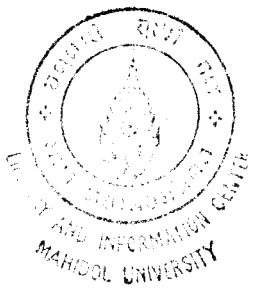

A DEVELOPMENT OF WEB DATABASE SYSTEM FOR POISONOUS PLANTS AND MUSHROOMS IN THAILAND

RUTCHANEE CHANTRAKET

A THESIS SUBMITTED IN PARTIAL FULFILLMENT
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Little information about poisonous plants and mushrooms is available in the Internet. The purpose of this study therefore is to analyze, design and develop appropriate application providing reference material on poisonous plants and mushrooms in Thailand. The Web Database was developed for the search of the poisonous plants and mushrooms information on the Internet. It could reduce access time and produce consistent data. The application was designed and developed using a relational database. The software used included Microsoft SQL Server 7.0 as a Database Management System, Microsoft Visual Basic 6.0 as a program, Internet Information Server (IIS) as a web server, and VBScript for Internet Server Application Program Interface (ISAPI) as an interface between web server, database and users.

The result of this study is a Web Database giving information on poisonous plants and mushrooms in Thailand. It is an application reference program, which contains 100 species of poisonous plants and 50 species of poisonous mushrooms. The assimilated data included plant/mushroom names (scientific names, synonyms, common names or English names, local names and families), images, descriptions of poisonous plants and mushrooms, toxic substances, poisonous plant parts symptoms, treatments and references. Characteristics of the poisonous mushrooms and related species as well as level of toxicities are indicated. The system is divided into 2 parts, the application server and the application for retrieval from browser. The application server can identify the user before entering the system, i.e. insert, edit poisonous plants and mushrooms information and print out the information. The application for retrieval from the browser is based on steps of the information search.

The web database is tested and evaluated. The result shows that the users were satisfied with the efficiency and information obtained from the database.

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รัชนี จันทร์เกษ: การพัฒนาระบบฐานข้อมูลบนเครือข่ายสำหรับพืชและเห็ดพิษในประเทศไทย (A DEVELOPMENT OF WEB DATABASE SYSTEM FOR POISONOUS PLANTS AND MUSHROOMS IN THAILAND) คณะกรรมการควบคุมวิทยานิพนธ์: สุทธินันท์ นันทจิต M.S., วีณา จิรัจฉริยากูล Dr. rer. nat., ชุมโชค นำศรีสกุลรัตน์, M.Eng. 95 หน้า.
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การค้นหาข้อมูลเกี่ยวกับพืชและเห็ดที่เป็นพิษ เป็นเรื่องยาก เนื่องจากข้อมูลมีน้อย ทั้งยังไม่มีการรวบรวมข้อมูลเหล่านั้นมาไว้แหล่งเดียวกัน ในการวิจัยครั้งนี้จึงมีวัตถุประสงค์เพื่อวิเคราะห์ออกแบบและพัฒนาโปรแกรมที่เป็นแหล่งอ้างอิงของข้อมูล ฐานข้อมูลบนเครือข่ายเกี่ยวกับพืชและเห็ดที่เป็นพิษที่พบในประเทศไทย จึงได้รับการพัฒนาให้สามารถค้นหาข้อมูลได้บนอินเตอร์เน็ต เพื่อช่วยลดเวลาในการเข้าถึงข้อมูล และเพิ่มความถูกต้องของข้อมูล ระบบออกแบบและพัฒนาโดยใช้หลักการออกแบบฐานข้อมูลเชิงสัมพันธ์ (Relational database) ใช้ Microsoft SQL Server 7.0 เป็นตัวจัดการฐานข้อมูล, Microsoft Visual Basic 6.0 เขียนโปรแกรม,ใช้ Internet Information Server (IIS) เป็น web server, ใช้ VBScript สำหรับ Internet Server Application Program Interface (ISAPI) ซึ่งเป็นตัวติดต่อระหว่าง web server, database และผู้ใช้ระบบ

ผลที่ได้จากการศึกษาคือฐานข้อมูลบนเครือข่ายเกี่ยวกับพืชและเห็ดที่เป็นพิษที่พบในประเทศไทยซึ่งเป็นแหล่งของข้อมูลอ้างอิง มีพืชพิษ 100 ชนิด และเห็ดพิษ 50 ชนิด เก็บรายละเอียดชื่อไทย ชื่อสามัญ ชื่อวิทยาศาสตร์ ชื่อพ้อง ชื่อท้องถิ่น ชื่อวงศ์ ลักษณะต้น ประเภทพันธุ์ไม้ ความเป็นพิษ สารพิษ ส่วนที่เป็นพิษ การออกฤทธิ์ อาการพิษ การรักษา รายงานการพบพิษและเอกสารอ้างอิง ในส่วนของเห็ดเก็บข้อมูลเพิ่มเติมประกอบด้วย ลักษณะเด่น สายพันธุ์อื่น ๆ และระดับความเป็นพิษ ระบบสามารถเข้าถึงฐานข้อมูลได้ 2 ส่วน คือ โปรแกรมประยุกต์ที่เซิร์ฟเวอร์ และโปรแกรมสืบค้นข้อมูลทางอินเตอร์เน็ต โปรแกรมประยุกต์ที่เซิร์ฟเวอร์จะมีการตรวจสอบผู้ใช้ก่อนเข้าสู่ระบบเพื่อเพิ่มเติมหรือเปลี่ยนแปลงแก้ไขรายละเอียดพืชพิษและเห็ดพิษและสามารถนำเสนอรายงานได้ ส่วนการสืบค้นข้อมูลทางอินเตอร์เน็ต เป็นส่วนที่เกี่ยวข้องกับการสืบค้นข้อมูลพืชพิษและเห็ดพิษ

จากการประเมินพบว่า ผู้ใช้มีความพึงพอใจในประสิทธิภาพและข้อมูลที่ได้รับจากฐานข้อมูล

CONTENTS

Page

Page

LIST OF TABLES

LIST OF FIGURES

Page

LIST OF ABBREVIATIONS

ADO	=	ActiveX Data Objects
CGI	=	Common Gate Way Interface
DBMS	=	Database Management System
DDT	=	Dichlorodiphenyl-trichloro-ethane
E-R	=	Entity Relationship
FD	=	Functional dependency
GUAM	=	Generalized Update Access Method
HAL	=	Hardware Abstraction Layer
HTML	=	HyperText Markup Language
HTTP	=	Hypertext Transfer Protocol
IIS	=	Internet Information System
ISAPI	=	Internet Server Application Program Interface
NF	=	Normal Form
ODBC	=	Open Database Connectivity
OLE DB	=	Object Linking and Embedding database
PPWS	=	Personal Peer Web Server
PWS	=	Personal Web Server
RDBMS	=	Relational Database Management System
RDO	=	Remote Data Access
SQL	=	Structured Query Language
URL	=	Uniform Resource Locator
WWW	=	World Wide Web
O3	=	Ozone
CO	=	Carbon monoxide
CO2	=	Carbondioxide
SO2	=	Sulphurdioxide
NO2	=	Nitrogendioxide
H2O	=	Water

CHAPTER I
INTRODUCTION

Background and Statement of Problems

In everyday life new chemicals are discovered and involved owing to the process in science, technology and development of the industry. We are surrounded by chemicals and pollutants. The chemicals are useful and also dangerous. The toxic chemicals can be divided into 8 groups as follows (1):

1. Heavy metals, i.e. mercury, lead and arsenic, etc.
2. Ozone gas and some oxides of non-metallic compounds, i.e. O_3, CO, CO_2, SO_2, NO_2, etc. O_3 is an oxidant. Some oxides react with H_2O and provide acidity that are irritating, sometimes they are poisonous and cause the death, e.g. poisonous gas.
3. Insecticides and herbicides, e.g. chlorinated hydrocarbons (DDT), organophosphates and carbamates
4. Food additives and contaminants
5. Cigarettes and alcoholic beverages
6. Mycotoxins and bacterial toxins
7. Poisonous plants and animals
8. Air pollutants, e.g. silica dust that is originated from glass ceramic industries and mine. Asbestos used in the production of micro fiber, plastic, paper, etc.

Here, the poisonous plants and mushrooms in Thailand are our concern. The information of poisonous plants and mushrooms will be collected, processed and assimilated in a database.

Human has learned how to use plants as foods, clothes and medicines since ancient time. Many plants are useful, but if they are not used in the right way, they are dangerous. The plants have been also used as raw materials in the drug discovery.

Mushrooms are also another important natural resource, they are easy to find in the rainy season. The knowledge about the poisonous mushrooms has been scarcely known and recorded. For example, there is no record on *Scytinopogon echinosporus Berk. et Broomem,* (local name: เห็ดปะการังชมพู) which is widely spreaded in the northern part of Thailand.

Each year some people are died of eating poisonous plants and mushrooms by mistake. They may receive the poison via external contact, e.g. splashing of the plant exude into the eyes, touching the poisonous plants. The incidences can be decreased if the database of the poisonous plants and mushrooms are available.

The causes of the poison in United States and United Kingdom have been recorded and ranked as follows (2):

1. From the drugs
2. From the household chemicals
3. From the poisonous plants

Children are often the victims because they do not know much about the poison and they like to taste. The poisonous symptoms in children are usually more severe than the adults because of their smaller size and weight.

