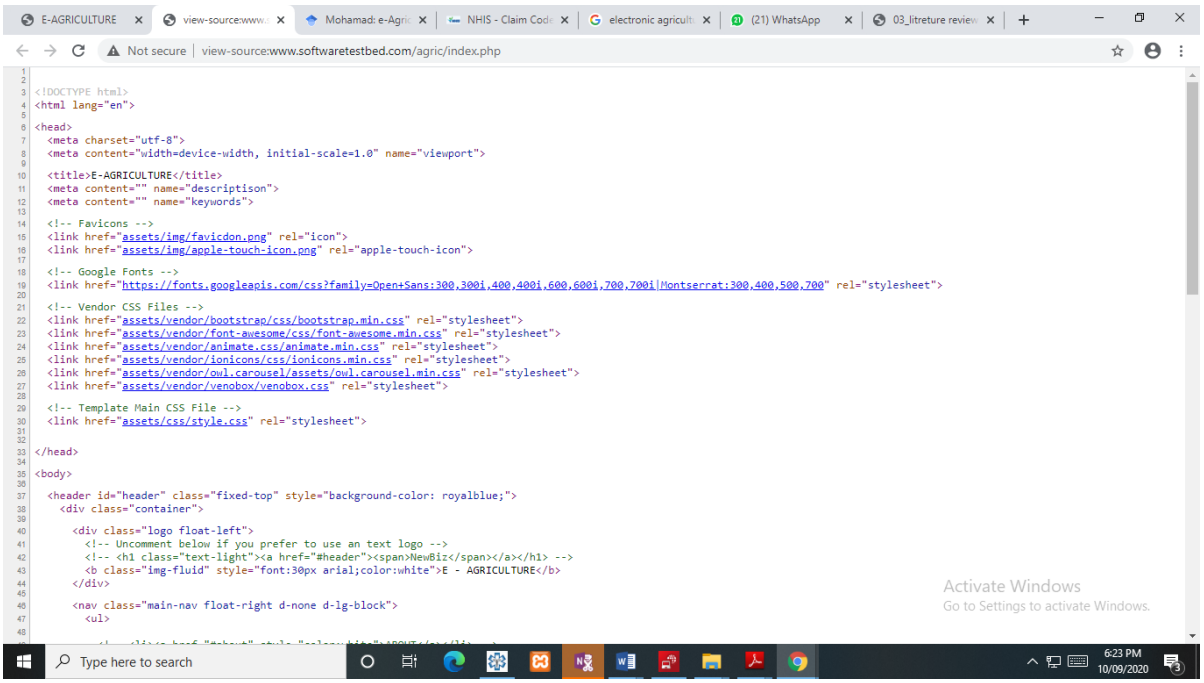

**Figure 3: Flo chart**

### 3.6 Programming Tools

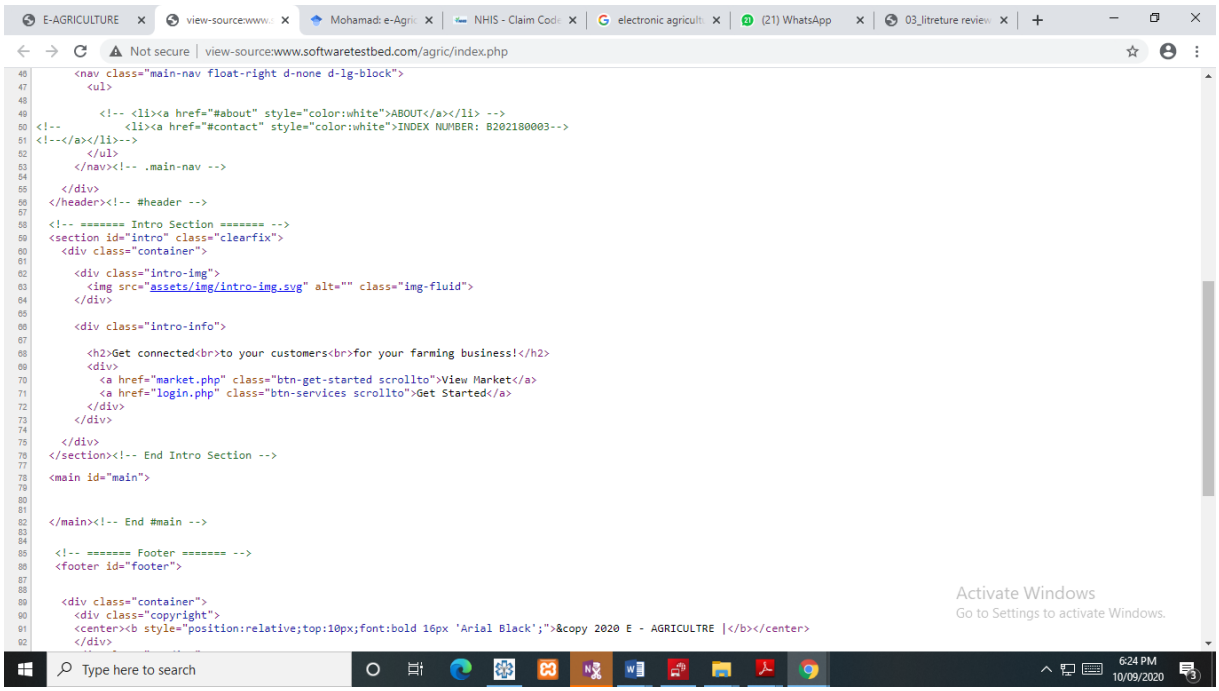
The programming language tools in developing the proposed system are: HTML, PHP, CSS, Bootstrap and JavaScript.

