Profitable Crops DSS

by

Bellyzia Beliat

Dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
(Business Information System)

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CERTIFICATION OF APPROVAL

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Business Information System Programme
Universiti Teknologi PETRONAS
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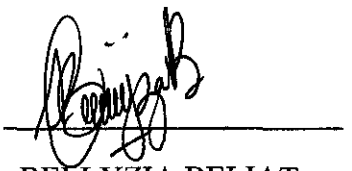
Approved by,

(Dr. P. Dhanapal Dorai Dominic)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
July 2007

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.



BELLYZIA BELIAT

ABSTRACT

This report is divided into five chapters named Chapter 1, Chapter 2, Chapter 3, Chapter 4 and Chapter 5 accordingly. First it represents the abstract of this report. Chapter 1 describes the background of study, problem statement and objective and scope of study. Chapter 2 is about the literature review/theory in practice, conduct research to build a point of view or to critics the findings that related to the project. Chapter 3 consists of methodology section which explained in details about the procedures and methodology used and the tools/software needed to implement the project. The result and discussion and also conclusion are described in the Chapter 4 and Chapter 5. The focus of this project paper is to study profitable crops in the industry which can be extended to develop a new system to aid the grower in Malaysia. The system will be develop to assist targeted farmer to make better decision on the profitable crops and perfectly suitable to be grown on their land.

ACKNOWLEDGEMENTS

Firstly, I would like to thank God for giving me the chance to be able to engage in this project. With Him, all things are possible.

Secondly, I would like to thank my supervisor, Dr. P. Dhanapal Dorai Dominic, he has been a great help in providing guidance and direction to where this project should lead while giving valuable comments on work done.

Last but not least. I express my gratitude towards family members and friends who have directly or indirectly contributed towards the successful execution of this project.

ABBREVIATIONS AND NOMENCLATURES

- **BDC Portal : Business Development Centre Portal**
- **DOA : Department of Agriculture Malaysia**
- **DSS : Decision Support System**
- **FAMA : Federal Agriculture and Marketing Authority**
- **MOA : Ministry of Agriculture Malaysia**
- **PCDSS : Profitable Crops Decision Support System**
- **ROI : Return On Investment**

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CHAPTER 1

INTRODUCTION

1. Introduction

1.1 Background Study

The information technology provides a potential source of tools that could help farmers work smarter by choosing the right crop to plant commercially and increasing the productivity of the crops they plant. Eventually, as the cost of information technology infrastructure continues to decrease, the benefits of providing Decision Support Systems (DSS) technology will exceed the cost in more situations, and the role of DSS in agriculture will grow.

To some extent, this is because DSS are an integrator of information and a producer of secondary data rather than a generator of primary or source information. Furthermore, skills are required in both computer science and management information systems, so that the software developed is computationally efficient, easy to use, and produces results that are reliable to those who will use the outcomes to make decisions. However, DSS can provide help to decision-makers in terms of serving the analyzed data into useful information.

1.1.1 What is Decision Support System?

Aronsan [2] defines DSS is a specific class of computerized information system that supports business and organizational decision-making activities. A properly designed DSS is an interactive software-based system intended to help decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.

1.1.2 Characteristics and capabilities of DSS

Apparently, there is no agreement among scholars on standard characteristics and capabilities of DSS. However they have established the figure below about the major DSS capabilities and characteristics. These characteristics allow decision makers to make better, more consistent decisions in a timely manner. In a nutshell, a research model by Aronsan [2] was constructed in Figure 1 to help researcher a better understanding of DSS.

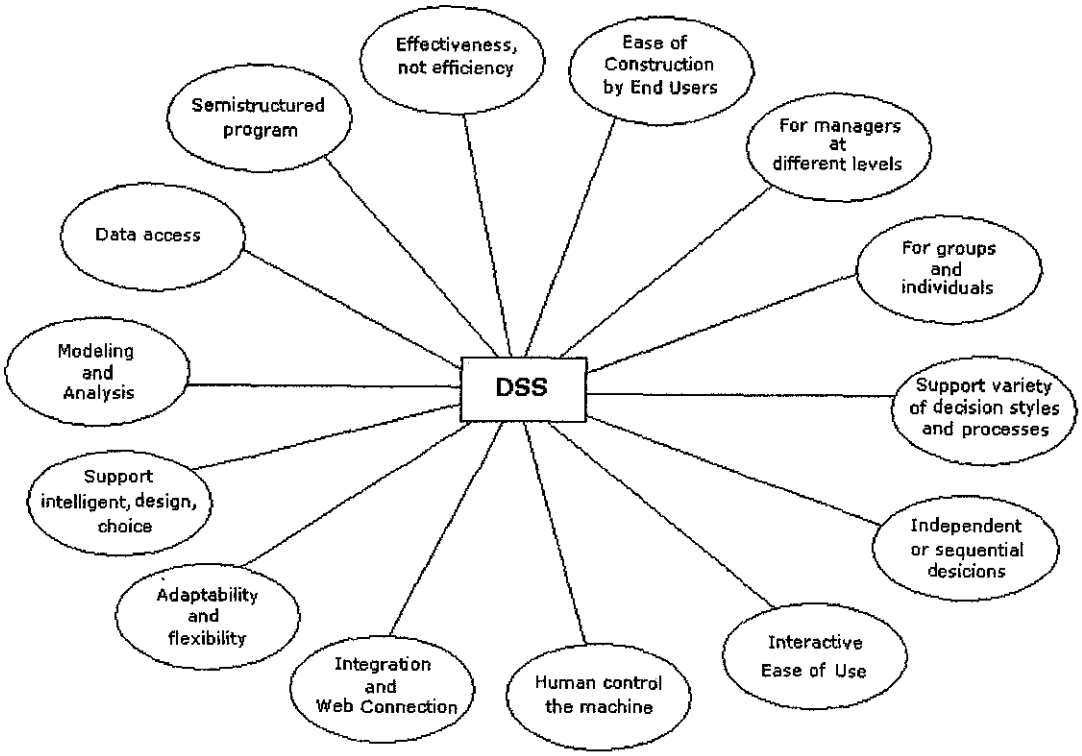

Figure 1: The Characteristics and Capabilities of DSS

1.1.3 Profitable Crops DSS

Profitable Crops DSS is a system to help grower to have a better solution or an idea on what to start planting. The traditional way that always been practice by grower is only by grows the plant without a good or profitable plan at all. This system will be integrated and presented in a way that can give the whole group of people of the agriculture industry to have a new experience of accessing these important tools, thus improving the speed of makes decision, more efficient, and increasing the quality of decision.

1.2 Problem Statement

1.2.1 Problem Identification

Currently in Malaysia, there is no specific DSS tools to help the farmer in deciding which crops is profitable and perfectly suitable to be grown on their land.

The author has identified several problems with respect to this project to shows the need to have the suggested system:

i. The grower use prediction in deciding to be planted crops. This may lead in poor making decision which is not accurate. Which resulted to the waste used of their land; they not really utilize their land very well. This methodology does not maximize the earnings from the cultivation activity.

ii. Traditional farmer usually inherited the cultivation knowledge from their family and continuing their family's legacy of the farm, even though it is not profitable. This so much different as compared to U.S and Japan grower, we can see they are really successful in agricultural business.

iii. Lack of technology usage, still practicing the traditional way to cultivate their crops. Way far lower standard of productivity from neighboring country such as Thailand.

1.2.2 Significant of the Project

Based on these problems, we can conclude that the usage of DSS in agricultural is needed to make significant impact on farmer's economic scale, saves time, and effectively assisting farmer to make correct decision which can give better solution to their problem. Therefore the role of DSS tools is vital in our agriculture industry. However, although the suggested system is possibly created, the other problem such as encouraging user to use this system is takes time since our existing grower is not really or still new to computer technology. Therefore, not only the user must be computer literate, the software itself must definitely easy to use and very straight forward.

1.3 Objective and Scope of Study

1.3.1 Objective

The objectives of this project are as follow;

- To provide online advisory service particularly in preparation of the suitable crops for the specified information.
- To guide and develop successful agricultural entrepreneurs in order to increase farm productivity and the national agricultural production.
- To provide knowledge and information to the grower.
- To encourage grower to be a player in the agricultural market.

1.3.2 Scope of Study

The materials used in this document were solely for studies purpose which focused on current cultivation activities done in Malaysia. The reviewed journal and website was used to determine what crops can be marketable. This information will be use as a ground to provide a basis whether a farmer can profit from the market using their current planted crop. Failure to market their cultivation would require the farmer to rethink of a new plant and might consider a plant that has values in niche market.

1.3.3 Feasibility Study of Project

This project is going to be conducted in two semester time. This project is started with conducting studies, fact finding, and research in the first semester. The studies and research is done mostly through books from the library and also journal or any related information regarding DSS from the internet. Advices and suggestions from the supervisor are also contributing towards the progress of the study.

CHAPTER 2

LITERATURE REVIEW AND THEORY

2. Literature Review and Theory

2.1 Important of Online DSS

According to Sean B. Eom (2001)

> The World Wide Web is increasingly being used as the client-server platform of many business organizations due to its network and platform-independence and very low software/installation/maintenance costs. More and more groupware will be inextricably tied to Internet technology. Especially, the World Wide Web is becoming an infrastructure for the next generation of decision support systems and groupware applications.

Obviously it is good to have an online DSS system because we are moving towards the cyber world especially our next generation farmers. In future internet is like a backbone for the next generation. They will depend mostly on the internet to manage their farm activity.

From Sean B. Eom (2001)

> As we enter the age of the global village where geographical and temporal boundaries are shrinking rapidly, global DSS are emerging as the new frontiers in management information systems area. Over the next decade, DSS will focus on teams, work groups, and distributed, decentralized organizational structures

(King 1993). Consequently, many organizations will increasingly design and implement group/organizational/global DSS.

Nowadays many companies started to do their business online which is low software/installation/maintenance cost. In the other word, doing business online will expand their company to the global world which set them apart from their competitors.

Daniel J. Power (2000) says

Web-based DSS are available seven days a week and 24 hours a day and user will have different needs.

By implementing Web-based DSS in agriculture sector, user can get any information or advice regarding crops and can make decision from the system at any time as long as they can access the internet. It is also save time and increases the speed of making decision rather than go to the DOA office to get an advice from them.

2.2 Benefit of Using DSS in Agriculture

From S.Newman, T.Lynch, and A.A. Plummer (1999)

The use of DSS within animal production allows producers to integrate information into more useable forms and enhances management skills through improved decision-making and increased capacity for benefit: cost and risk analyses, and DSS allows comparisons of the cost-effectiveness of various production alternatives.

It has been proven that having DSS in agriculture sector will bring good opportunity to the farmer. DSS really helps the farmer to have a good plan on what crops that is perfectly suitable to plant on their land. The system will suggest a decision for the farmer on what type of crops they should plant based on data given. Indirectly it will

increase the productivity of the farm cultivation and increase the profit also improves the quality of decision making.

By using the system the DSS tool has already generate the risk that will be faced by the farmer. So they should focus and prepared for the risk to occur. Using old method or traditional way is more costly because the farmer did not know the risks that they might face which make the farmer suffer losses due to the low productivity of cultivation which leads to low income or profit.

Nik Mazlan Wan Abu Bakar (2003) says

> One of the constraints faced by the smallholders is the small, uneconomic farm size, which has led to low farm productivity and income. One of the reasons why farmers' incomes are low is that most farmers practice monoculture where only single type of crop is planted.

Using DSS in agriculture to produce accurate result and generate high income can be achieved if and only the farmer have at least the required size of land to profit from monoculture. Otherwise, the farmer might only earn profit from horticulture because of the small farm size they have. Therefore, in Profitable Crops DSS, a minimum of size of land is required to ensure that the farmers can get good profit and maximize the potential of their land, and not just to break even.

2.3 The Efficiency of DSS

According to WebHADSS (2002)

> WebHADSS™ is a weed control decision aid developed by weed scientists in several states. It has been designed to assist growers, consultants, and pesticide applicators in making economically sound weed control decisions for both post emergence and soil-applied herbicides. Data from university trials and the experience of weed scientists from several universities have been built into the decision making process of HADSS. Included are efficacy data for most herbicide treatments available for corn, soybeans, peanuts, and cotton, as well as

competition data for over 70 weed species, depending on the state. A new release is available each year, incorporating the results of the recent research. Work is in progress to add support for additional crops and states.

The WebHADSS™ is reliable because of the data of recent research is yearly updated to produce an accurate decision making for weeding process for the farmers. Therefore the efficiency of the result continues to be consistent every year. Hence, from this system it is proven that DSS can be a reliable system with frequent update and regularly maintained.

David L. Jordan (2007) says

> Using WebHADSS and given a crop value of $425 per ton, adequate growing conditions (good soil moisture for satisfactory herbicide performance), and large size weeds (at least 4 inches tall)... Although issues relative to accuracy and time required for weed scouting do exist, the WebHADSS program does allow a relatively quick and clear comparison of herbicide options while taking herbicide efficacy, herbicide cost, and economic return from that investment into account.

Meaning having the DSS in weeding process can help the farmer to save time where they can expect the right time to weed the crop and save cost. WebHADSS also provide several other herbicide options for the farmer to select, which match with their capital or available resources.