Nowadays, there is little information on poisonous plants and mushrooms. If we can establish the database of the poisonous plants and mushrooms, it will help the health personnel in the immediate and proposed treatment of the poison.

As the necessity stated above, and owing to my career at the Medicinal Plant Information Center, Faculty of Pharmacy, Mahidol University, I am very much interested in establishing the database of poisonous plants and mushrooms in Thailand. The database will be planned for the easy access and provision of information on poisonous plants and mushrooms. The identifications together with pictures, symptoms, treatment, and etc. , will be provided.

Objectives

1. To analyze and design an online application reference program of the poisonous plants and mushrooms in Thailand

2. To develop the application reference program for poisonous plants and mushrooms in Thailand

Scope of the study

1. The development of the application program for the access to the information of poisonous plants (100 species) and mushrooms (50 species), which are found in Thailand.

2. The use of Microsoft SQL Server 7.0, Microsoft visual basic 6.0, VBScript and HTML in developing the application program

3. The application program running on Microsoft Windows NT Server 4.0, using the microcomputer and displaying Thai language on web browser as client

4. The developed application program implemented by Medicinal Plant Information Center, Faculty of Pharmacy, Mahidol University

Steps of work

1. Literature reviews
2. Study the relevant programs
3. Collectthe data on poisonous plants and mushrooms in Thailand
4. Workflow analysis
5. Design the application screen
6. Application development
7. Implementation of the developed application program
8. Conclusion and recommendation
9. Thesis writing

Expectation of the study

Following results are expected:

1. A database comprising 100 species of poisonous plants and 50 species of poisonous mushrooms in Thailand
2. Applications for the access to poisonous plants and mushrooms in Thailand

CHAPTER II
LITERATURE REVIEW

The poisonous plant and mushroom information could be retrieved from the following available programs or databases.

Toxic Plant Expert System involved with the development of a rule-based expert system. It provided information the clinical manifestations of patients, who received poisons from plants. Toxic Plant Expert System was developed to assist the physicians, pharmacists, nurses and other health personnel in the diagnosis and the treatment. The knowledge base contained 30 groups of 94 poisonous plants, which were commonly found in Thailand (3).

The program on medicinal plants in primary health cares, which was distributed by Medicinal Plant Information Center, Faculty of Pharmacy, Mahidol University. The program was developed from the multimedia technology, which enabled the users to get the information on the Internet. It provided the details of 44 plants. There are 3 methods for the access to the information, they are, name indices, pictures and symptoms. The decision information was created using hypertext markup language (HTML). The database composed of plant names, ethanomedicine, scientific data and the medicinal uses of the plants. Users were able to retrieve information by selecting the plant name or the image. Hypertext markup language (HTML) and JavaScript were used to create multimedia interactivity (4).

The program of Thai Medicinal Plants in Siri Ruckhachati Garden contained 216 plant names. The tools used to develop the system were Visual Basic 3.0 as program, and Microsoft Access 1.1 as database management system. There are 10 ways to get the information from the system. They are scientific names, Thai names, other Thai names, English names, habitats, characteristics of leaf,

characteristics of flower, pharmacological actions and toxicities, traditional uses and active ingredients (5).

Medicinal Plant Database, which was developed by Medicinal Plant Information Center, Faculty of pharmacy, Mahidol University, provided the rapid access to the desired plant information. The tool used to develop the system were Microsoft SQL Server 7.0 as database management system. The access to the information could be made by selecting either scientific names, common/Thai names or genus. The retrieved information included ethnomedical activity, chemical composition, biological activity and references. The web site of the database: http://medplant.mahidol.ac.th

The Application of Web Database for Executive Information System case study included Levi's Products, which primarily concerned the application of web database. It designed the database for the executives access to the web page using the web browser. Such system provided the executives the information quickly and easily from any place where the Internet connection was available. O'Reilly Web Site program was used as the web sever in the prototype system. Windows Common Gateway Interface using Visual Basic was applied for the interface between web server, database and the users (6).

Nowadays, The information on poisonous plants and mushrooms could be retrieved from WWW by using URL. The information was presented as monographs, showing scientific names, plant descriptions, medicinal uses, and so on. The web sites were given in the references.

Poisonous Plants and Mushrooms

Definition:

Plants and mushrooms that are hazardous cause the irritation, pain and other toxicities to human beings and animals via consumption or external contact (7).

Database system:

It consists of the database and the database management system.

Database

Database comprises the structure that can house information of multiple types of entities, the attributes, and the relationships among the entities (8).

The important viewpoints of the database include the following (9):

- Physically, the database composes of a number of bits recorded on some storage media.
- Semantically, the database represents some universe of the discourse.

Database Management System: DBMS

Database Management System is a collection of the program that manages the database structure and controls the access to the data stored in the database. Formally, we describe a database as a structure that houses a collection of data as well as "data about data" known as metadata. It provides a description of the data characteristics and the set of relationships that link the data found within the database. Such descriptions help to make it possible for the DBMS to hide much of the database's internal complexity from the database user. Fig. 2.1 illustrates how the DBMS stands between the end user and the database (10).

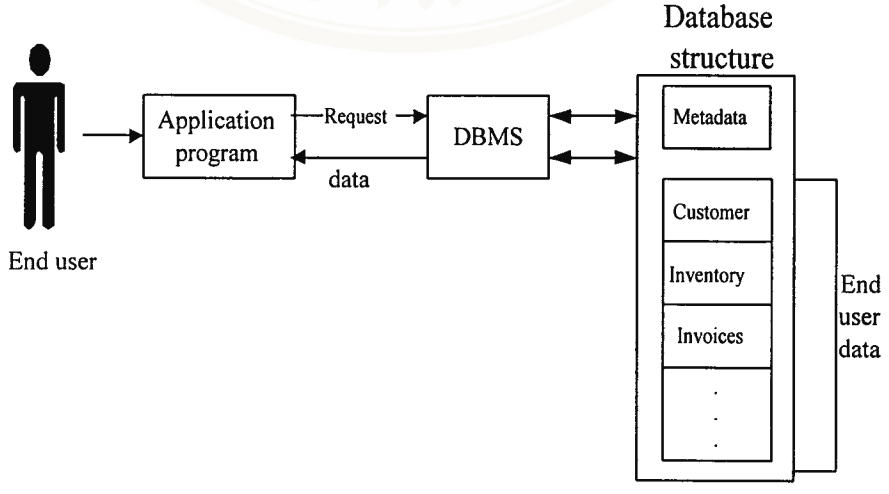

Figure 2.1 The DBMS managing the interaction between the end user and the database

The database processing by using microcomputer DBMS offers advantages and disadvantages. They are shown in Table 2.2.

Table 2.1 The advantages and disadvantages of database processing (10)

Advantages	Disadvantages
1.Lower Cost	1. Larger Size
2.More information can be accessed from the same amount of data.	2. Greater complexity
3. Sharing the data	3. Greater impact of a failure
4. Balancing the conflicting requirements	4. More difficult recovery
5. Controlled or eliminated redundancy	
6. Consistency	
7. Integrity	
8. Security	
9. Increased Productivity	
10. Data independence	

Database Models

A database model is a collection of logical constructs used to represent the data structure and the data relationships found within the database. Basically, they may be grouped into two categories: conceptual models and implementation models. The conceptual model focuses on the logical nature of the data representation. It is concerned with what is represented in the database rather than how it is represented. Conceptual models include the Entity Relationship (E-R) model and Object-Oriented model.

Conceptual models use three types of relationships to describe association among data. There are one-to-one, one-to-many and many-to-many.

An Implementation model places the emphasis on how the data are represented in the database or on how the data structures are implemented to represent what is modeled. These models include the hierarchical database model, the network database model and the relational database model.

The Hierarchical Database Model

North American Rockwell began to develop its own database system, and audit of the collection of computer tapes revealed that more than 60 percent of the data were redundant. The data redundancy forced North American Rockwell to develop an alternative strategy for managing the huge data quantities. So borrowing parts of existing database concepts, software known as GUAM (Generalized Update Access Method) was developed. The GUAM' s ordered arrangement conformed to the "upside-down-tree" structure. The hierarchical database model is based on a tree structure that is composed of a root segment, parent segments, and child segments. The segment is the equivalent of a file's record type. The hierarchical model uses a hierarchic sequence or preorder traversal to navigate through its structures, always starting at the left side of the tree.

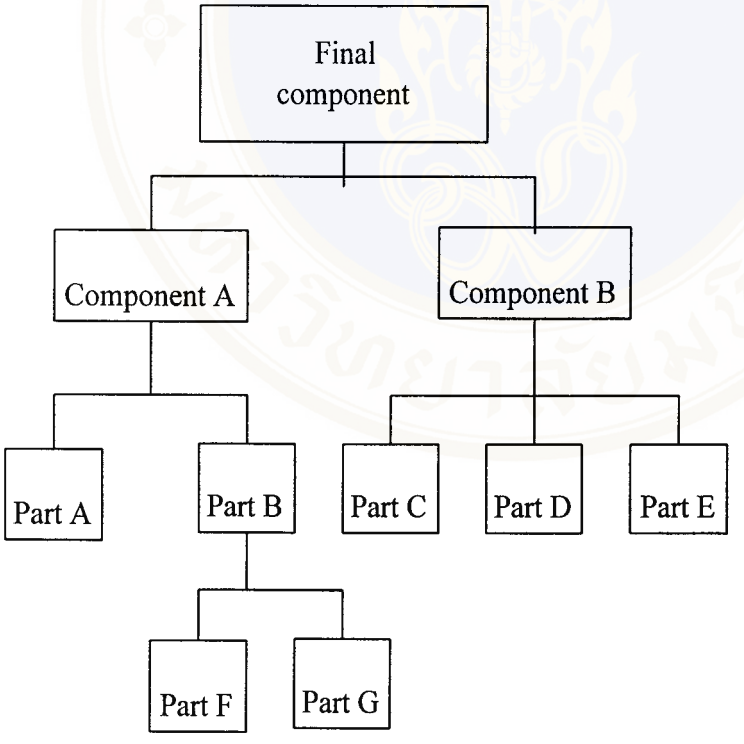

Figure 2.2 Illustration of a hierarchical structure (10)

The Network Database Model

A network model database is perceived by the user as a collection of record types (which represent the entities), field within these record types (which represent the attributes), and explicit relationships between these record types. Fig. 2.3 illustrates an example of a network database model.