# IV. EXPERIMENTAL RESULTS AND DATA ANALYSIS

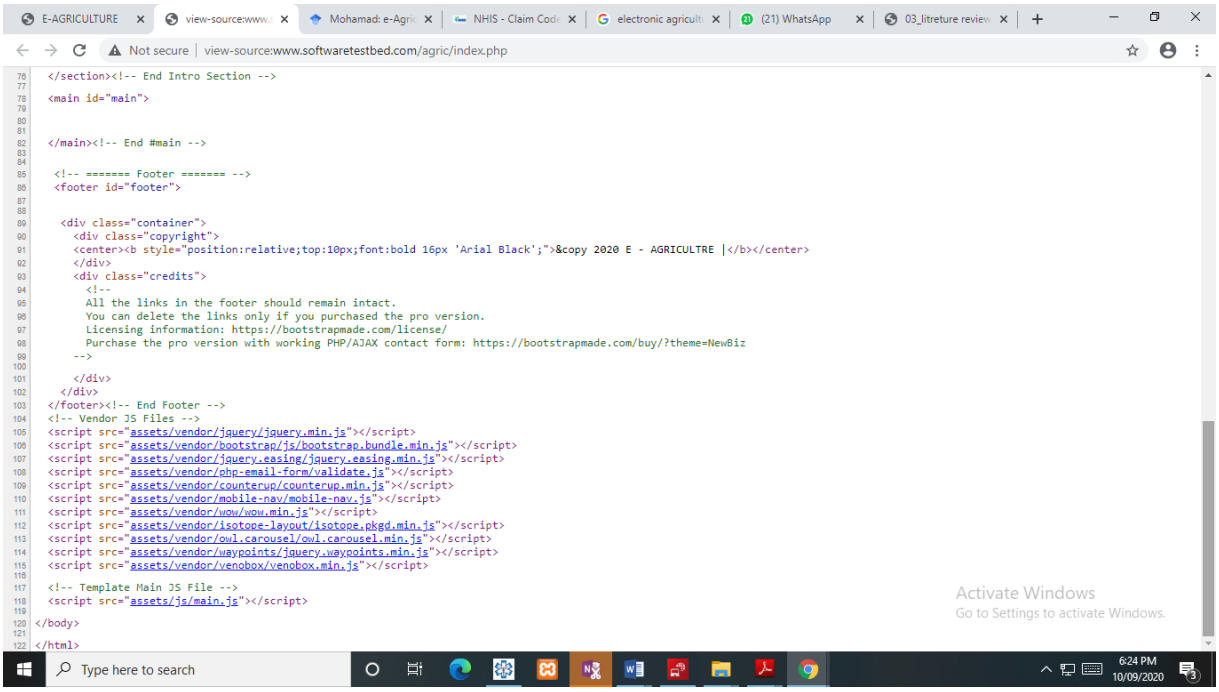
## 4.1 Screenshots of Dashboard Source Codes of the system



```
<!DOCTYPE html>
<html lang="en">

<head>
  <meta charset="utf-8">
  <meta content="width=device-width, initial-scale=1.0" name="viewport">

  <title>E-AGRICULTURE</title>
  <meta content="" name="descriptison">
  <meta content="" name="keywords">

  <!-- Favicons -->
  <link href="assets/img/favicdon.png" rel="icon">
  <link href="assets/img/apple-touch-icon.png" rel="apple-touch-icon">

  <!-- Google Fonts -->
  <link href="https://fonts.googleapis.com/css?family=Open+Sans:300,300i,400,400i,600,600i,700,700i|Montserrat:300,400,500,700" rel="stylesheet">

  <!-- Vendor CSS Files -->
  <link href="assets/vendor/bootstrap/css/bootstrap.min.css" rel="stylesheet">
  <link href="assets/vendor/font-awesome/css/font-awesome.min.css" rel="stylesheet">
  <link href="assets/vendor/animate.css/animate.min.css" rel="stylesheet">
  <link href="assets/vendor/ionicons/css/ionicons.min.css" rel="stylesheet">
  <link href="assets/vendor/owl.carousel/assets/owl.carousel.min.css" rel="stylesheet">
  <link href="assets/vendor/venobox/venobox.css" rel="stylesheet">

  <!-- Template Main CSS File -->
  <link href="assets/css/style.css" rel="stylesheet">

</head>

<body>

  <header id="header" class="fixed-top" style="background-color: royalblue;">
    <div class="container">

      <div class="logo float-left">
        <!-- Uncomment below if you prefer to use an text logo -->
        <!-- <h1 class="text-light"><a href="#header"><span>NewBiz</span></a></h1> -->
        <b class="img-fluid" style="font:30px arial;color:white">E - AGRICULTURE</b>
      </div>

      <nav class="main-nav float-right d-none d-lg-block">
        <ul>
```



```
      <nav class="main-nav float-right d-none d-lg-block">
        <ul>

          <!-- <li><a href="#about" style="color:white">ABOUT</a></li> -->
<!--         <li><a href="#contact" style="color:white">INDEX NUMBER: B202180003-->
<!--</a></li>-->
        </ul>
      </nav><!-- .main-nav -->

    </div>
  </header><!-- #header -->

  <!-- ======= Intro Section ======= -->
  <section id="intro" class="clearfix">
    <div class="container">

      <div class="intro-img">
        <img src="assets/img/intro-img.svg" alt="" class="img-fluid">
      </div>

      <div class="intro-info">

        <h2>Get connected<br>to your customers<br>for your farming business!</h2>
        <div>
          <a href="market.php" class="btn-get-started scrollto">View Market</a>
          <a href="login.php" class="btn-services scrollto">Get Started</a>
        </div>
      </div>

    </div>
  </section><!-- End Intro Section -->

  <main id="main">


  </main><!-- End #main -->

  <!-- ======= Footer ======= -->
  <footer id="footer">

    <div class="container">
      <div class="copyright">
      <center><b style="position:relative;top:10px;font:bold 16px 'Arial Black';">&copy 2020 E - AGRICULTRE |</b></center>
      </div>
```




## 4.2 Software Testing

Different tests were conducted to determine the system'soperational, transitional and maintenance characteristic

All the tests executed showed that the system isreliable, efficient, reusable, portable, adaptable, maintainable and scalable.