2.4 Support The Government Resolution

From the Ninth Malaysia Plan 2006-2010 (2006)

> The productivity, efficiency, and the income and wealth generating potential of the sector will be enhanced through the wider application of modern farming methods and ICT, strengthening R&D and innovation, improving marketing capability, and promoting increased participation of the private sector including entrepreneurial farmers and skilled workers.

It is proven by having the DSS Tool in agriculture is a way to support the Ninth Malaysia Plan towards modern farming methods. Indirectly we reduce the dependency on imported foods and encourage more entrepreneurial farmers and skilled workers to be involved in agricultural sector.

2.5 Types of Land Classification Systems

The following are important land classification systems that have been drawn up to ensure the judicious use of land resources and proper planning and application of land utilization systems in Malaysia.

2.5.1 Soil Crop Suitability Classification

This classification was the first suitability classification for agricultural development. It grouped soils into five classes, based on various factors that affect crop production. Some of these factors are drainage, topography, soil chemistry, soil texture and availability of plant nutrients.

To support the rapid development of agriculture in 1960s, a study of a classification system to determine more specifically the suitability of crops for different soil types is needed. Hence, the earlier basic land classification evaluation system was refined, improved and upgraded to its present form which is called the Soil-Crop Suitability Classification for Peninsular Malaysia in 1974 (Wong, 1986). This classification determines the classes of the soils by their qualities; Class 1 has better soils which allow a wider range of suitable crops as compared to Class 2 which is then better than Class 3. Classes 4 and 5 soils are better reserved for forest.

2.5.2 Agro-Climatic Classification

Agro-climatic Classification is another decision-making domain used in Malaysia. Factors used to determine agro-climatic zones are rainfall, evapotranspiration, wind, and soil moisture content. In 15 years, two agro-climatic classifications have been developed in Malaysia, namely Agro-ecological Regions in Peninsular Malaysia (Nieuwolt, et al., 1982), and Agro-climatic and Crop Zone Classification of Malaysia (Malaysian Meteorological Services [MMS], 1993).

2.5.3 Crop Zonation

There are 2 types of crop zonation namely agro-ecological and agro-climatic zones map which were refined through the years to produce various crop zone maps in the country. In the zonation concept, the factors considered are soil, terrain, climate, disease incidence, economic, socio and even political factors. Crop zone maps for Peninsular Malaysia were produced by DoA in 1983 (DOA, 1986). The maps show the regions where strategic and economic crops should be grown. The major crop zones identified are those of paddy: paddy and mango; field crops, cocoa/coconut; and fruit areas consisting of various combinations.

2.6 Agriculture Activities

In Malaysia the horticultural crops grown are fruit, vegetable and ornamental crops. Tropical fruits are widely grown either in mixed or single fruit orchards. Smallholders cultivate most fruit. However, there are a few private companies that undertake large-scale cultivation of fruits. The popular fruits cultivated commercially are papaya, banana, pineapple, star fruit, watermelon and citrus. Except for the pineapple, which is grown on peat soil, other fruits are grown on mineral soils.

2.7 DECISION SUPPORT SYSTEM OVERVIEW

Web-based Decision Support System was developed as a tool with aim to help the manager or business analyst in decision making process using a web browser. It offers help in such way to retrieve, analyze and display structured data from large multidimensional or relational databases, provide access to a model or expert system, provide access to multimedia documents and unstructured data, and facilitate communication and decision making in distributed teams. [9]

In specific, Decision Support Systems can be divided in six types:

Model-Driven

Model-Driven Decision Support Systems emphasize access to and manipulation of a statistical, financial, optimization or simulation model. This type of DSS uses data and parameters provided by decision makers to aid decision makers in analyzing a situation, and not necessarily data intensive. Online analytical processing (OLAP) systems is one example that provide complex analysis of data can be classified as hybrid DSS systems providing both modeling and data retrieval and data summarization functionality.

Communications-Driven DSS

A Communications-Driven DSS supports more than one person working on a shared task, examples include integrated tools like Microsoft's NetMeeting™. Communications-Driven DSS support communication, collaboration, and coordination.

Data-Driven

Data Warehouses and Executive Information Systems that can be delivered using a Web browser is a type of Data Driven Decision Support Systems.

Document-Driven

Document-Driven DSS manage, retrieve and manipulate unstructured information in a variety of electronic formats. This type of DSS assists in knowledge categorization, deployment, inquiry, discovery and communication.

Knowledge-Driven

Knowledge-Driven DSS have specialized problem-solving expertise stored as facts, rules, and procedures or in similar structures. The knowledge were extracted from experts consists of knowledge about a particular field, understanding of problems within that area, and skill at solving some specific problems.

	Technology	
DSS Types	LAN- Based	Web-Based
Model-Driven	Single user	Multiple user
Communications-Driven DSS	Narrow scope	Global scope
Data-Driven	Thick-client	Thin-Client
Knowledge-Driven	Stand-alone PC	Shared rules
Document-Driven	Limited, doc., .xls	Also HTML, Search Engine

Figure 2: Implementing Decision Support System

The evolution of the Internet has a direct positive effect towards Web Based DSS research and development. Over the years, some HTML function has slowly been replaced by a stricter and cleaner tag of XML, and the improvement of fusion language such as Ruby on Rails, and AJAX. This has created new opportunities for DSS research and for developing innovative decision support systems. More research is needed that focuses on building and evaluating Web-Based Decision Support Systems to be portable for various evolving Internet browser on the web and also on mobile. DSS development and research was also influence by many discipline of development theory that has to be tested and relate to improve decision-making using computing technology. Figure 3 below depicts the interaction between web browser, web server and DSS models according to Power,D.J. [9] .

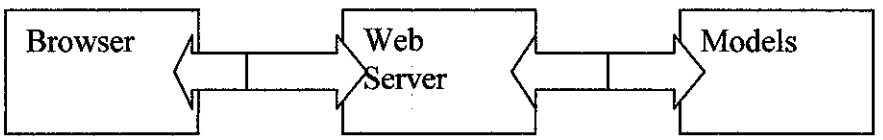

Figure 3: Web-Based DSS Architecture

Web-Based DSS have reduced technological barriers and made it easier and less costly to make decision-relevant information and Model-Driven DSS available to managers, staff users, customers and suppliers. The Web has increased access to DSS and it should increase the use of well-designed decision support systems. Using a Web-Based infrastructure for building DSS helps to improve the availability, available seven days a week and 24 hours a day and portability of the system without having the Operating System as an obstacle.

Managers and MIS professionals should note that Web-Based DSS could provide companies with a competitive advantage. These systems will primarily impact in-house decision processes and make them faster and more predictable. Web-Based DSS can also improve customer service where a decision is required. Most major DSS software vendors have made a major commitment to the Web for providing product information and for creating new DSS products. Overall, Web-Based Decision Support Systems show great promise for contributing to the success of organizations, but more research can help improve the design and implementation of these systems.

CHAPTER 3

METHODOLOGY/PROJECT WORK

3. METHODOLOGY/PROJECT WORK

3.1 Development Model

The development model used to implement the project is System Development Life Cycle (SDLC). The structure of the model which focuses on each phase to be completed first before proceeding to the next level makes this model is suitable to be adopted as the system's development methodology.

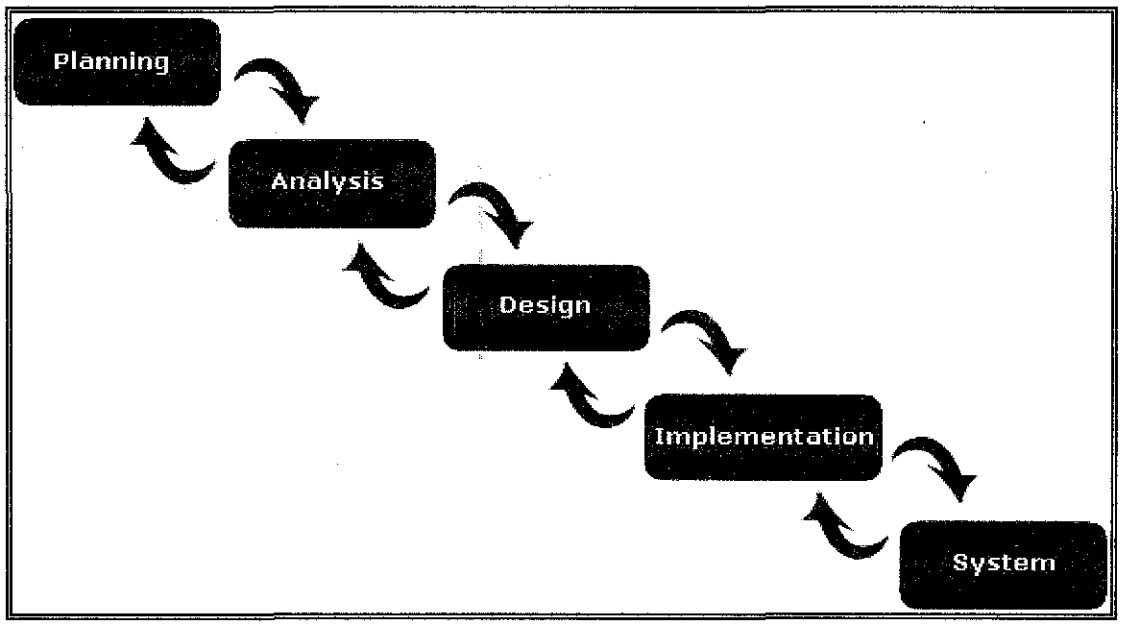

Figure 4: Project Development Model

1) Planning

At this stage, author has identified problems, objective and scope of the system. During this phase, the author has to decide on how to gather data and resources to be used as a ground for a research in this project.

2) Analysis

Analysis stage, the author conducted data gathering about the topic. At this stage the author has done lots of reading, interview, observed the environment and research in the internet, books, journal regarding to support the author's research in this topic. The author has conducted an interview with one of the DOA Officer, Mrs. Rahimah in Ipoh, Perak.

Feasibility Study

Technical feasibility (moderate)

Familiarity with application (medium)

- Majority of the modern farmer have medium skill with web-based application.
- The Department of Agriculture has a medium to rich experience with web-based application.

Familiarity with technology (high)

- The web-based technology has been known and used by the staff for over 4 years.
- This technology has been used in many agriculture departments, so we can get help and experience from them.
- The migration of data from the old database to the new database can be done by DOA administrator.

Project Size (small):

- The size of this project is estimated to be small in size.
- After completing this project, we will have an online DSS that is suitable for the grower.
- The system will be design to be simple and easy to use with fully functioning system that gives benefit to the users.

Economic Feasibility (excellent)

Tangible costs and benefits:

- 20% increase in food production after the crops is ready to be harvested

Intangible costs and benefits:

- Improve farmers' salary.
- Improve food production.
- Improve the quality of making decision.
- Improve time to make decision, faster.

Organizational feasibility (excellent)

User

- Farmer

Additional comments:

- System is build using web-based because it can reduce cost and also web-based application is flexible to be access from any platform.
  Most of the source of information is derived from DOA website.

3) Design

At this phase, author selected the best and suitable software and hardware for the project, the system architecture, designed the flow of the system, on how the system going to act when user used this system. Also create the graphical user interface for the system.