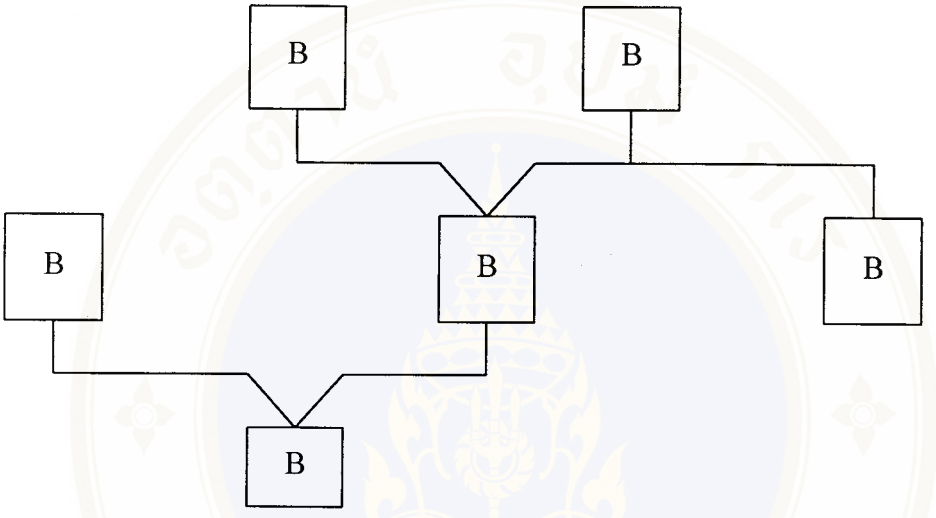

Figure 2.3 Illustration of a network model (5)

The Relational Database Model

Represents the database as a collection of relations, as a 'Table' of values. A table is consisted of rows and columns. Each row in the table represents a collection of related data values. The table names and column names are used to help in interpreting the meaning of the values in each row of the tables. The column names specify how to interpret data values in each row, based on the column each value is in.

In a database structured according to the relational model, all data elements are placed in two-dimensional tables called relations that are the logical equivalent of files. In relational model terminology, a row is called a tuple, column header is called an attribute, and the table is called a relation. The data type describing the types of values that can appear in each column is called domain.

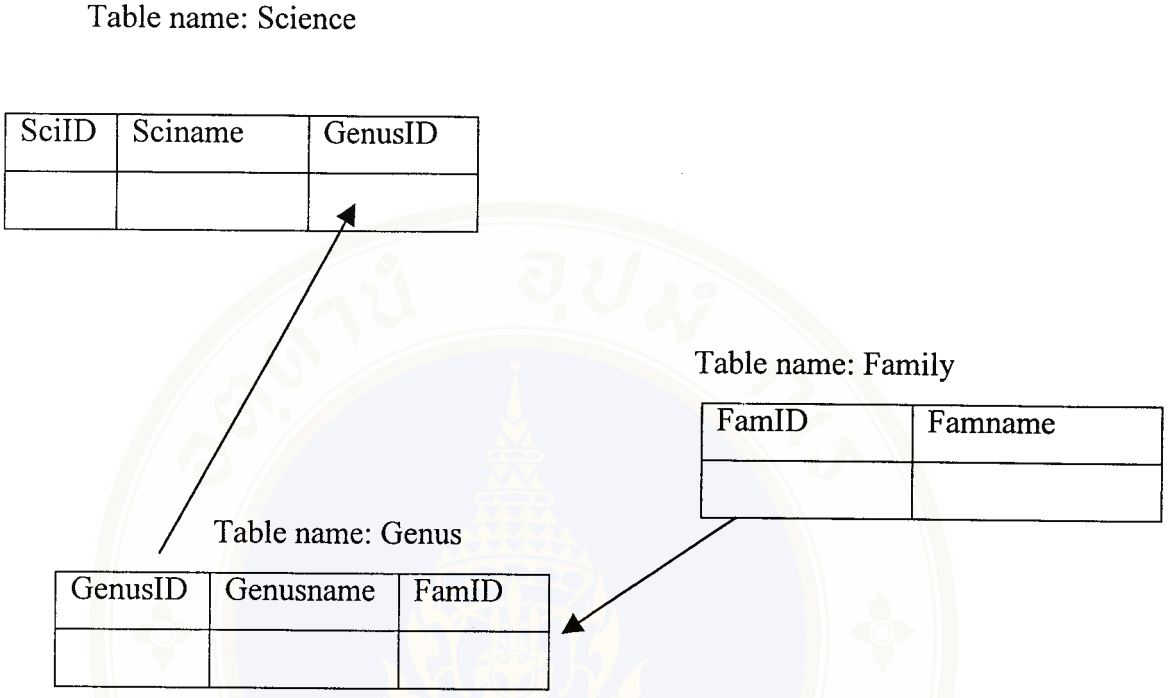

Figure 2.4 Illustration of a relational database model

Table 2.2 Relational terminology (11)

Relational Model	Programmer	User
Relation	File	Table
Tuple (Row)	Record	Row
Attribute	Field	Column

Table 2.3 Lists of advantages and disadvantages of the 3-database model (10)

	Advantages	Disadvantages
Hierarchy	• There is always a link between the parent segment and its child segment(s). Since the child segment is always automatically referenced to its parent, and promotes a condition known as database integrity. • It tends to be very efficient when the database contains a large volume of data in 1:M relationships and when users require large numbers of transactions, using data whose relationships are fixed over time.	• Many common relationships do not conform to the 1:M standard required by hierarchical model. Such a common M:N relationship is difficult to implement. • A common two-parent condition cannot be implemented easily in a hierarchical environment. • It tends to be complex to manage, and it tends to lack flexibility • The parent record must be accessed first, in order to access the child records. • It does not provide the currently favored ad hoc query capability. • There is no standard hierarchy model, it lacks portability.
Network	• M: N relationships are easier to implement than in the hierarchical model. • An application can access an owner record and all the member records within a set. Therefore, if a	• They are difficult to design and use properly. • It is difficult to make changes in a database, and some changes are impossible to make. • It yields a very complex

	member record has two or more owners, you can move directly from one owner to another. • It achieves sufficient data independence to at last partially isolate the programs from complex physical-storage details.	structure from the application programmer's point of view.
Relation	• It achieves both data independence and structural independence, it becomes much easier to design the database and to manage its contents. • The relational database model's rise to dominance in the database market is its very powerful and flexible query capability by SQL. • A good RDBMS complexity stems from the fact that it performs far more tasks for both the system' s design and users.	• RDBMS that hides most of the system' s complexity is also the cause of its need for substantial hardware and operating system overhead. It simply takes a more powerful computer to perform all the RDBMS assigns tasks.

Database design

Normalization

Normalization is the process of gathering data items (or properties) into relations. The types of modification anomalies can classify relations. Someone would find an anomaly, classify it and think of a way to prevent it. Each time this happened, the criteria for designing relations improved. These techniques for preventing anomalies are called normal from. The relation might be in first normal form, second normal form, or some other normal form.

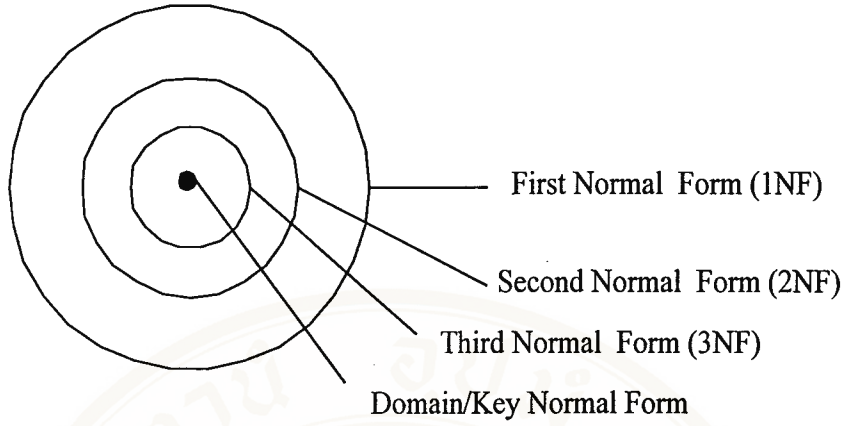

Figure 2.5 Relationship of normal forms

- **First normal form (1NF)**

A relation (Table), that contains a repeating group, is called an unnormalized relation. Removal of repeating groups is the starting point for relations that are as free of problems.

Definition: A relation (Table) is 1NF if it does not contain repeating groups (8).