### 4.3 System Interfaces

Figures 4 to 15 are the system interfaces showing different uses as explained below.

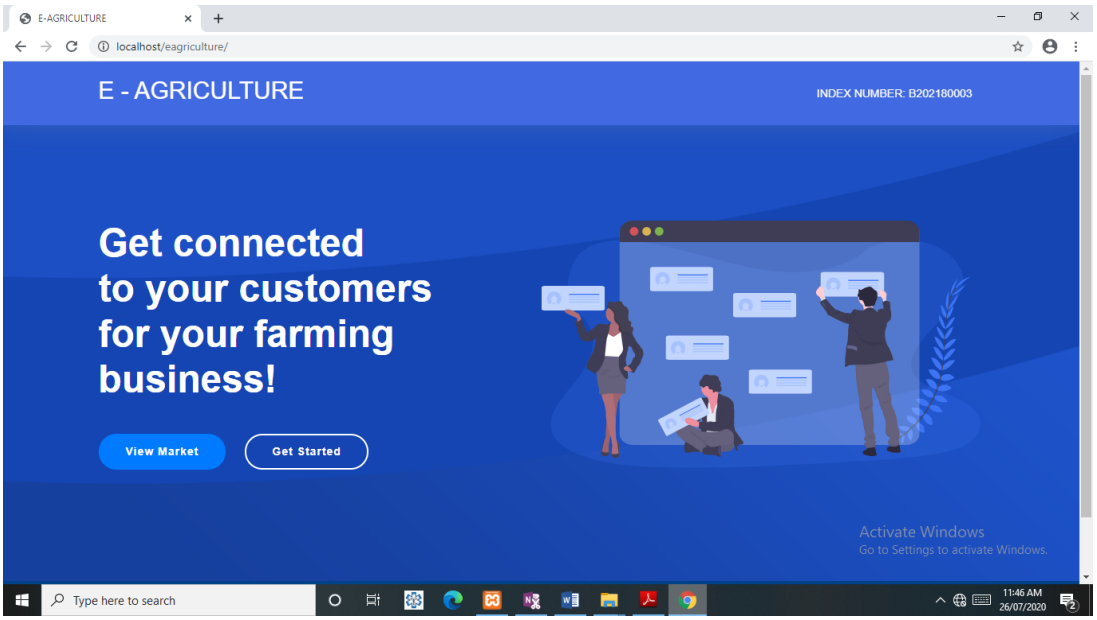



**Figure 4** above is the home page of EAMS which displays the view market and get started buttons.

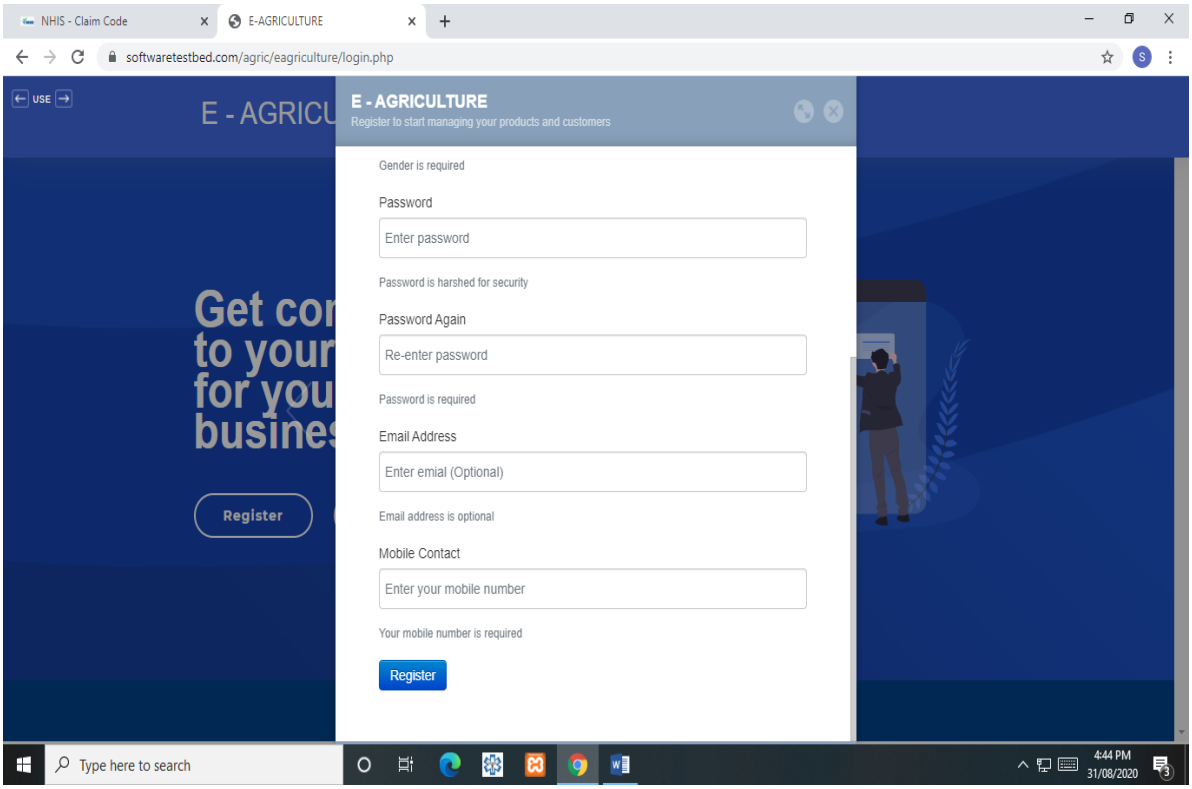



**Figure 5** above shows the registration form to be filled by farmers and customers before login to the system

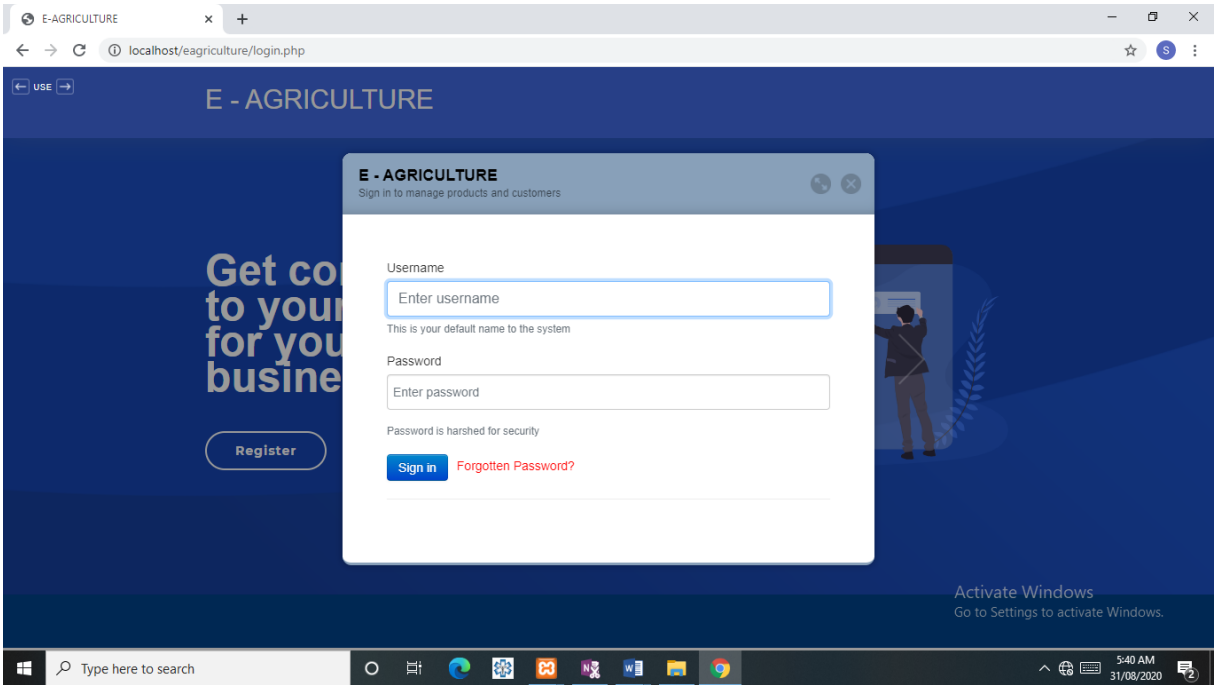



**Figure 6** above shows the login interface for username and password credentials

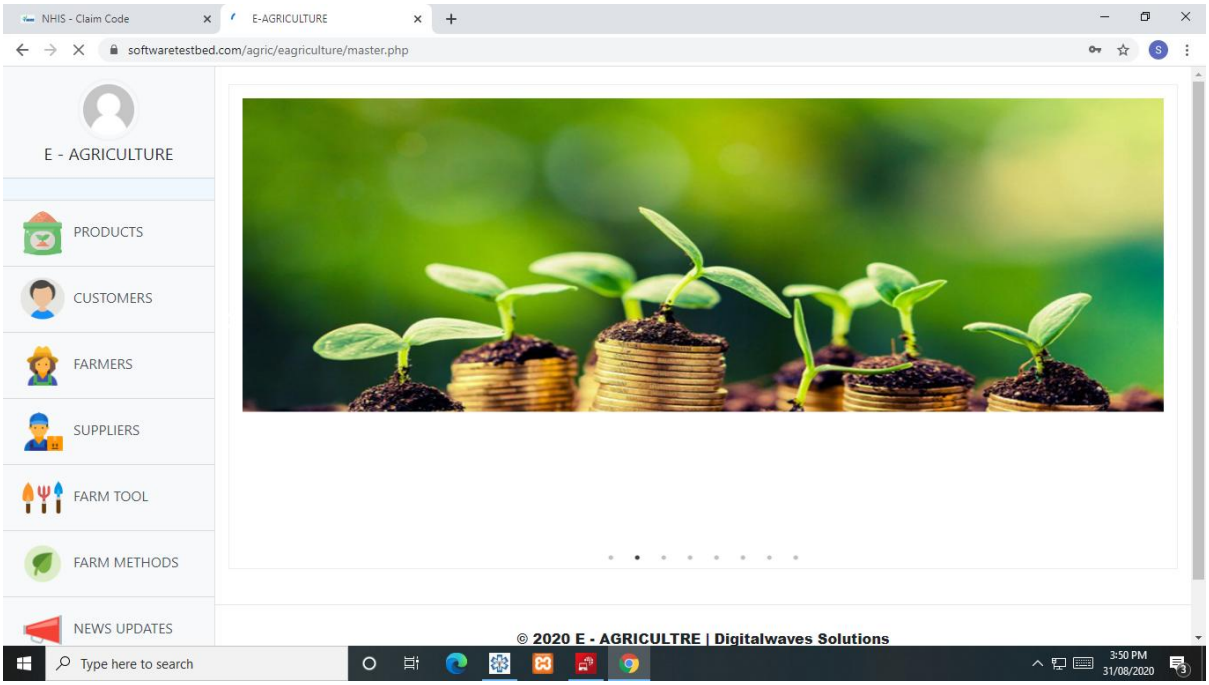