3.1.1 System Architecture

In developing a system that will interact with the users, system architecture is important to illustrate the interaction between users and the system. The author used the classical 3-tier web application as shown by Aronson [2] in constructing the "Profitable Crops DSS" architecture. Figure 5 shows the architecture overview:

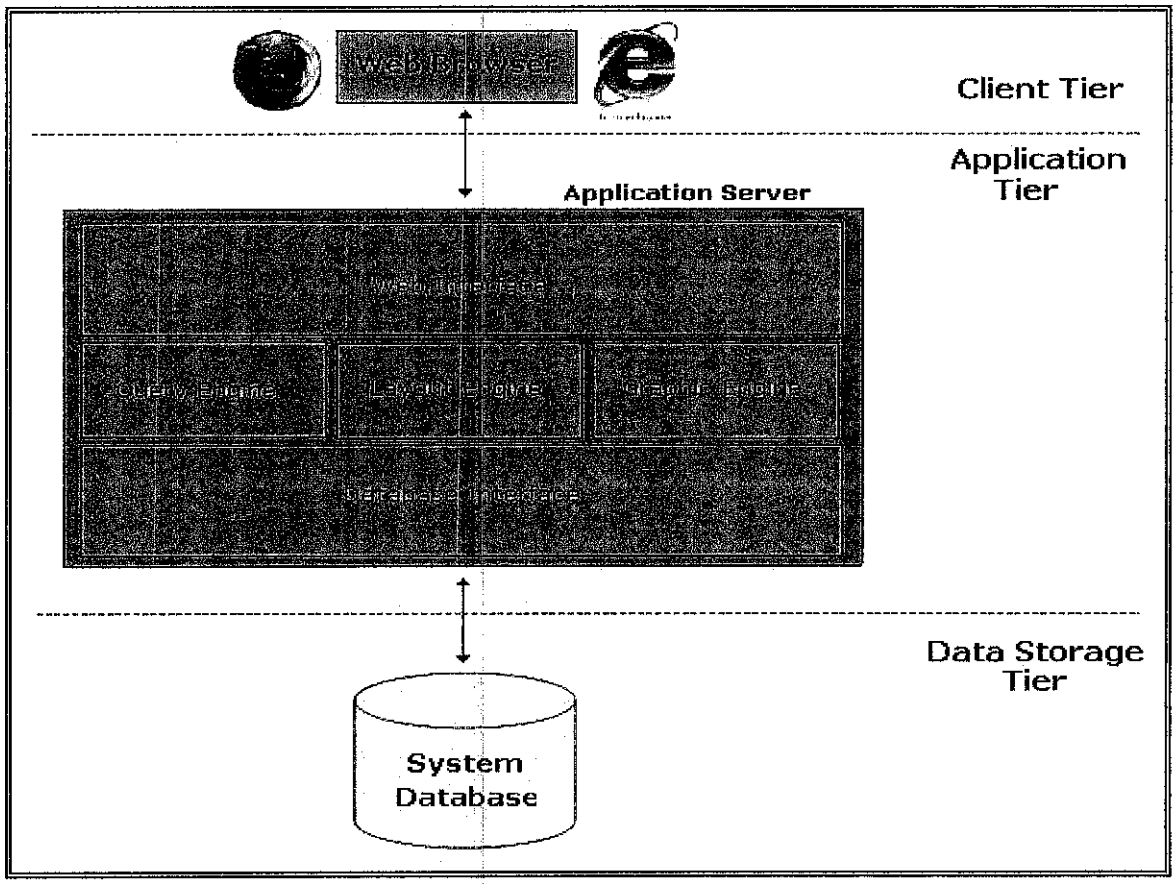

Figure 5: Profitable Crops DSS Architecture Overview

Description of System Architecture

1. Client Tier –User access the Profitable Crops DSS using web browser such as Internet Explorer or Mozilla Firefox or any other web-browser. Users will enter their queries into HTML forms. The browser passes the query data to the system application server by sending a HTTP request. When the application server has finished query processing, the browser displays the returned query results. Clicking on other internal links will trigger another HTTP request.
2. Application Tier – The main part of Profitable Crops DSS is the application server. It accepts queries, retrieves the corresponding data from the database, computes the result and delivers it to the client tier.
3. Data Storage Tier – The part where the data of the house will be stored in the Database Management System (DBMS).

3.1.2 The Application Server

The application server can be said as the heart of the Profitable Crops DSS. It consists of several components, which one of it will be implemented in PHP. The application server will be developed mainly on Microsoft Windows operating system. There are 5 components in the application server which are web interface, query engine, layout engine, graphic engine and also the database interface.

The web interface is responsible for the communication with the client tier. It receives the query in terms of a HTTP request with associated parameters. It parses the request and triggers the corresponding functionality of the query engine which processes the query and returns the result. The web interface uses the layout and graphics engine to transform results into a picture if available and delivers it to the client. The query engine executes the user queries. It extracts the required information from the database. The database interface is required for the

communication between the query engine and the database and graphic engine is used to generate images.

3.1.3 The Flow of Profitable Crops DSS

The process flow of the system can be seen in Figure 6 below.

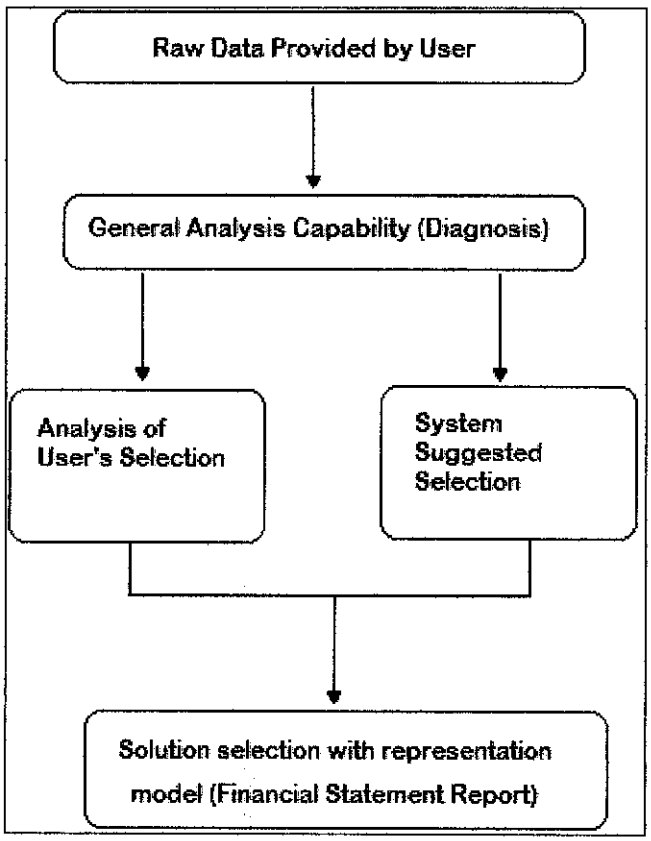

Figure 6: Flow of Profitable Crops DSS

Design documents

Design documents are explained in **Table 1** that describes the use of each document and the scope of the document in this system.

No.	Document	Purpose	Scope
1	System Requirement Specification	To detail out the requirements of the proposed system in terms of functional requirements and also specify non-functional requirements for the system.	Hardware and software specifications, system functions and conditions to determine satisfactory usage of the proposed system
2	Use Case Specification	To summarize system interaction with users and the external environment and to specify the situations where each function is used	System stakeholders, external systems, relationships, non-functional requirements

Table 1: Design documents specification

Use Case Diagram

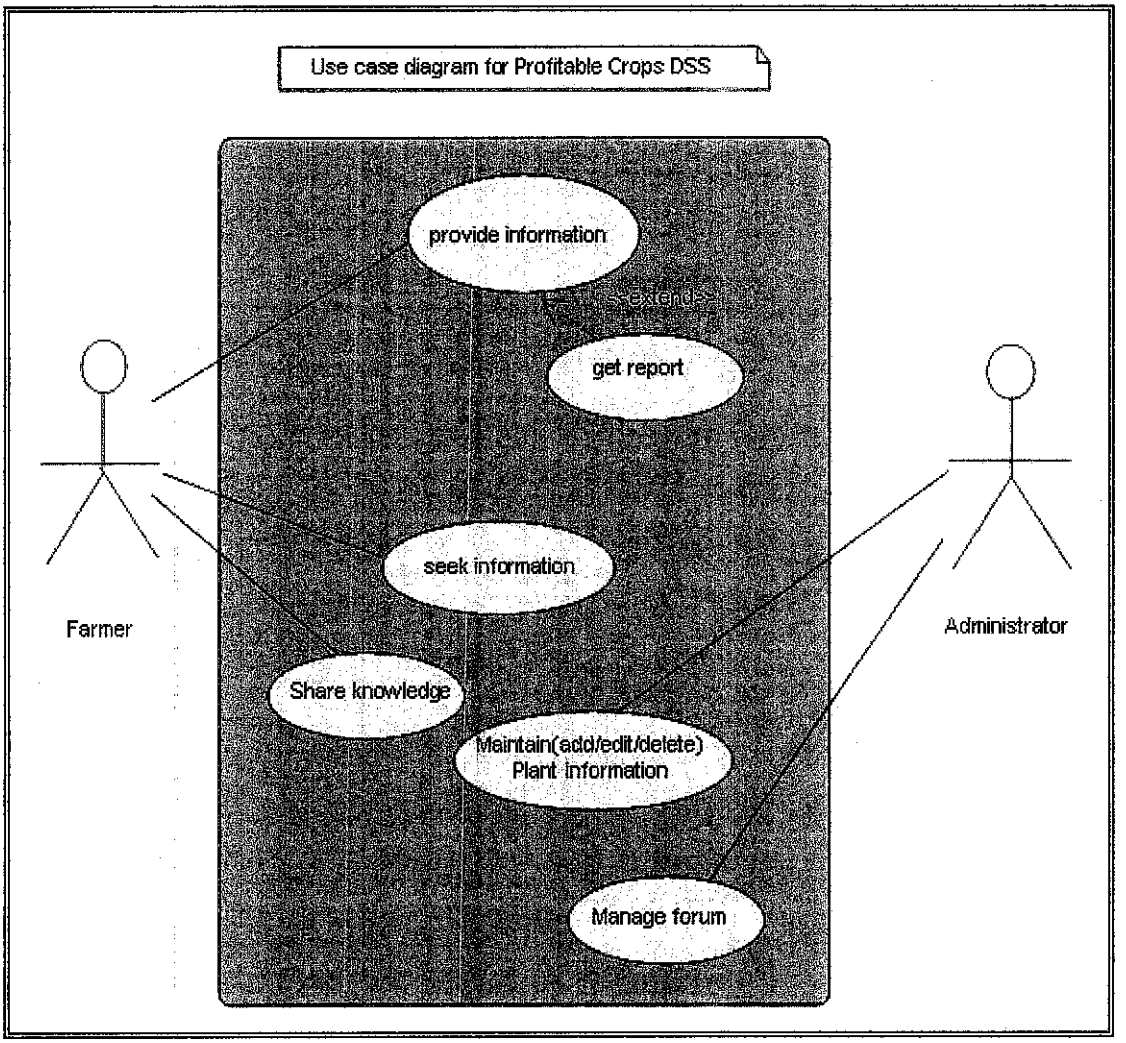

Figure 7: Use Case Diagram for Profitable Crops DSS

Use Case Diagram Description

1. User will enter the system and select and key in the 4 data, which are types of crops, types of soil, amount of money, and size of land. The system will generate a report based on data keyed in by the user.
2. User can seek information about the crops such as pest management, fertilizer, care steps, and steps to start planting the crops.
3. User also can share and gain knowledge in the forum, where they can exchange their opinion regarding cultivation activities.

4. Administration work is to maintain the system, and update the plant information based on current information from the DOA.
5. Administrator also manages the forum section.

4) Implementation

At this stage the system is installed and tested by the user. The system will be tested overall from the interface, bugs and the functionality of the system. The author maintained and modified the system based on the feedback give by the user during testing period. Preparations are made to move from the manual based to the automated system.

3.2 System Requirement

In developing this project tools are used to ensure it wills successfully complete. It being identify that there are four (4) elements that are going to be used in developing the system that are (1) tools for development, (2) server, (3) database and (4) client. The brief description regarding to the system requirement are state as follows:

3.2.1 Development Software

- **Macromedia Dreamweaver MX**
  - This web development software will be used to create the user interface for the system. It has more features compare to other software and is easy to integrate with PHP.

- **Adobe Photoshop CS**
  - Graphic editor for image and graphic processing. To create necessary effects for the web graphic.

3.2.2 Web Server

- **Apache Server**
  - The server that will be used in order to make the system online
  - Apache is the web server component of the popular web server application called WAMP (Windows, Apache, MySQL and PHP)

3.2.3 Database

- **MySQL**
  - MySQL is popular for web applications like MediaWiki and PHP-Nuke and acts as the database component of WAMP platforms.
  - Its popularity as a web application is closely tied to the popularity of PHP, which is often combined with MySQL.

3.2.4 Hardware

- Personal computer

CHAPTER 4

RESULTS AND DISCUSSION

4. Results and Discussion

4.1 Profitable Crops DSS

The purpose of Profitable Crops DSS is to assist farmer in making decision and give an idea how to start. The user interface of the system is designed to be simple but yet user friendly in order to meet its targeted user expectation and for better understanding using the system.

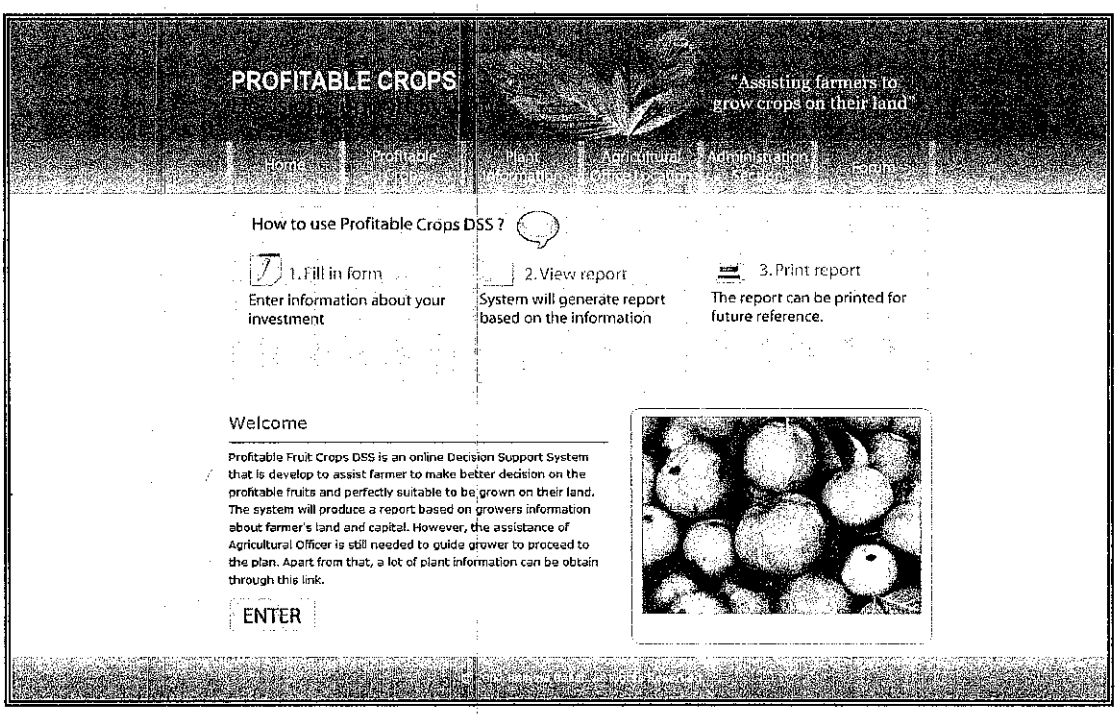

Figure 8: Home or Welcome page

This is the main page of the system. User will see the steps on how to use the system and brief explanation about the system. There are 6 links on the first page, Home, Profitable Crops, Plant Information, Agricultural Office Location, Administration Section and Forum each links will bring the user to the page.