- **Second normal form (2NF)**

Definition: A relation (Table) is 2NF if it is 1NF, and there are no non-key attributes. The non-key attributes are functionally dependent on the whole of its primary key.

- **Third normal form (3NF)**

Definition: A relation (Table) is 3NF, if it is 2NF, and if the only determinants, which it contains, are candidate keys (8).

Functional dependencies

The first underlying concept of the normalization process is that of the functional dependence . A fundamental concept is that of functional dependence (FD). An attribute a^1 is functionally dependent on another, a^2, if and only if, for a single value of a^2 there is exactly one corresponding value of a^1. We denote the functional

dependence by a single-headed arrow from the dependent functional determinant to the attribute, viz (9).

Functional dependence

$a^2 \rightarrow a^1$

(Functional determinant) (Dependent attribute)

Keys

A second underlying concept of the normalization process is that of the primary key. It builds on functional dependence, and it completes the background required for an understanding of the normal forms. A key is a group of one or more attributes that uniquely identifies a row.

In computing environments, the goals of classic relational databases predominate. They are preferable. Summarizes the fundamental goals and characteristics of relational databases as follow (12).

1. Primary goal: data independence
2. Data only: The database generally stores data only.
3. Data sharing: Any processes can share data. Data are designed for any type of use.
4. Passive data: Data are passive. Certain limited operations may be automatically triggered when the data are used.
5. Constant change: Process using data constantly change.
6. Data independence: Data can be physically reorganized without affecting how they are used.
7. Simplicity: Users perceive the data as columns, rows, and tables.
8. Separate tables: Each relation (table) is separate. JOIN commands relate data in separate tables.
9. Nonredundant data: Normalization of data is done to help eliminate redundancy in data. (It does nothing to help redundancy in application development.)
10. SQL: The SQL language is used for the manipulation of tables.

11. Performance: Performance is a concern with highly complex data structures.
12. Different conceptual model: The model of data structure and access represented by tables and JOINs is different from that in analysis, design, and programming. Design must be translates into relational tables, and SQL-style access.

Programs used for developing Applications

Microsoft SQL Server

Microsoft SQL Server is a client/server database processing quires on the server machine and returns results on client machines. Microsoft SQL has a distinct advantage over those DBMS, which include operating system functionality. It cooperates very closely with Windows NT and does not attempt to micromanage operating system functions. In a multiprocessor environment, scheduling of work on other processors is done by the Windows NT operating system and not by the SQL language. The server software itself is not capable if displaying data to user. It can be used Visual Basic or others to create reports, data sheets or forms and display the data retrieved from the database server. It can built many types of application and offers a variety of features for database needs, high performance database management system for Window NT-based system.

Microsoft Windows NT Server 4.0:

Microsoft Windows NT Server is a network operating system product of Microsoft Corporation. It contains enhanced features that make it a powerful network server operation system for sever-based applications, such as SQL Server, Systems Management Server, SNA Server, and Exchange Server. Windows NT uses two modes, User Mode and Kernel Mode to maintain operating efficiency and integrity (13).

User Mode

Applications, and the subsystems that support them, run in User Mode. User Mode processes has the following limitations:

- No direct access to hardware
- Limited to an assigned address space
- May need to use hard disk space as virtual RAM
- Process at a lower priority then Kernel Mode components

User Mode processes cannot directly access resources. Resource access requests must be granted by Kernel Mode component. This provides protection against malfunctioning applications or unauthorized user access.

Kernel Mode

The Windows NT Executive Services are central to all major operating system functions, it is important to protect them from User Mode applications and subsystems. Only Kernel Mode components can access resources directly. Most of these operating system components are Executive Services. The following line shows the services and their functions.

- Manager Various modules that manage I/O, objects, security, processes, interprocess, communication, virtual memory, and window and graphics management.
- Mocrokernel Component of Windows NT Executive Services that provides that most basic operating system services, such as thread scheduling and interrupts handling.
- Hardware Abstraction Layer (HAL) Code that isolates most hardware interface differences from Windows NT, making Windows NT more portable.
- Device Drivers Modules that control hardware access.

Microsoft Visual Basic:

Microsoft Visual basic development is a tool for creating high-performance client/server or internet/intranet application. It can be used to operate with other database management system (DBMS), for example, ORACLE, SQL Server, Informix. A program that is created for operating in a kind of database can be changed to use another kind of databases conveniently because database is separated from commands or methods for using database. Visual basic can be used to design of user-interface from set of commands for processing.

Web Database

Web database are databases accessed via other Web applications--specifically, forms developed using standard (almost) HTML. Using facilities available in HTML, applications programs on the Web server are accessed through a server-side mechanism known as the Common Gateway Interface (CGI) (14).

HyperText Markup Language (HTML)

The HyperText Markup Language (HTML) is used to create hypertext documents that can be displayed by viewing clients.

Common Gateway Interface (CGI)

The Common Gateway Interface (CGI) is a gateway for communication between an application and server. The CGI defines an interface for running external application and programs on behalf of a Web server. It provides a delivery mechanism for queries from the Web server back to the Web clients that made those queries.

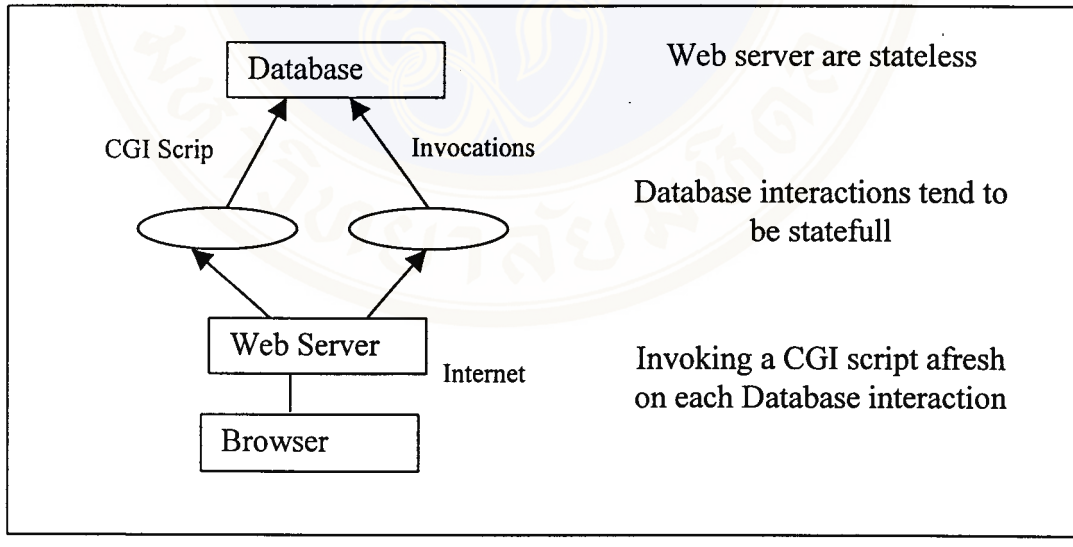

Figure 2.6 connecting the database to the web

The CGI Data-flow Process

The typical steps in the CGI data-flow process follow:

1. A Web Client (for example, a browser) makes a connection to a Web server at the server's address in the URL.

2. The Web client sends a request.

3. Data from the request client (such as user input on as HTML form) in passed the server to the CGI program referenced in the initial URL.

4. The CGI program reads in the requesting client's data that it received from the Web server and performs some processing on the client's behalf.

5. The CGI program generates a response to the client. Typically, this response is an HTML document, but it can be some other type of document. This response is passed to the client via the server.

6. After passing the server response to the requesting client, the server closes the connection to the client. An exception to this is when the CGI program continues to push data to the client.