**Figure 7** above displays the various interfaces when a user login with the correct credentials.

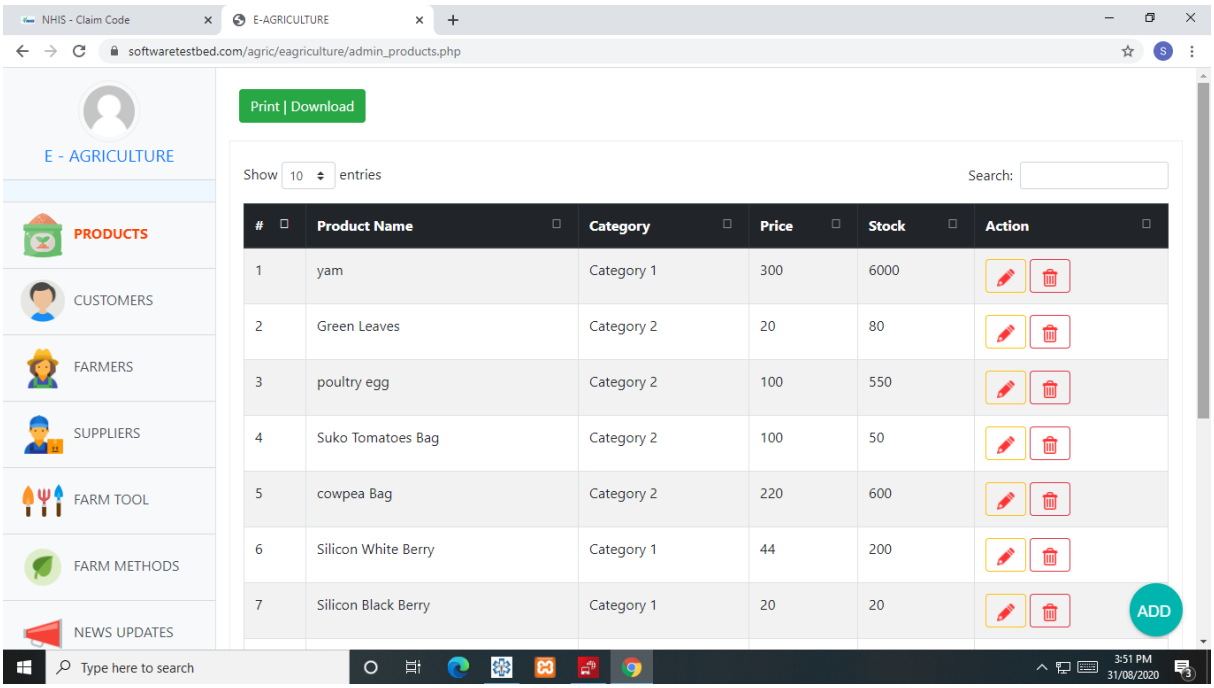



**Figure 8** above shows product names, categories, prices and the stocks available

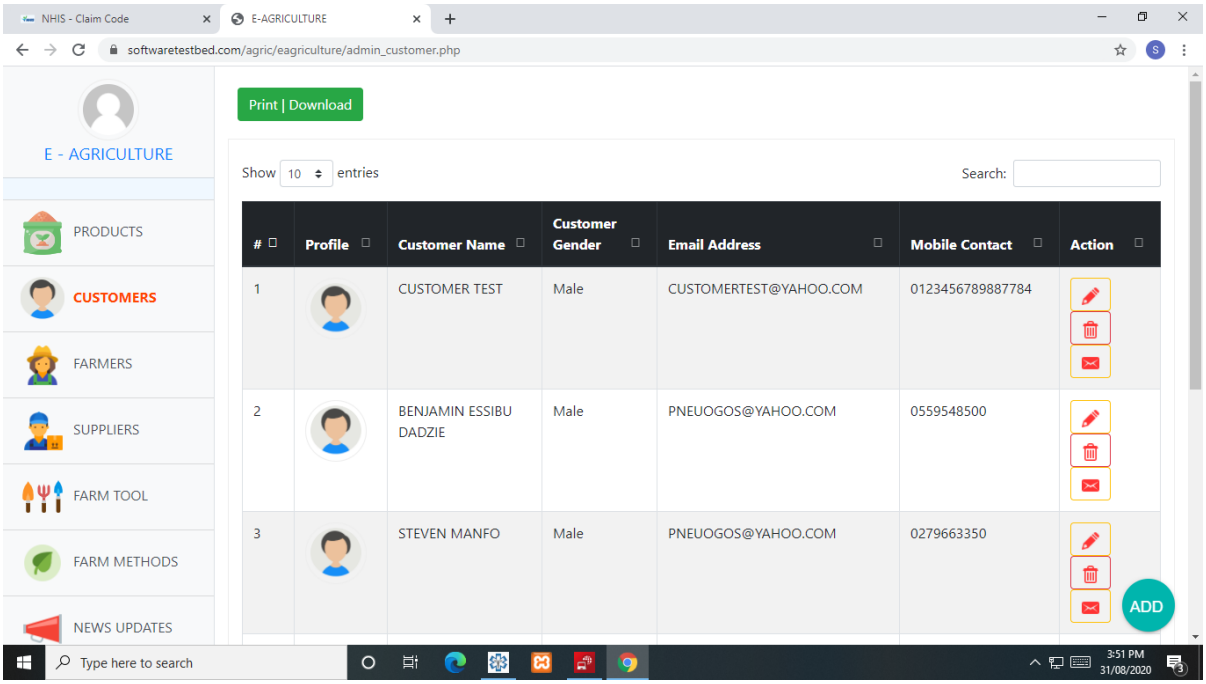



**Figure 9** above shows profile, names, gender, email address and mobile contact of customers.

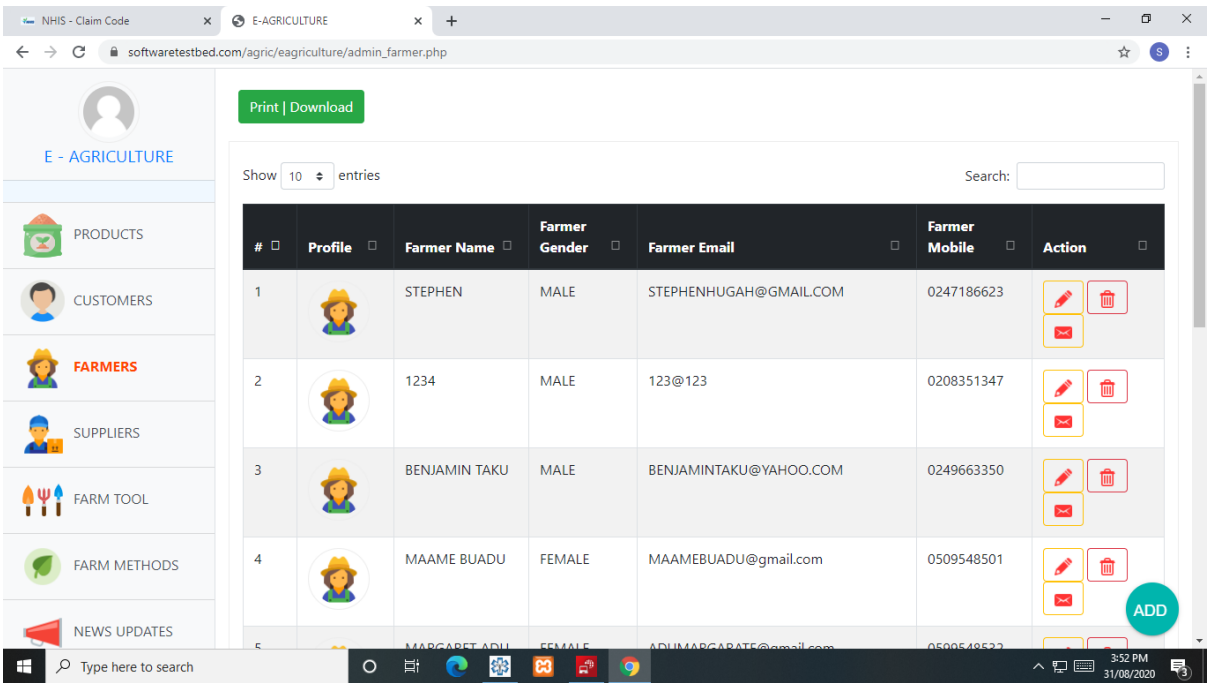



**Figure 10** above shows profile, names, gender, email address, mobile numbers of farmers

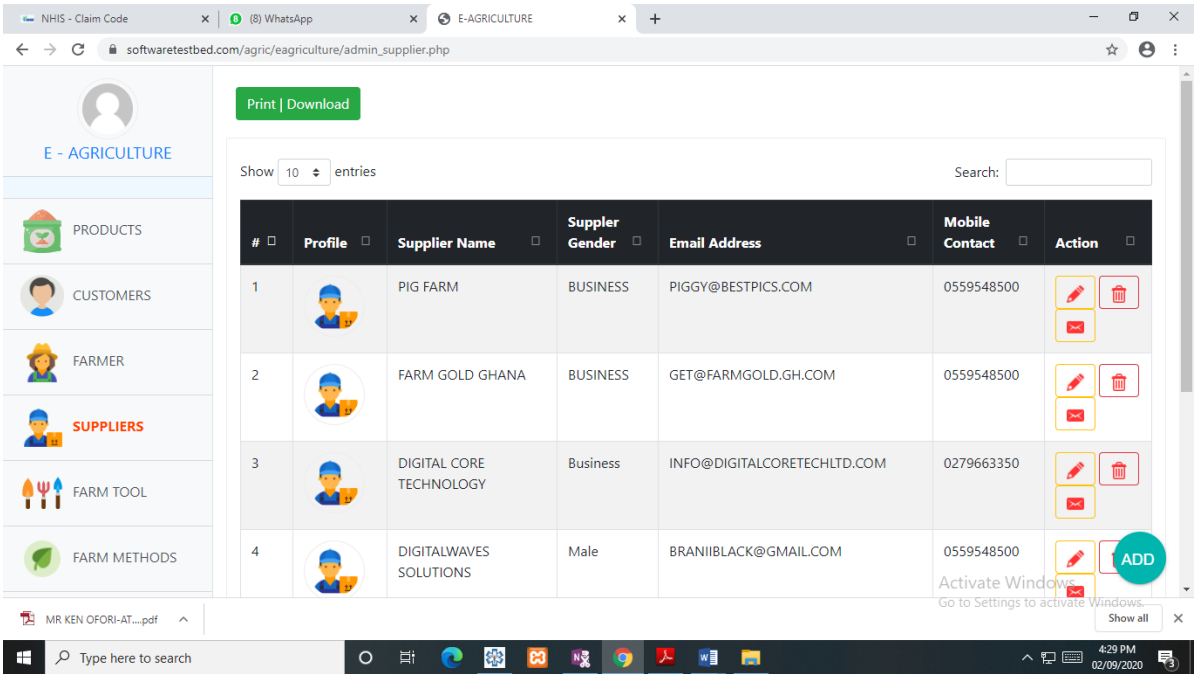



**Figure 11** above displays profile, names, gender, email address, mobile numbers of customers

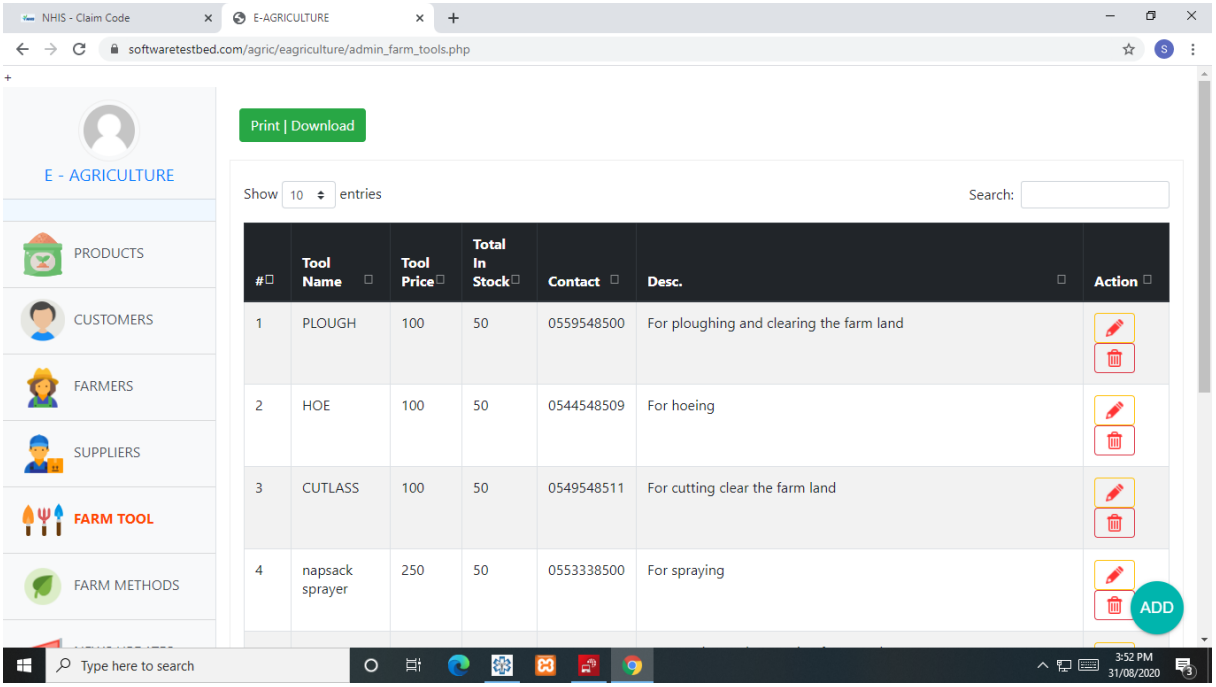