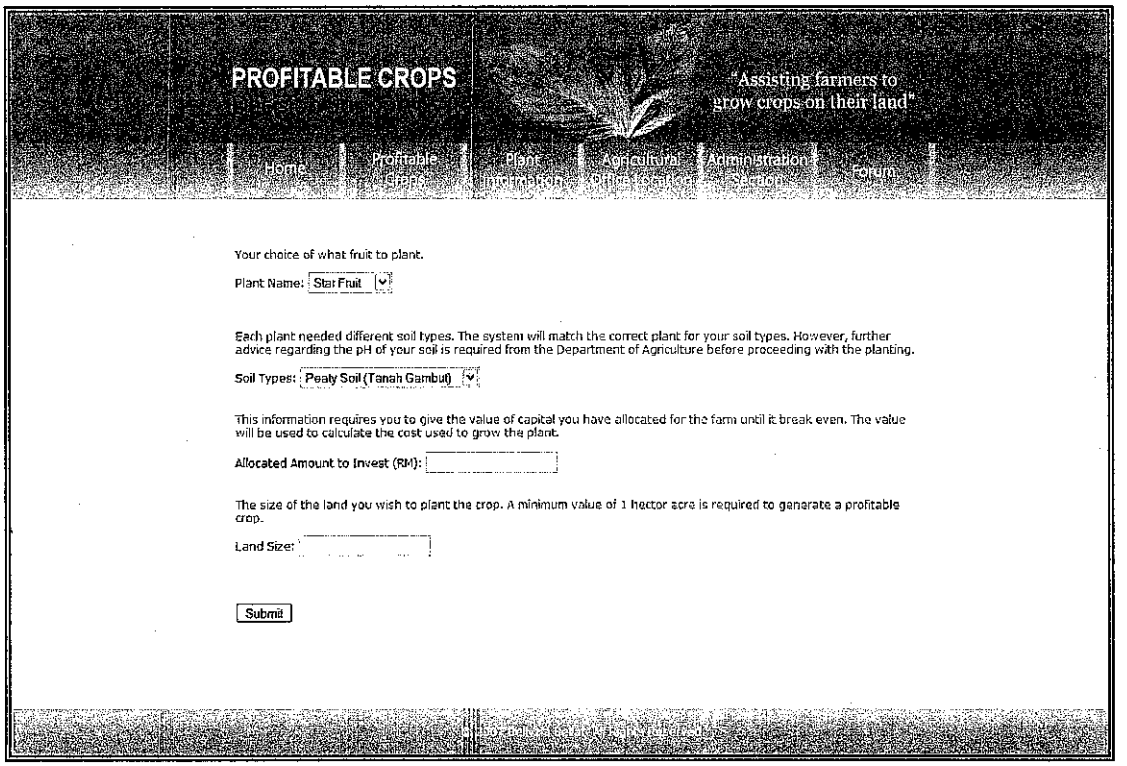

Figure 9: Profitable Crops DSS/Selection Page

This is the main features in the system. User needs to fill in 4 values, namely Fruit Name, Land Size, Soil Type and Allocated Amount to Invest before the system can start compute the data given to produce a report. Along with the input values were a simple guide written to help user to give the correct information. The report will be generated from these values.

Fruit Name - Used drop down list, the fruits in the list were called from the plant table. This is to make sure that user will only input the existing fruits in the database and also as a prevention measure to avoid user typo error.

Soil Type - The list of the soil has already been fixed in the system, because in Malaysia there are only 6 types of soils.

Allocated Amount to Invest (RM) - User needs to input value of the capital that they have allocated for the farm.

Land Size - The area or size of land that user wish the crop to be planted.

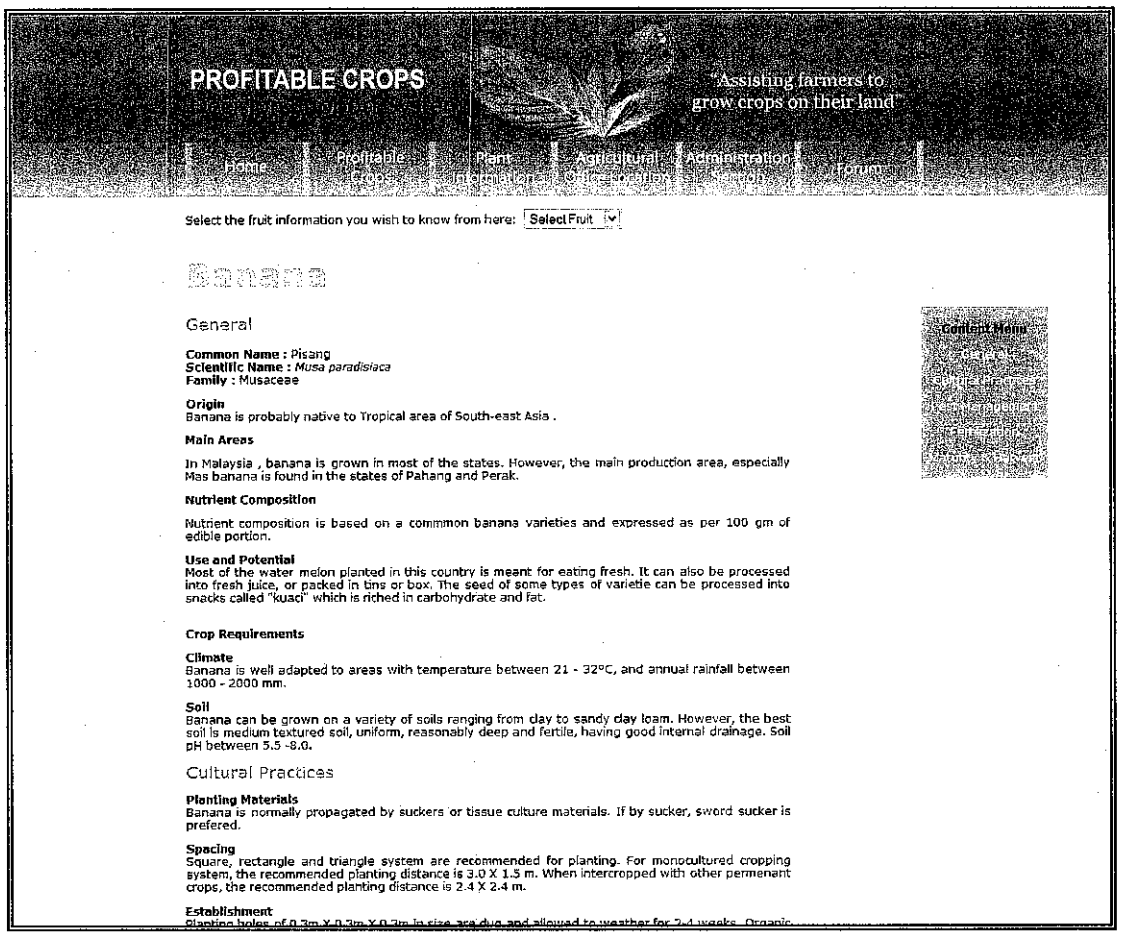

Figure 10: Plant Information

This is Plant Information page. Users can go directly to this link to see the crop requirements. This page is to give information in a way to educate the farmers on crop management such as planting materials, spacing for planting, fertilization, pest management – expected disease and insect and the expected maturity period to harvest.

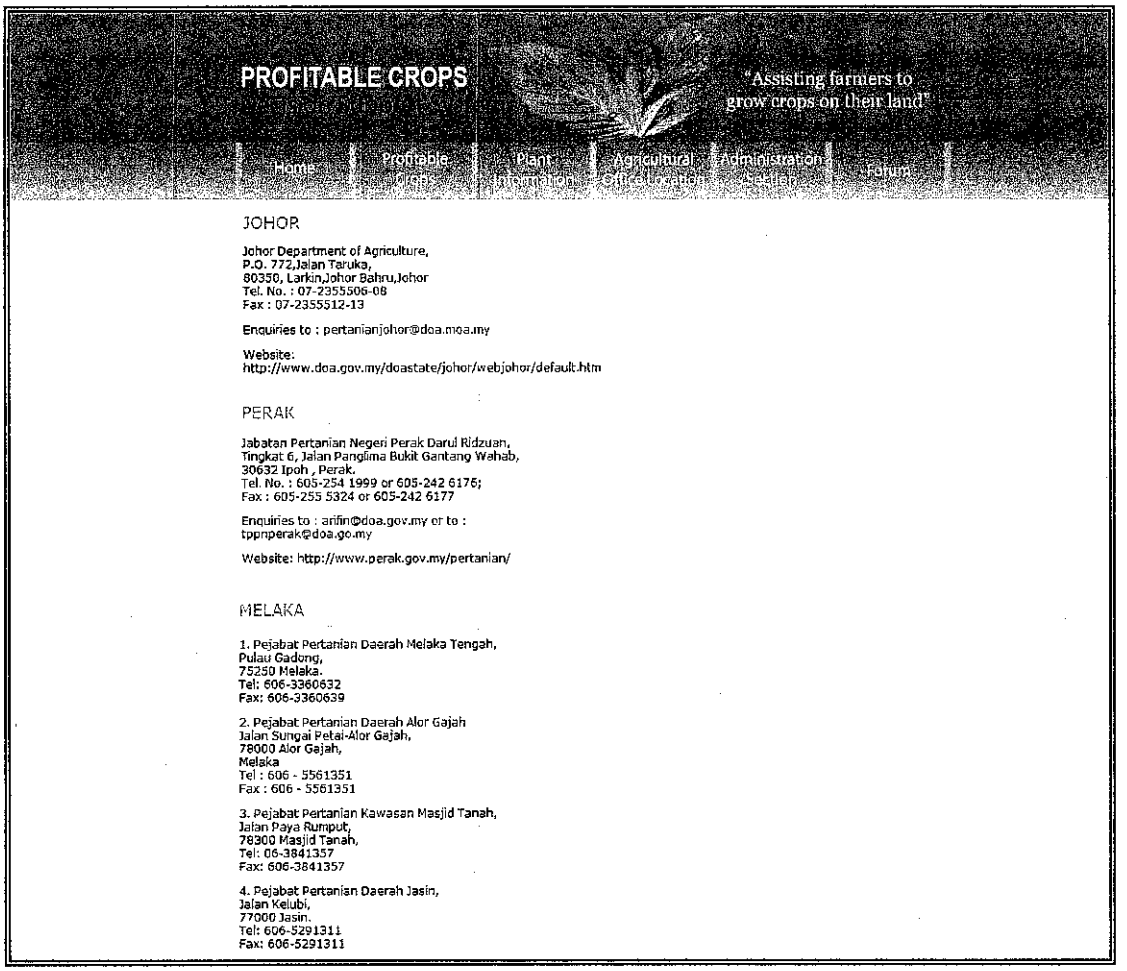

Figure 11: Agricultural Office Location

Agricultural Office Location link contains the address, email, phone number and fax number and also the website address according to the state in Malaysia. This is for user reference for any enquiries regarding cultivation activities to their respective Agricultural Office at they place.

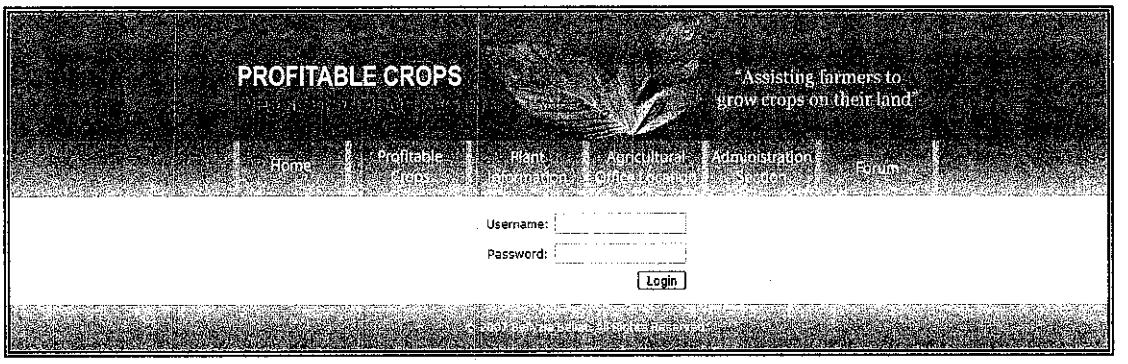

Figure 12: Admin Login Page

This is Administration Section link. This page is to authorize the admin to their page, for admin access only. The admin needs to key in their username and password in order to get fully authorization to the system to access the system.