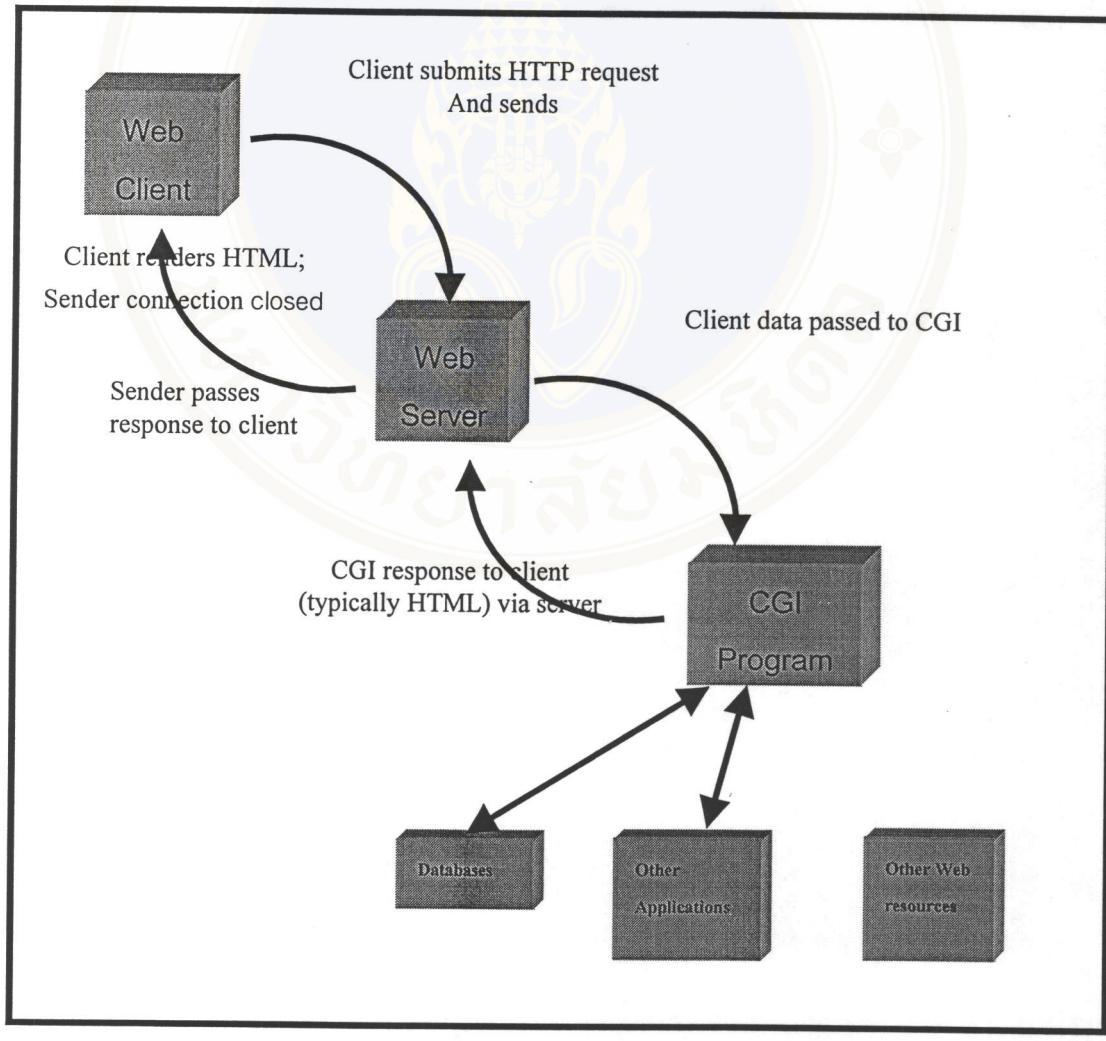

Figure 2.7 The CGI data-flow process (15)

CHAPTER III
RESEARCH METHODOLOGY

Steps of Research Methodology

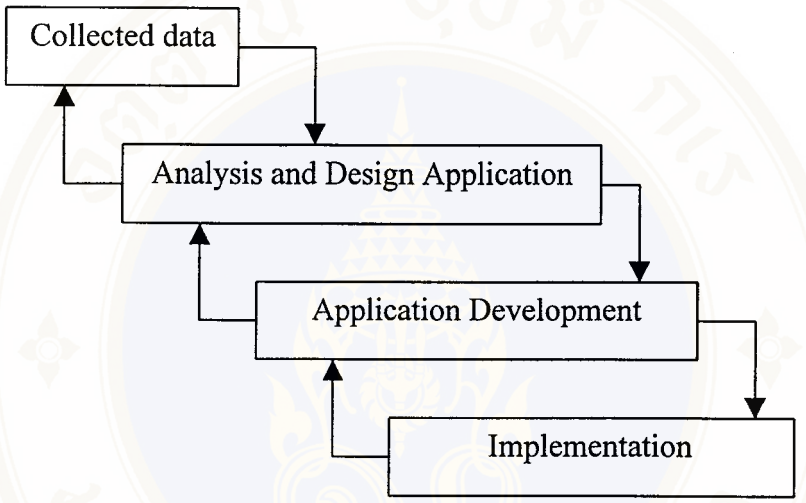

Figure 3.1 Steps of research methodology

Collected data

The assimilated data of poisonous plants and mushrooms

The data of poisonous plants and mushrooms were collected and reviewed the Books, documents, journal papers, and the web site. The web site was related to the proposed thesis. The data of the poisonous plants were included the followings:

- Plant names (scientific names, synonyms, common names or English names, local names and families)
- Images or pictures
- Poisonous plant parts
- Major toxic substances
- Symptoms of the poison
- Treatments

- Descriptions of the poisonous plants
- References

The data of poisonous mushrooms were included the followings:

- Mushroom names (scientific names, synonyms, common names or English names, local names and families)
- Images or mushroom pictures
- Major toxic substances
- Symptoms the poison
- Treatments
- Descriptions of the poisonous mushrooms
- References
- Other species
- Level of toxicities
- Characteristics of the prominent spp.

The data of poisonous plants and mushrooms were classified into 2 categories:

1. The toxicity from the consumption.
2. The toxicity from the touch.

The characteristic and level of toxicities of poisonous plants could be given. The classification of poisonous plants and mushrooms was shown in Appendix A.

The assimilated data of the current system arise from:

- The interview from the executives and staffs about the requirement of the new system
- The request reports were sent to users asking for write their requirements
- The other reports and documents used in this current system

Analysis and Design Application

The existing data were collected for the analysis and design the Web database of poisonous plants and mushrooms in Thailand. The details of work was shown as below:

- Analysis the current system by reviewing the existing data such as
  - General information on plants and mushrooms, workflow and the interview given by the executives and the users about the new system. The new system was presented in structure method (Fig. 4.1-4.9).

After the completion of the analysis of the current system, the next step was the analysis of the new system.

The following charts of the new system comprised the components of structural analysis:

- Data flow diagrams (Fig. 4.1– 4. 7)
- Structure charts (Fig. 4.8-4.9)

- The architecture of the new application

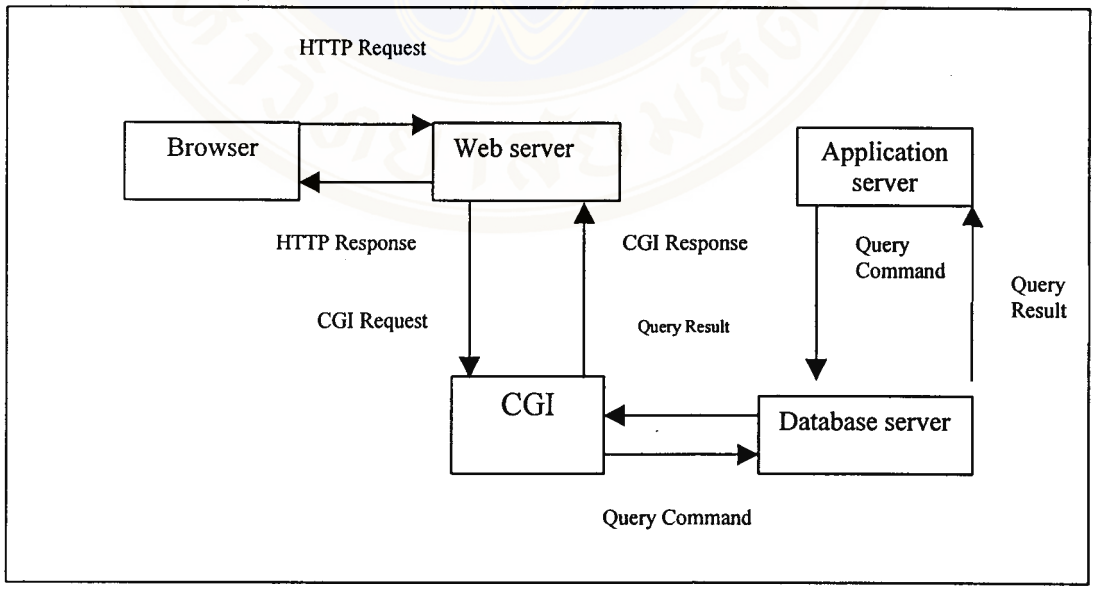

Figure 3.2 Illustration of the communication steps between WWW, database server via browser and client via user interface.

The system was designed after the completion of the requirement. Relational Database Management System (RDBMS) was used for the database. It provided more efficiency for searching than the Hierarchical Database and Network Database. It could retrieve the information easily.

In the analysis phase, the identification of Web database was involved. The knowledge about objects and features poisonous plants and mushrooms were needed to develop the new system which comprised. The defined relations (tables), tuples (rows or records), attributes (columns or fields). The E-R diagram was made, the architecture of the system was analyzed and the relationships of table was identified.

The design phase comprised the following:

1. Design the database with relational database to represent:
   - Consideration of normalization of 3rd normal form
   - Validation of the table model
   - Database security: Only the staffs at the Medicinal Plants Information Center are allowed to manage this section.
2. Design the User Interface and function as follow:
   2.1 The application server
   - Design MDI form, insert forms, update and delete forms, searching forms (typing or selecting the words)
   - Report
   - Design the functions, they are, function of insert, delete, update and search

   2.2. The application for retrieval from browser
   - Design the main menu, searching pages (typing or selecting the words), and display pages
   - Design the questionnaires for users who took poisonous plants and mushrooms by accident. The web page for the users to contribute the suggestion.
   - Design the search function

To accomplish the results of analysis and design application, Microsoft SQL Server 7.0 was used to construct the tables, attributes, relationships, store procedures and queries of the data. The Crystal Report created the reports to the executives. In the research database consisted of 100 species of poisonous plants and 50 species of poisonous mushrooms.

Application development

This phase consisted of the construction of the web pages and interface between the web server. The Microsoft SQL Server 7.0 was the RDBMS (Relational Database Management System). The Visual Basic 6.0 was the program, which acted as User interface. The VBScript was used to retrieve the information from the database, which acted as CGI program. The HTML was used to display in browser. During the program development the errors were found and corrected by the debugging process.