**Figure 12** above shows the farm tools details

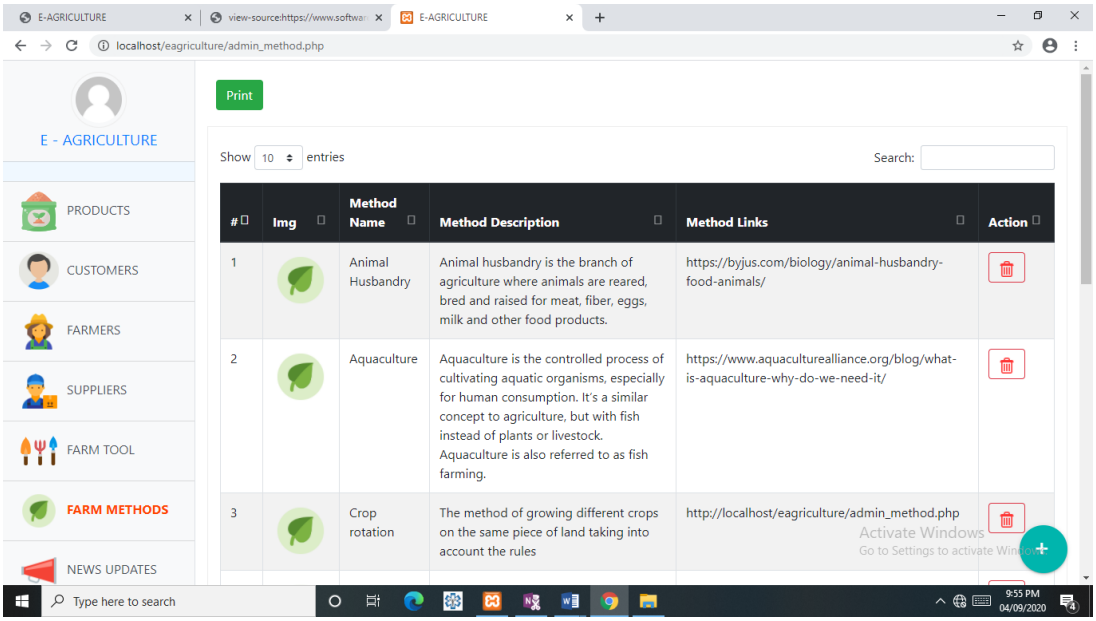



**Figure 13** above shows the various methods of farming

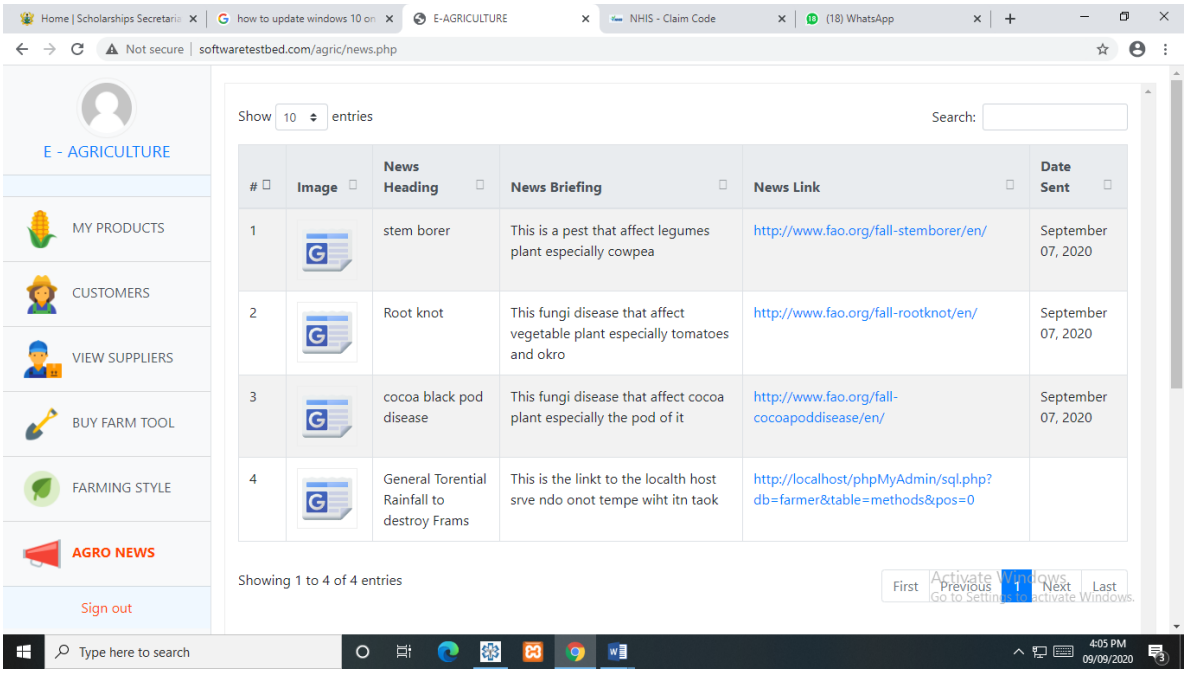



**Figure 14** above shows news update on farming

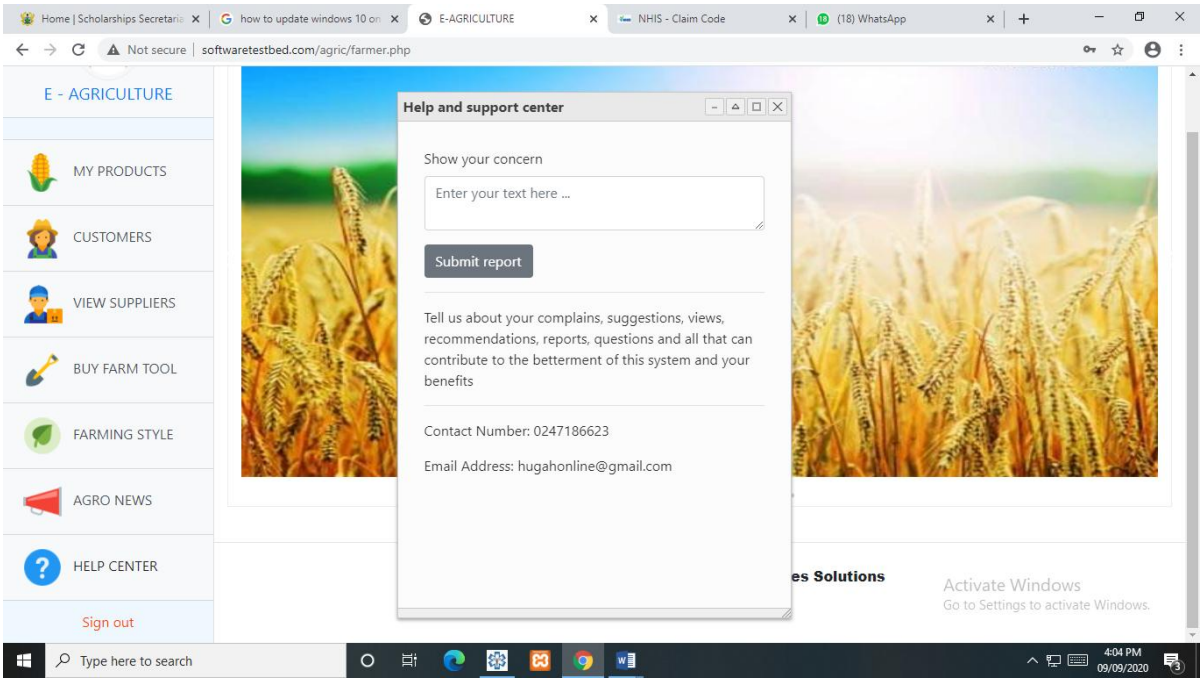



**Figure 15** above shows an interface where a farmer makes a request or enquiry and send complaint to the agriculture extension officer.

## V. CONCLUSION AND RECOMMENDATION

### 5.1 Conclusion

The results above showed that we have successfully developeda web based Electronic Agriculture Management System (EAMS) which provides reliable, consistent and accurate data about farm