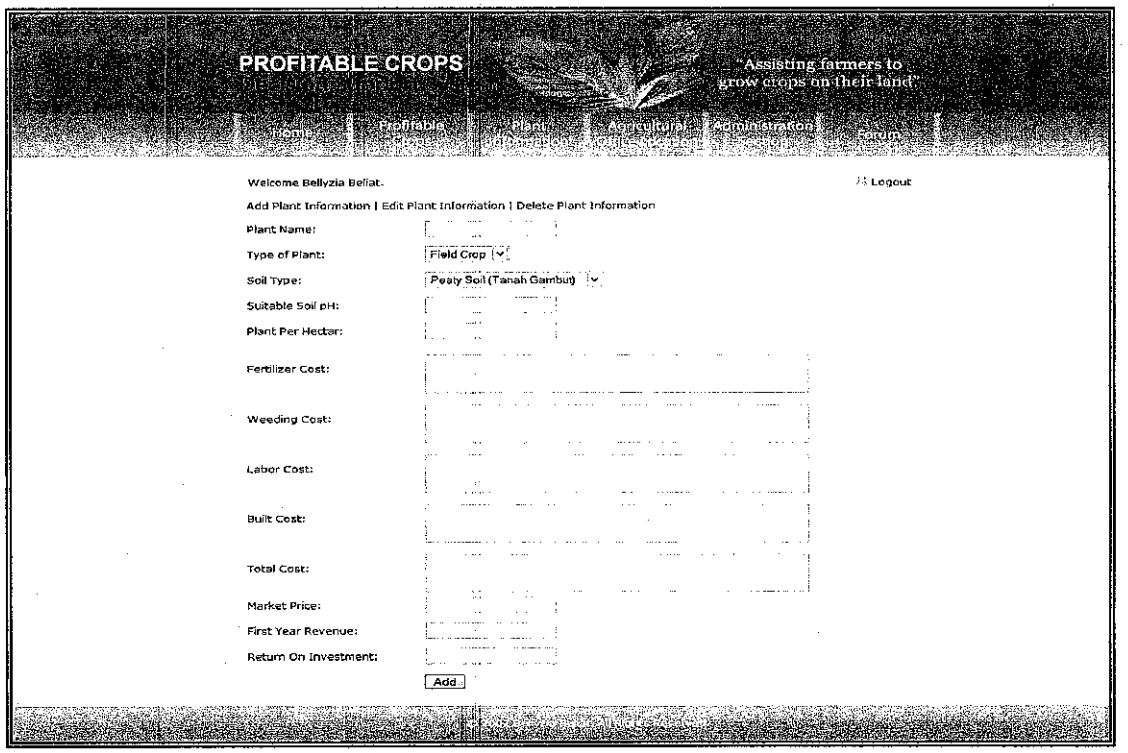

Figure 13: Administrator Page

Once a successful login, an administrator has the privileges to add, edit and delete plant information. Admin works is to maintain the system, and update the data in the database according to current information on plant from DOA and FAMA for market price.

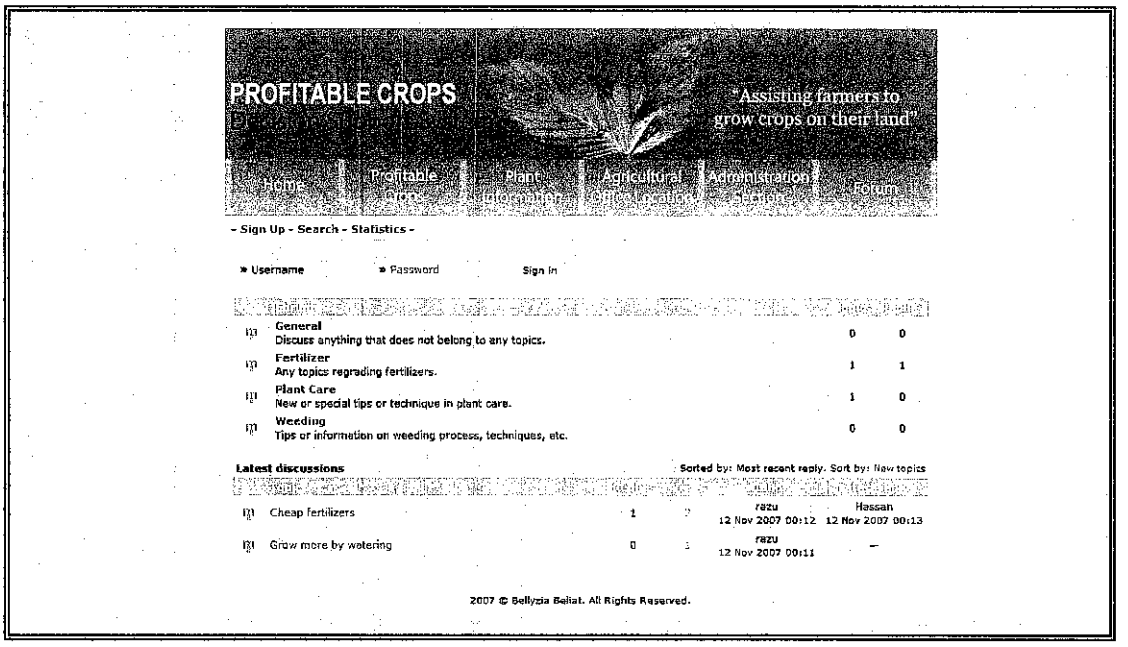

Figure 14: Forum

This is the forum page. User needs to sign up first before they can post or read any topic that was discussed by other users. Through this forum it will let the farmer to share their experience and knowledge to others and exchange opinion between the farmers. Admin will maintain and manage the forum section.

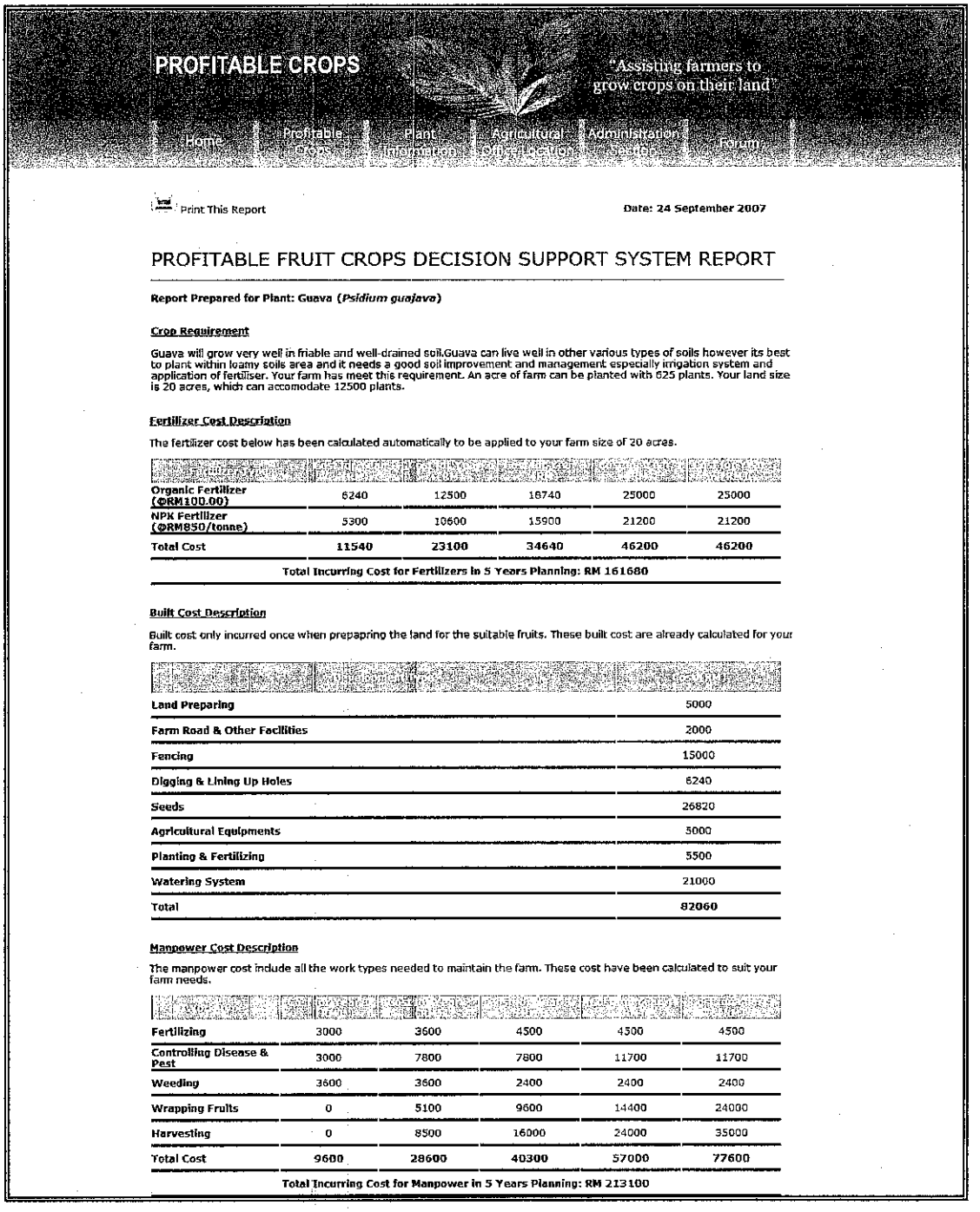

Figure 15: Financial Report

The main features of the system which is a cost-analysis report on the farm based on selected crops for certain period of the fruits maturity. The costs description were broke down into 4 parts which covers the manpower costs, the built costs, fertilizer costs and weeding costs. This report gives an early monetary view needed to maintain the farm.

4.2 Analysis

The questionnaire is done to survey the performance of the system that has been developed. It also used to measure the user satisfaction of the system. The users need to test and have experience with the system before answering the questionnaire. There are 30 users involved in the testing and answering the questionnaire. Those users are staff from DOA and also modern farmer. The results of this questionnaire from the users have analyzed and the results are as follows:

Q1. Based on the experience using the Profitable Crops DSS, are you satisfied with the interface?

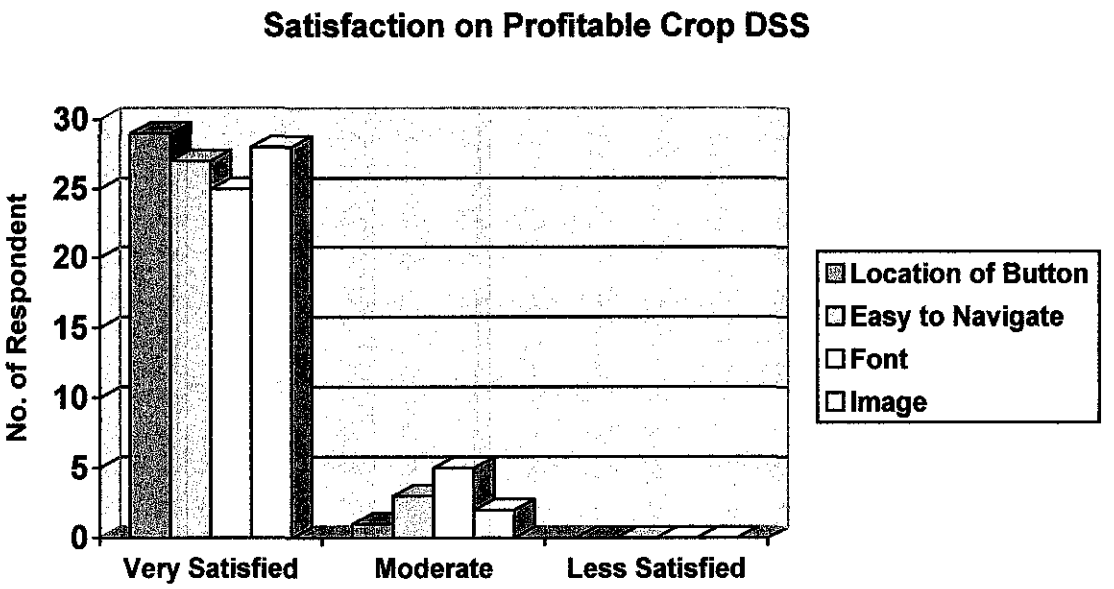

Figure 16: Satisfaction on Profitable Crop DSS Interface

Figure 16 illustrate testers toward the system interface. Testers experienced the system function and the interface. It is to identify whether the system is user-friendly. The first question contains 4 sub questions, the location of button, ease to navigate within the system, the font used and image used in the system. From the survey, 29 testers say they are very satisfied with the location of button in the system, where 1 tester says it is moderate. For ease to navigate, 27 users say that they are very satisfied and 3 users say moderate. For font, 25 users choose very satisfied

and 5 users choose moderate. 28 users say they very satisfied with the image used in the system, where 2 say moderate. These statistics support the main objective of this project.