Implementation

After the step of application development, the implementation was experimented at Medicinal Plant Information Center, Faculty of Pharmacy, Mahidol University. The computers connection was accomplished by LAN architecture using network peripherals. It took 4 weeks for the implementation.

For this study, there were 2 categories of the test.

1. Three expert pharmacists proved the implementtation on the correction of the data in the database.
2. Fifteen users tested the applications by questionnaires.

Tools used for the study:

Hardware

- Server (with main memory not less than 128 Mbytes)
  - CPU Pentium II
  - Main memory (RAM 128 MB)
  - Hard Disk 10 GB
  - Floppy Disk Drive (3.5",1.44 MB)

- CD-ROM Drive 36 X.
- SVGA Monitor 15"
- Keyboard 101 Key
- Standard PS2 port Mouse
- Network Adapter (Land Card, Wire, Hub)

- Client (Microcomputer)
  - CPU Pentium
  - Main memory (RAM 32 MB)
  - Hard Disk 2.1 GB
  - Floppy Disk Drive (3.5",1.44 MB)
  - CD-ROM Drive 36 X.
  - SVGA Monitor 15"
  - Keyboard 101 Key
  - Standard PS2 port Mouse
  - Network Peripherals (Land Card, Wire)
- Printer

Software used for application development

Table 3.1 Software used for application development

Software	Responsibility
Microsoft SQL Server 7.0	Relational DBMS
Microsoft Windows NT Sever 4.0	Operating System
Internet Information Server (IIS) 4.0	Web server
Netscape Communicator Internet Explorer 4.01	Web browser
Adobe PhotoShop 5.5	Image maker
Microsoft Visual Basic 6.0 or VBScript or Unlead GIF Animator 4.0 or HTML 4.0	Development Tools

CHAPTER IV
RESULTS

The data flow analysis, relational database and the programming of Web database for poisonous plants and mushrooms in Thailand had been designed and developed as shown below.

Data Flow Diagram

Data Flow Diagram of the current system

A data flow diagram of the current system consists of three levels.

Level 0: Context diagram

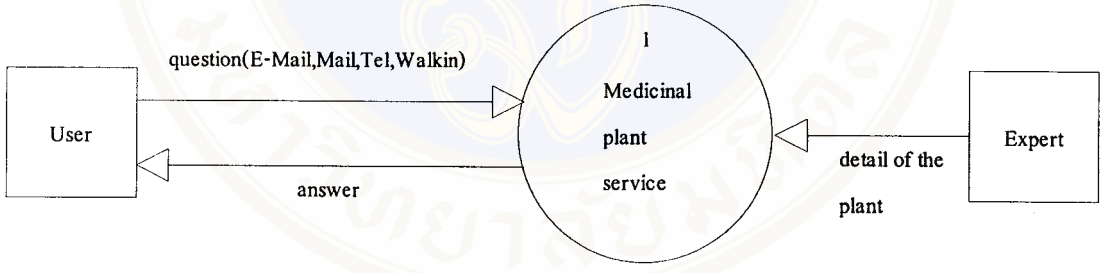

Figure 4.1 Illustration of a context diagram of the current system

Level 1: The process of medicinal plant service consists of 5 child-processes.

- Accept the question
- Search the plant name
- Search the answer
- Answer
- Print the report

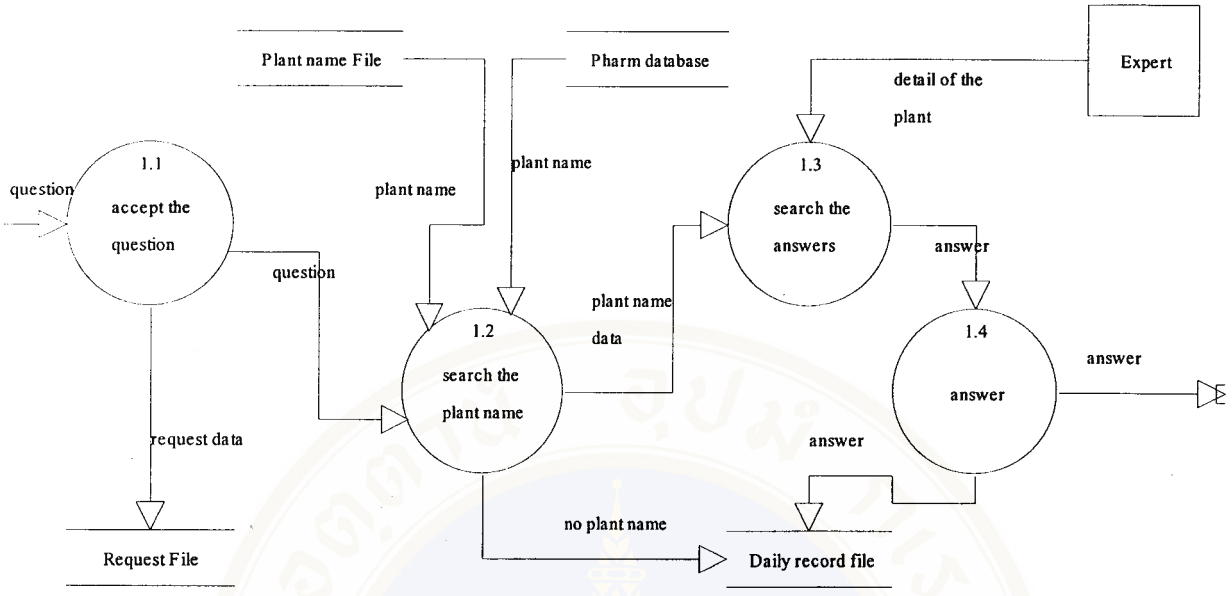

Figure 4.2 Illustration of the current system level 1

Level 2: Each process of the level 1 consists of several child-processes.

The process of accept the question consists of 3 child-processes.

- The inquiry
- Summarize the questions
- Make the requisition

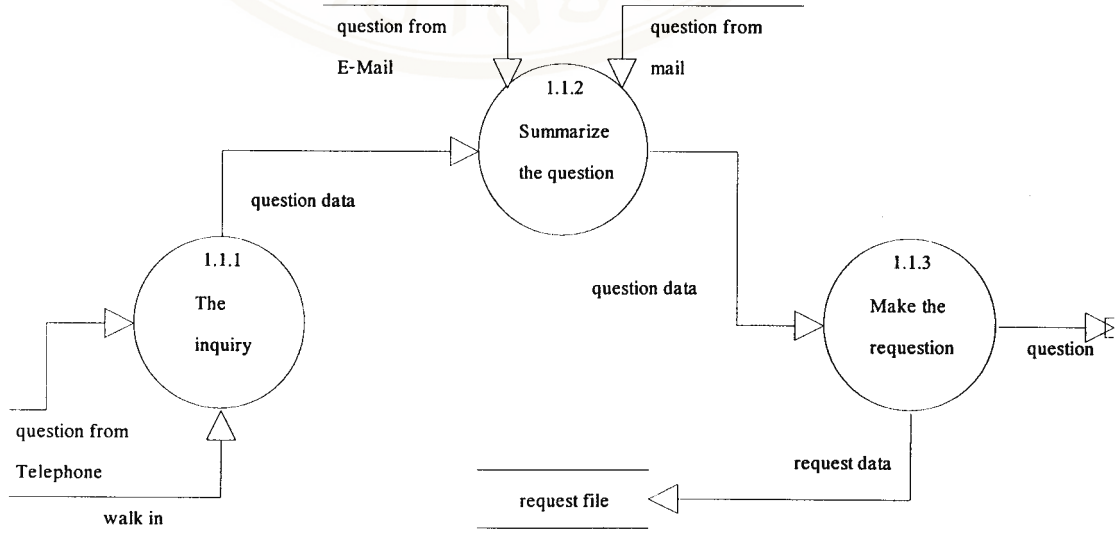

Figure 4.3 Illustration of the current system level 2: Accept the question process

The process of search the answer consists of 4 child-processes.

- Select the question
- Inquiry the details
- Search from the data sources
- Analyses of data