products, farmers, suppliers and other information. The extension officers in the Agriculture department ofAflao Ketu South Municipalitywill have adequate information about the farmers products and this will enable them to give necessary assistance to the farmers. The system is able to improve the farmers productivity and thereby resulting to increase in revenues from farm products.

### 5.2 Recommendation

It is recommended that the EAMS should be implemented by the Agriculture department of Aflao Ketu South Municipalityto replace the manual system of using spreadsheet to record and process data about the farm products because of its numerous benefits as stated above.

## REFERENCES

[1]. Dharani, D.B. (2019, April). E-Agriculture in Action: Big Data for Agriculture. ResearchGate. Retrieved from https://www.researchgate.net/publication/340664302_e-agriculture_in_action_big_data_for_agriculture
[2]. Mohamad, MRA., Gombe, MI. (2017). e-Agriculture revisited: a systematic literature review of theories, concept, practices, methods and future trends. British Academy of Management Conference Proceedings. Retrieved from http://usir.salford.ac.uk/id/eprint/43648
[3]. Fernando, E., Assegaff, S., Rohayani, H.AH. (2016, October). Trends Information Technology in E-Agriculture: A Systematic Literature Review.ResearchGate. Retrieved from https://www.researchgate.net/publication/315872811_Trends_information_technology_in_E-agriculture_A_systematic_literature_review
[4]. FAO (2017). Information and Communication Technology (ICT)in Agriculture. Retrieved from http://www.fao.org/3/a-i7961e.pdf
[5]. Bhandari, P. (2020, July 30). Methodology. Scribbor. Retrieved from https://www.scribbr.com/methodology/qualitative-research/

Dr. Egho-Promise EhigiatorIyobor, et. al. "E-Agriculture Management System (A Case Study of Aflao Ketu South Municipality in Ghana)." *Quest Journals Journal of Software Engineering And Simulation*, Vol. 06, No. 01, 2020, Pp. 38-49.