Q2. What do you think about the system?

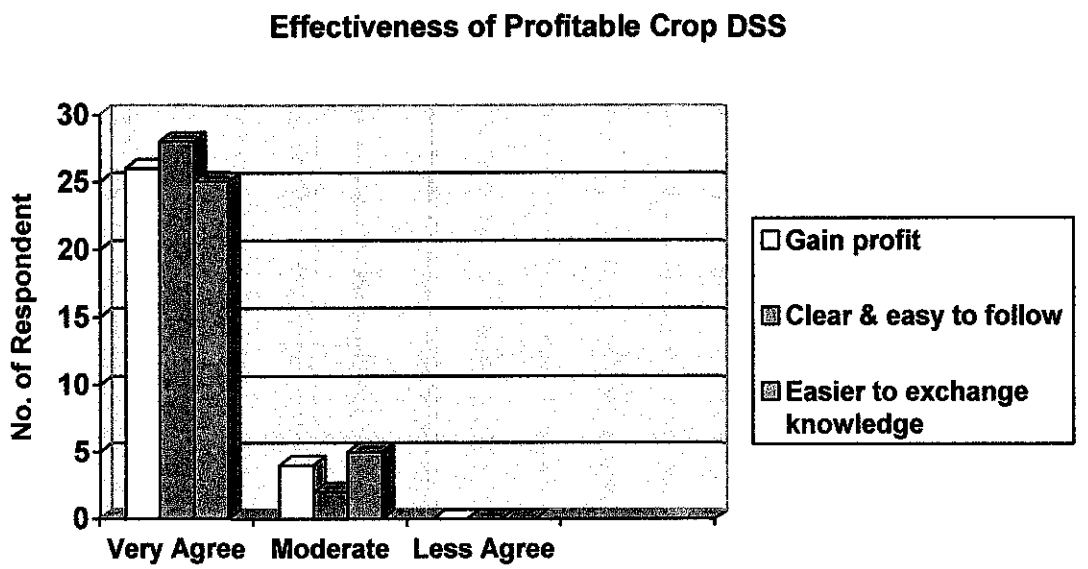

Figure 17: Effectiveness of Profitable Crop DSS

Figure 17 shows the result on effectiveness of Profitable Crop DSS. Based on the figure above, 26 testers believe that Profitable Crops DSS is a way to gain profit and 4 votes moderate. A total of 28 testers say that the steps clearly stated and easy to follow and only 2 who feel it is moderate. From the survey, 25 testers say that by having the system farmers can easily exchange their knowledge where 5 testers feel it is moderate.

Q3. From your opinion, how does the system reflect the user?

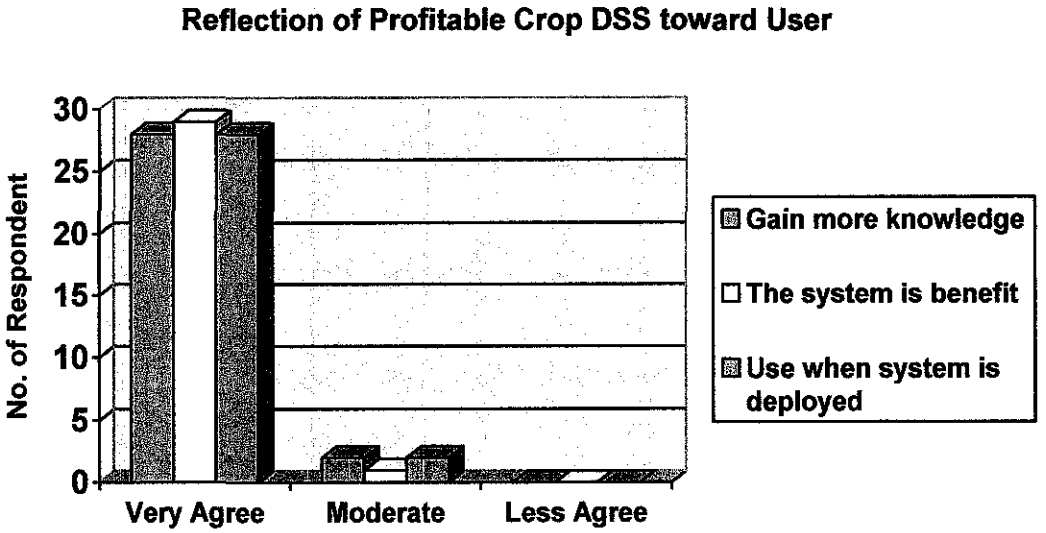

Figure 18: Reflection of Profitable Crop DSS toward User

Another area being investigated is the reflection of Profitable Crop DSS toward user. This is important to see whether the system is really useful and needed when it is really launched in the future. From 30 testers, 28 say they were very agreed that they will gain more knowledge after using the system and 2 testers feel moderate. Next, 29 testers were believed that the system would benefit them and only 1 says it moderate. 28 testers very agreed that they will definitely use the system when it is really deployed and 2 vote moderate. From these statistics, majority of the testers support the implementation of the system while 2 testers choose moderate. It is proved that the system really needed and welcomed by the testers.

Q4. What do think about the suggested report generate by the system?

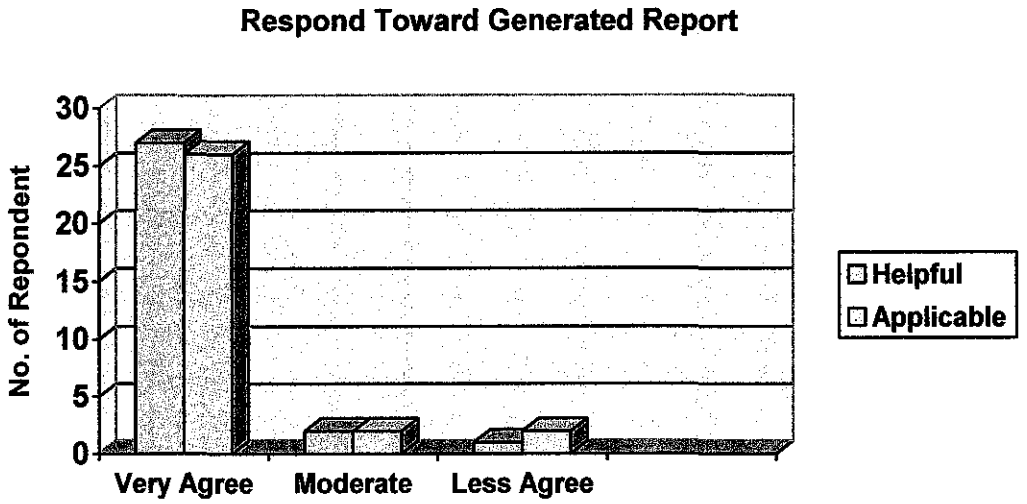

Figure 19: Respond Toward Generated Report

Figure 19 illustrate the testers respond toward generated report produced by Profitable Crop DSS. This question consists of 2 sub questions, first question whether the result generated by Profitable Crop DSS is helpful, the system will compute the 4 data keyed in by user and compare with the information in the database and then produce result. From 30, 27 testers believed that the report generated by the system is very helpful while 2 think it is moderate and 1 disagree that the system report is helpful. Next sub question is to survey whether the suggested report by Profitable Crop DSS is applicable. A total of 26 testers believed that the suggested report produced by the system is applicable in the real world, followed by 2 testers with moderate and 2 testers who feel the suggested report is not applicable.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5. Conclusion and Recommendation

5.1 Conclusion

Profitable Crops DSS is developed to assist the farmer in decision making before they can start planting. The system will generate a report based on the user's input and produce a total cash flow for farmer until they can gain profit from the farm. The cash flow calculated every incurring costs and revenues to expect the Return On Investment (ROI). Profitable Crops DSS does not only produce a good plan or report but also reduce time taken in making decision and cost based on known fruits. The system provides a base for the farmer to further planned the growth of their farm in order to increase the grower's income. Knowledge sharing and transfer were made able through forum section where the farmers can exchange their experiences and opinion regarding crops; and information on the plants such as expected disease and insect, fertilization, spacing, planting materials, maturity period and weeding process. In a way, the system educates the farmer on cultivation and agricultural techniques in an informal way. This proves, by implementing this system it is going to benefit the farmer in the long run.

5.2 Future Recommendation

5.2.1 Plant Growth Management Module

Add a new module that functions as a plant growth tracking in order for the farmers to monitor their crops growth as planned in the suggested report.

5.2.2 Complete Crop Lists

In the future, the system can be upgraded to cater all types of crop in Malaysia. With the complete list, it will give the user much more information and more selection of crops that can be chosen.

5.2.3 Weather Constraint

For the time being, only the weight of soil types, land size and allocated amount were used as the decision making basis on crops. However the accuracy of the decision making can be further increase by adding the weight of weather constraints to these available factors.

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APPENDICES

APPENDIX I

PROFITABLE CROPS DSS

This questionnaire is to evaluate the satisfaction and reactions to the new developed system.

Name : _____

Telephone No. : _____

E-mail Address: _____

Occupation : _____

Instruction: Please circle your answer between the given ranges.

1-Less Satisfied; 2-Moderate;3-Very Satisfied

User friendliness

1. Based on the experience using the Profitable Crops DSS, are you satisfied with the interface?

   a. The location of button is suitable.

1	2	3
Less	Moderate	Very

   b. It is easy to navigate within Profitable Crops DSS.

1	2	3
Less	Moderate	Very

c. The font can be easily read.

1	2	3
Less	Moderate	Very

d. The image clearly shown and understandable.

1	2	3
Less	Moderate	Very

Effectiveness of Profitable Crops DSS

2. Are you satisfied with the system?

a. Profitable Crops DSS is a way to gain profit.

1	2	3
Less	Moderate	Very

b. Steps clearly stated and easy to follow.

1	2	3
Less	Moderate	Very

c. Farmers can exchange knowledge more easier

1	2	3
Less	Moderate	Very

Use intention

3. From your opinion, how does the system reflect the user?

a. I would gain more knowledge from Profitable Crops DSS

1	2	3
Less	Moderate	Very

b. I believe that Profitable Crops DSS would benefit me

1	2	3
Less	Moderate	Very

c. I intend to use Profitable Crops DSS when it is deployed

1	2	3
Less	Moderate	Very

Generated Report by Profitable Crops DSS

4. What do think about the suggested report generate by the system?

a. The results generate by Profitable Crops DSS is very helpful.

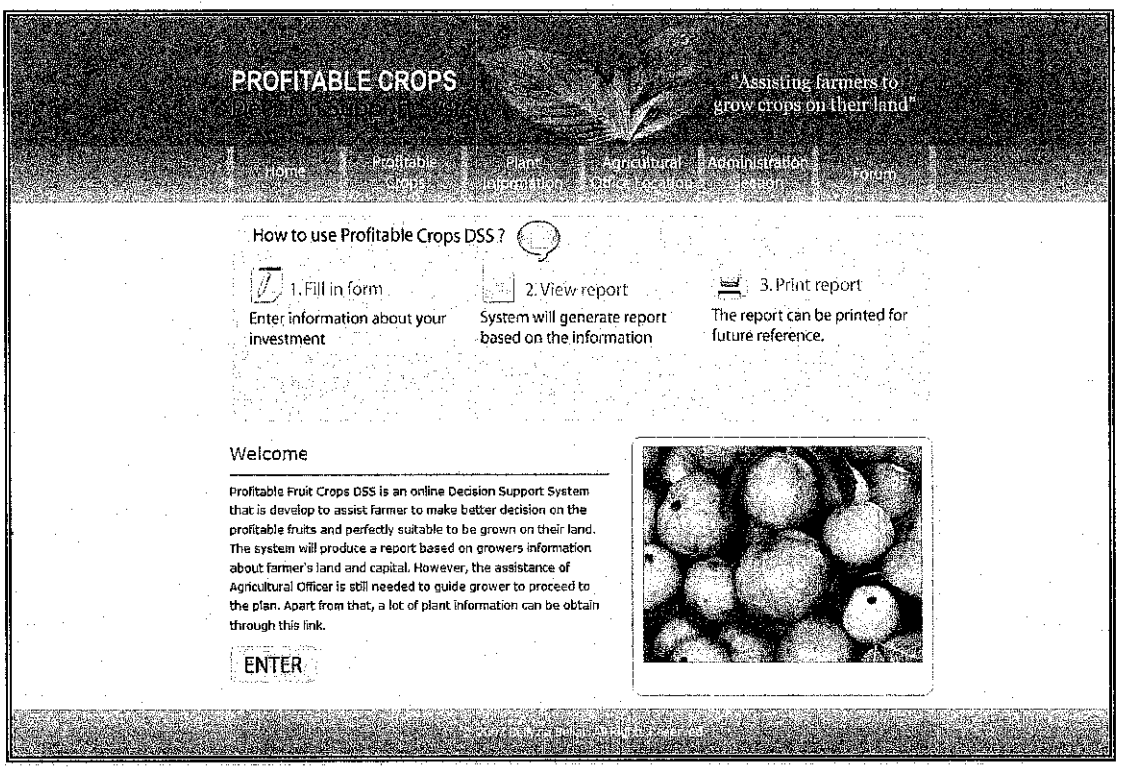
1	2	3
Less	Moderate	Very

b. The suggestion produced by Profitable Crops DSS is applicable.