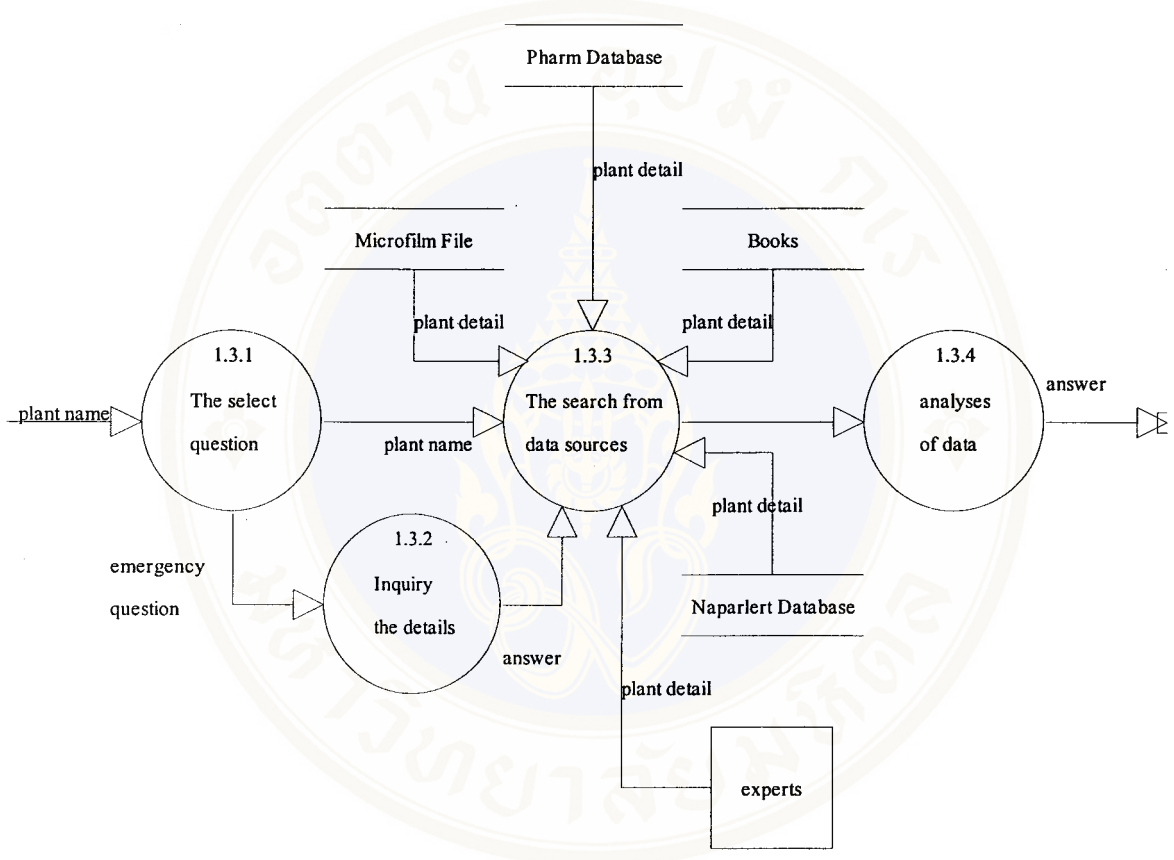

Figure 4.4 Illustration of the current system level 2: Search the answer process

Data Flow Diagram of the new system

A data flow diagram of Web database for poisonous plants and mushrooms in Thailand comprises three levels. It shows functional dependency of the system, including the identification of the input and output variables.

4.2.1 Level 0: Context diagram

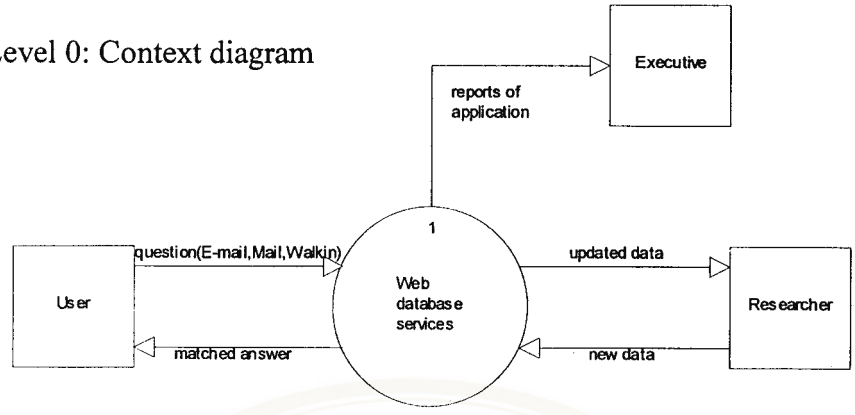

Figure 4.5 Illustration of a context diagram of the new system

4.2.2 Level 1: The process of web database services consists of 6 child-processes.

- Receive the questions
- Separate the questions
- Search the answers
- Answers
- Edit the data
- Print the reports

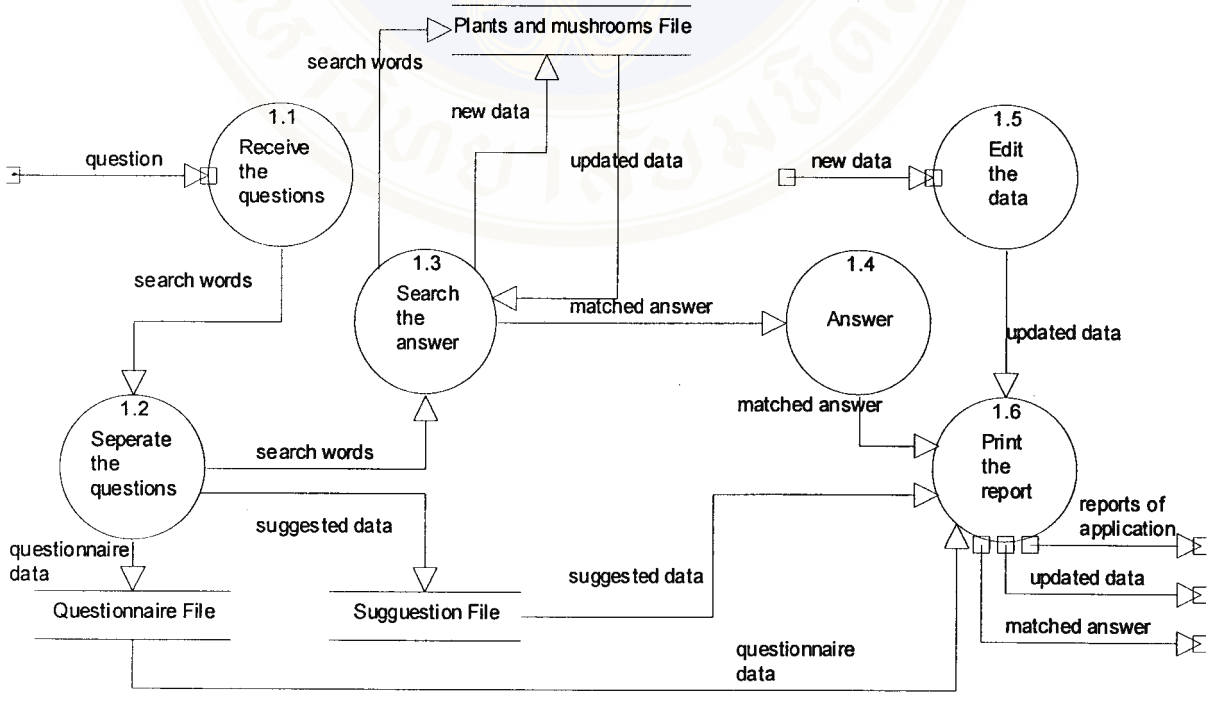

Figure 4.6 Illustration of the new system level 1

4.2.3 Level 2: Each process of the level 1 consists of several child-processes.

4.2.3.1 Search the answer process consists of 2 child-processes.

- Separate the search words
- Search the data

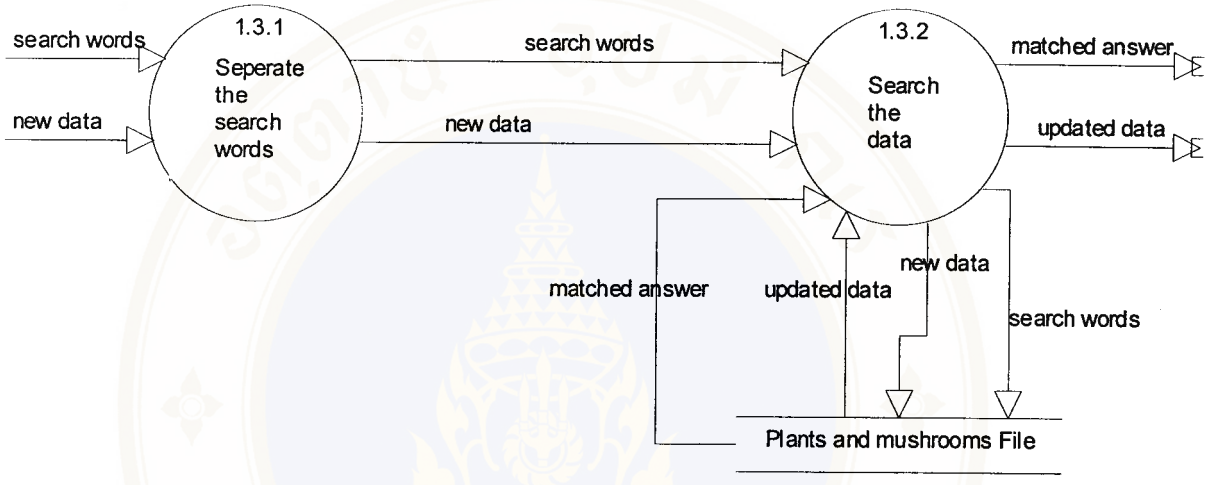

Figure 4.7 Illustration of the new system level 2

Structure Chart

A structure chart was a design tool that usually displays the relationships between program modules. It shows the interaction between modules within a system and also the easy understanding graphics. There are two structure charts for representing the web database services (Fig. 4.8-4.9).