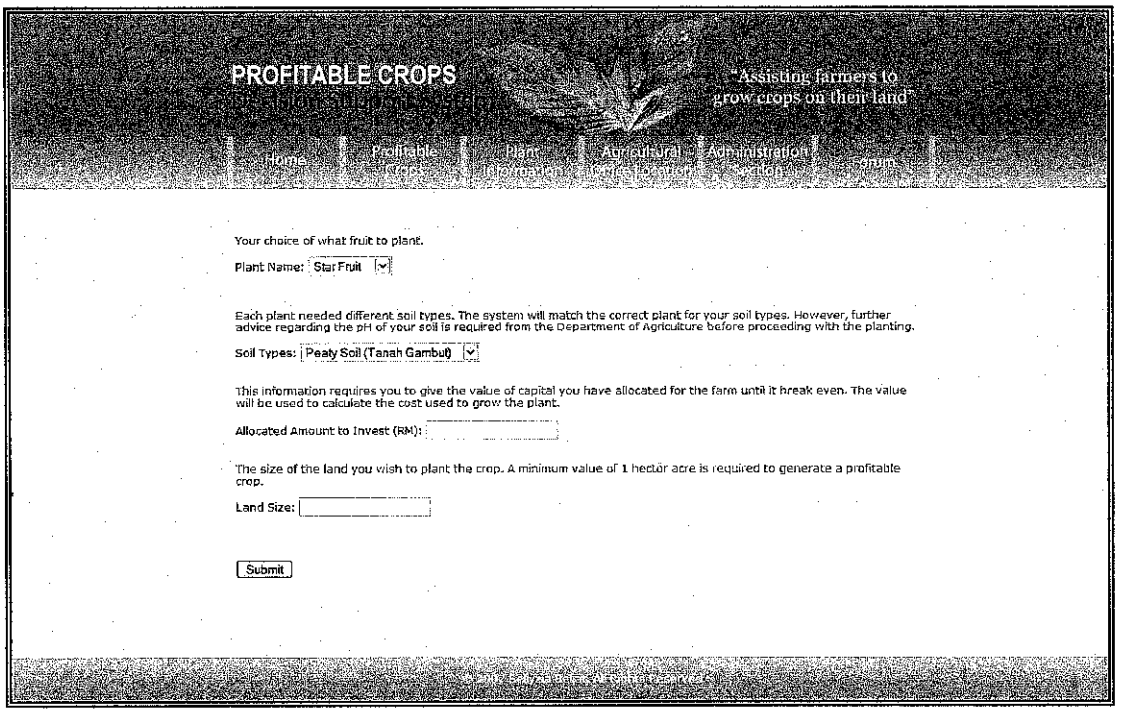
1	2	3
Less	Moderate	Very

APPENDIX II

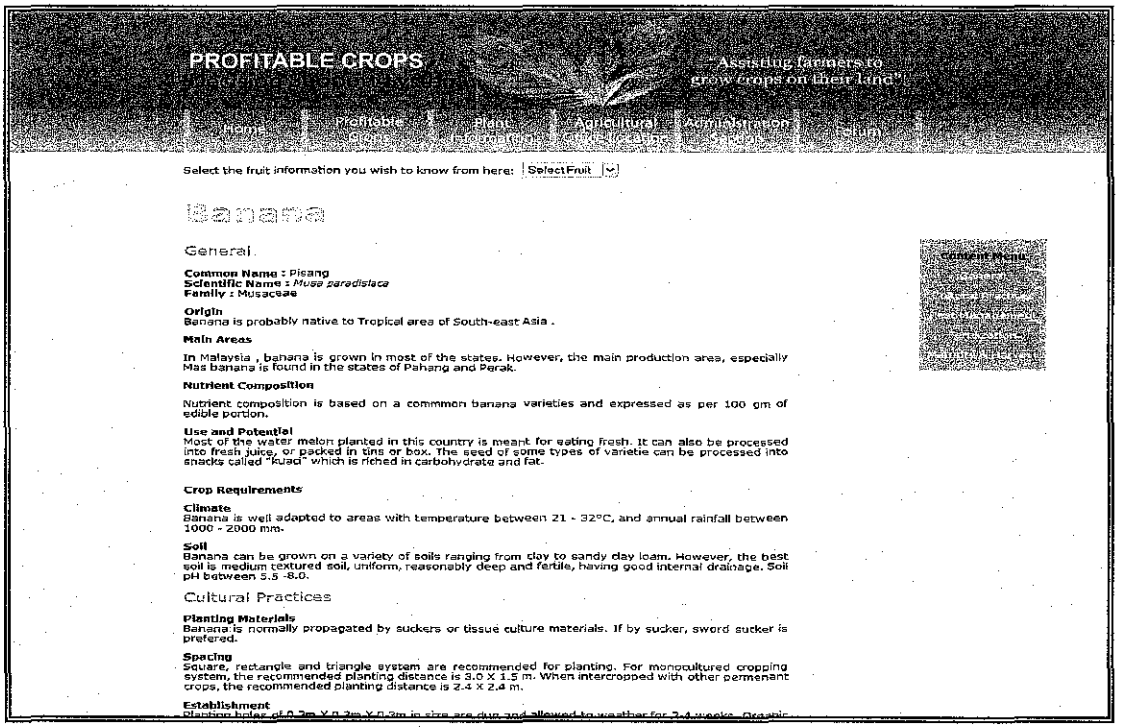
Welcome Page or HOME



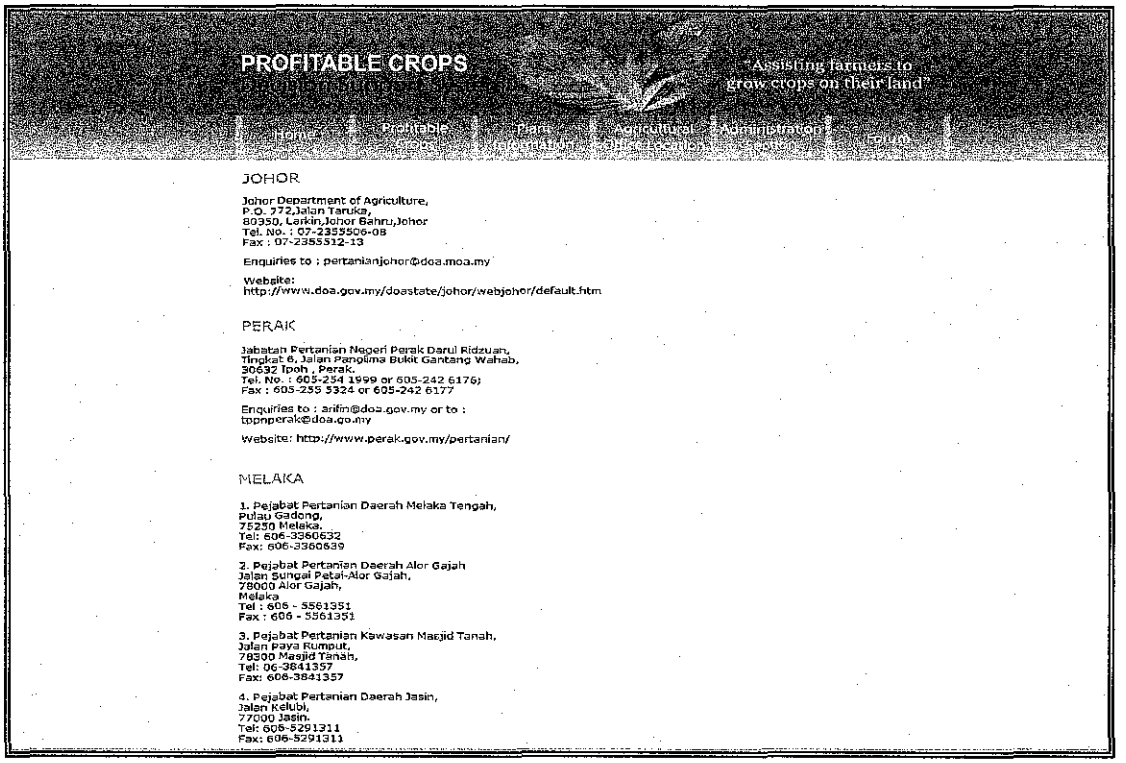
Profitable Crops DSS/Selection Page



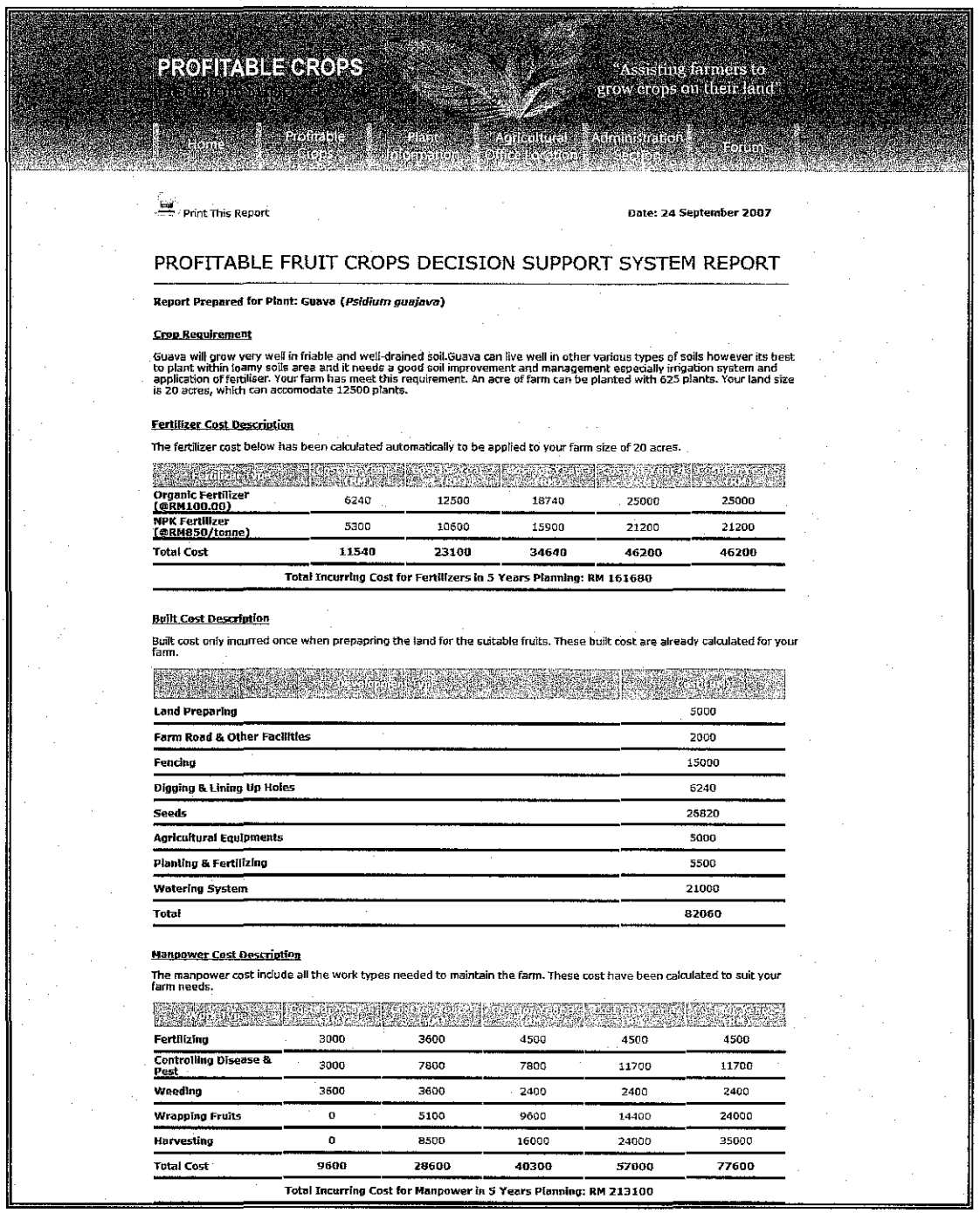
Plant Information



Agricultural Office Location



Financial Report Produce by The System



Print This Report

Date: 24 September 2007

PROFITABLE FRUIT CROPS DECISION SUPPORT SYSTEM REPORT

Report Prepared for Plant: Guava (*Psidium guajava*)

Crop Requirement

Guava will grow very well in friable and well-drained soil.Guava can live well in other various types of soils however its best to plant within loamy soils area and it needs a good soil improvement and management especially irrigation system and application of fertiliser. Your farm has meet this requirement. An acre of farm can be planted with 625 plants. Your land size is 20 acres, which can accomodate 12500 plants.

Fertilizer Cost Description

The fertilizer cost below has been calculated automatically to be applied to your farm size of 20 acres.

Organic Fertilizer (@RM100.00)	6240	12500	18740	25000	25000
NPK Fertilizer (@RM850/tonne)	5300	10600	15900	21200	21200
Total Cost	**11540**	**23100**	**34640**	**46200**	**46200**

Total Incurring Cost for Fertilizers in 5 Years Planning: RM 161680

Built Cost Description

Built cost only incurred once when prepapring the land for the suitable fruits. These built cost are already calculated for your farm.

Land Preparing	5000
Farm Road & Other Facilities	2000
Fencing	15000
Digging & Lining Up Holes	6240
Seeds	26820
Agricultural Equipments	5000
Planting & Fertilizing	5500
Watering System	21000
Total	**82060**

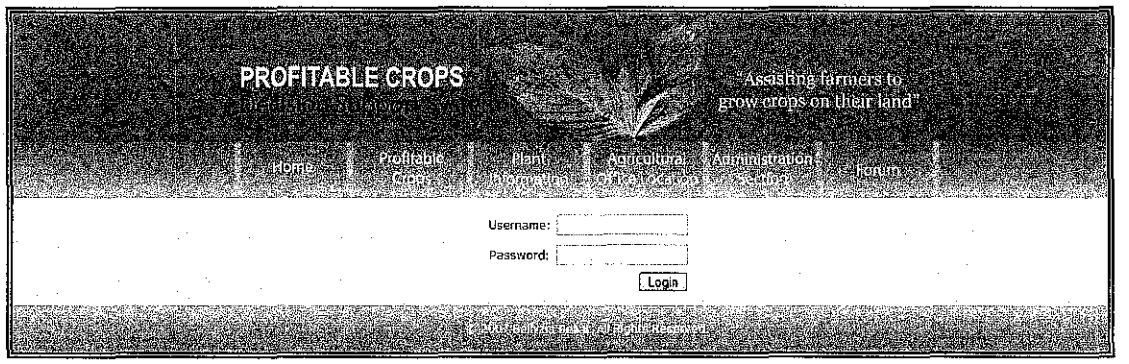
Manpower Cost Description

The manpower cost include all the work types needed to maintain the farm. These cost have been calculated to suit your farm needs.

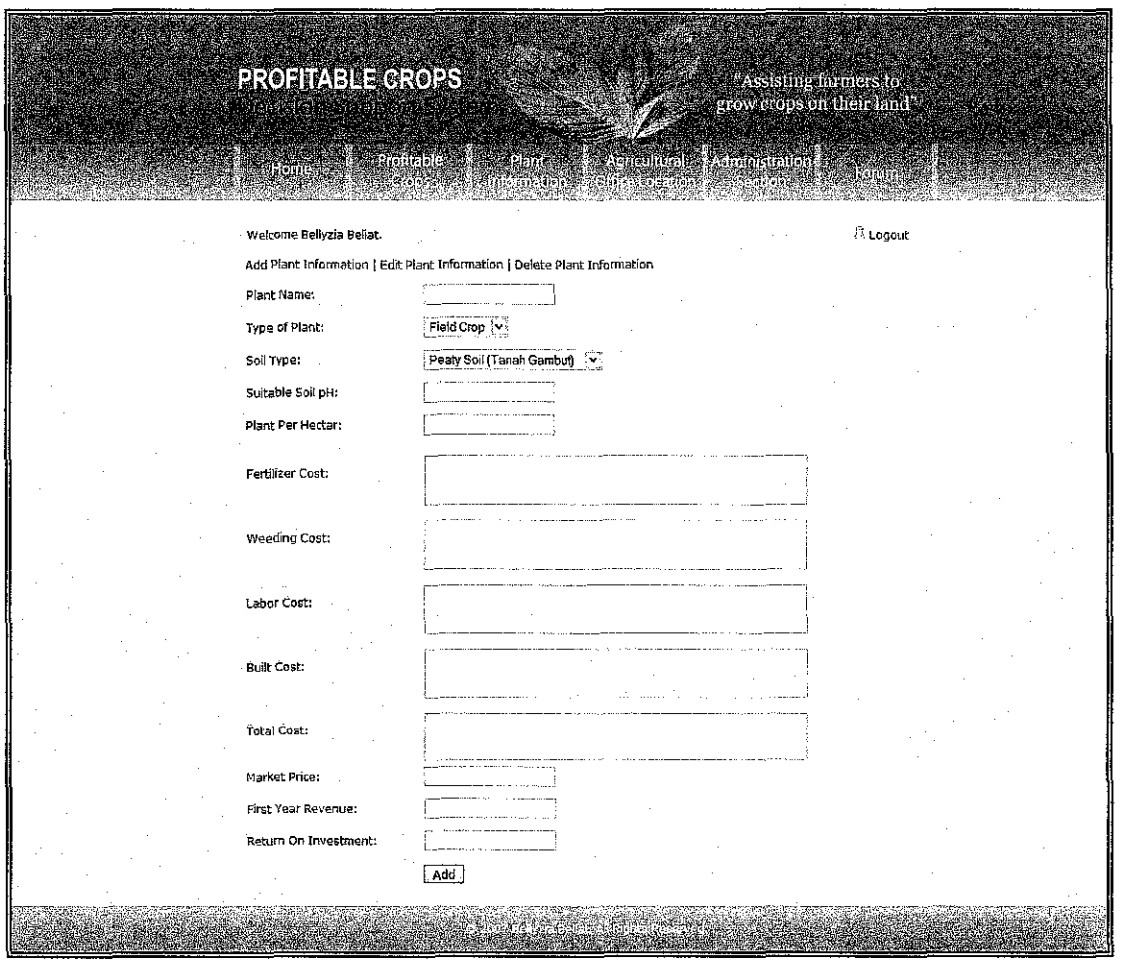
Fertilizing	3000	3600	4500	4500	4500
Controlling Disease & Pest	3000	7800	7800	11700	11700
Weeding	3600	3600	2400	2400	2400
Wrapping Fruits	0	5100	9600	14400	24000
Harvesting	0	8500	16000	24000	35000
Total Cost	**9600**	**28600**	**40300**	**57000**	**77600**

Total Incurring Cost for Manpower in 5 Years Planning: RM 213100

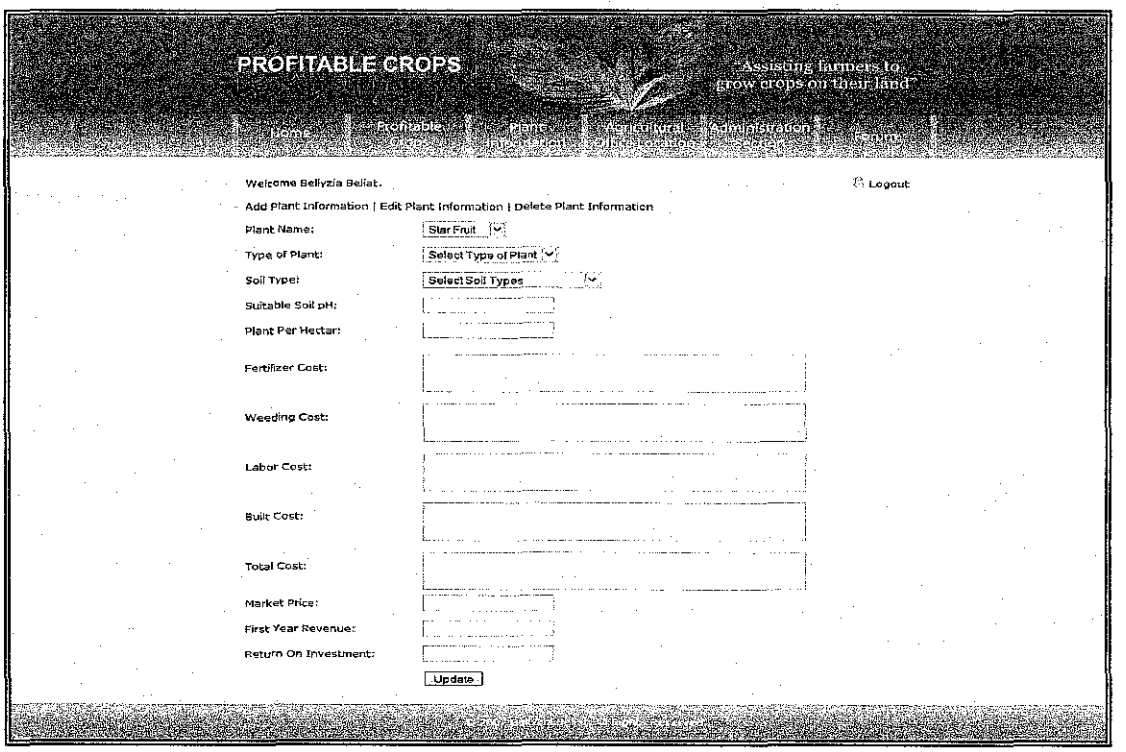
Login Page for Admin



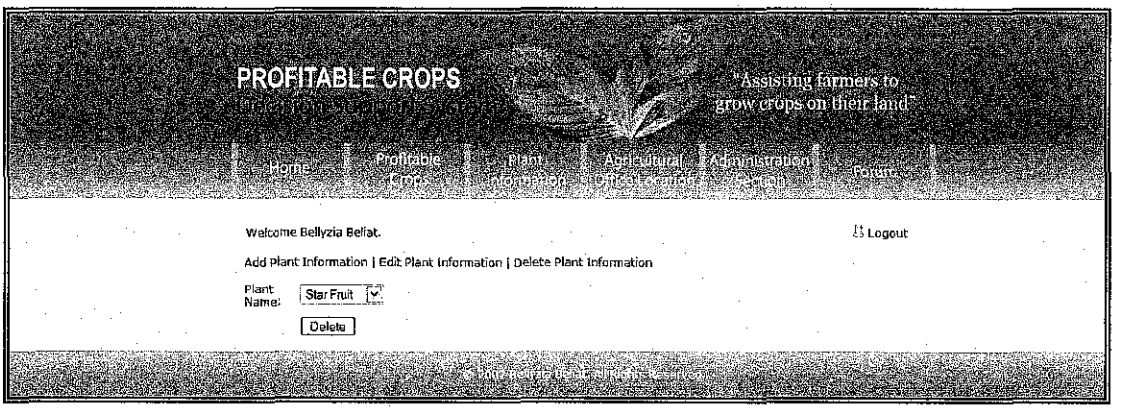
Add Page



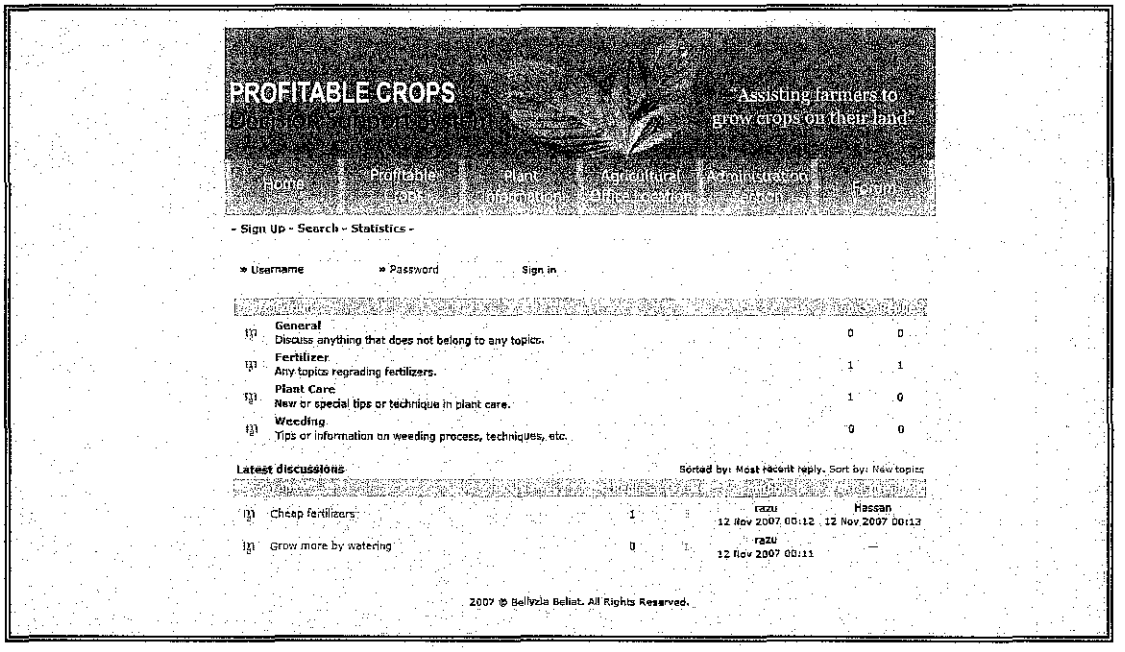
Update Page



Delete Page



Forum


PROFITABLE CROPS
"Assisting farmers to grow crops on their land"
Home
Profitable crops
Plant information
Agricultural farm location
Administration
Search
Forum
- Sign Up - Search - Statistics -
» Username
» Password
Sign in
General
Discuss anything that does not belong to any topics.
0 0
Fertilizer
Any topics regrading fertilizers.
1 1
Plant Care
New or special tips or technique in plant care.
1 0
Weeding
Tips or information on weeding process, techniques, etc.
0 0
Latest discussions
Sorted by: Most recent reply. Sort by: New topics
Cheap fertilizers
1
razu
12 Nov 2007 00:12
Hassan
12 Nov 2007 00:13
Grow more by watering
0
razu
12 Nov 2007 00:11
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