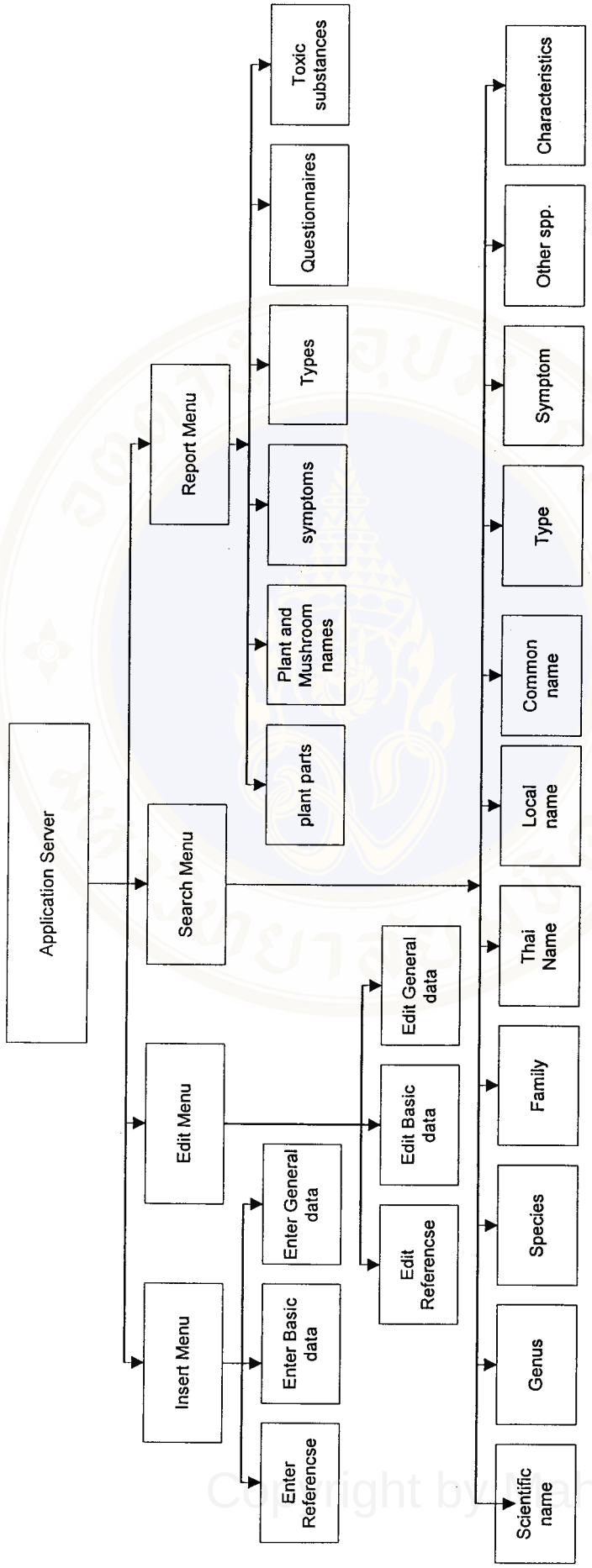

Figure 4.8 Structure chart of Database Management System

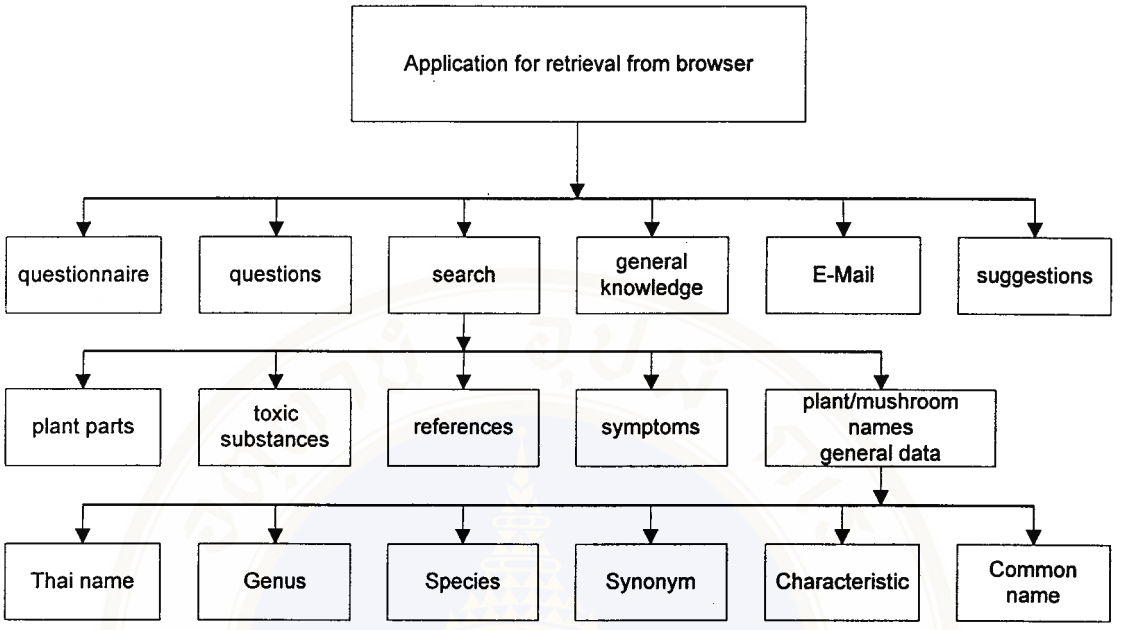

Figure 4.9 Structure chart of application for retrieval from browser

The Entity - Relationship Model

The Enter-relationship (E-R) diagram comprises objects called entity and relationships between the objects. It is used to represent the conceptual design of the database system. The boxes are used to indicate data items or entities, and diamonds to show relationships between data items or entities. The section E-R model represents relationships of each entity in the web database. The enterprise rules of the system include the following:

1. One plant/mushroom possesses more then one plant parts
2. One plant/mushroom produces more then one symptoms
3. One plant/mushroom possesses more then one toxic substances
4. One plant/mushroom has more then one references
5. One plant/mushroom type composes of more than one plant/mushroom
6. One family of plant/mushroom has more then one genus
7. One genus of plant/mushroom has more then one species

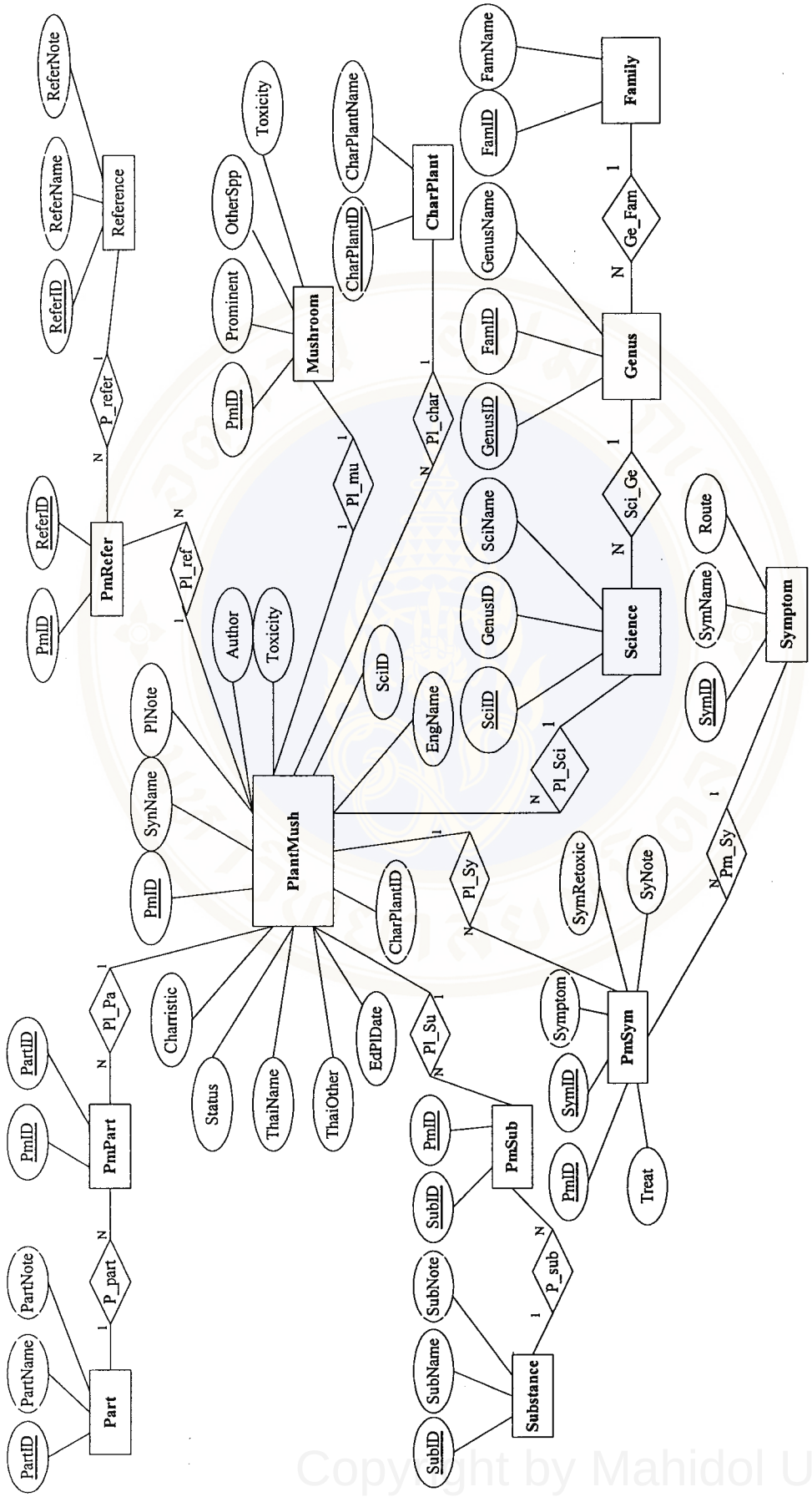

Figure 4.10 Illustration of E-R Model

Database of poisonous plants and mushrooms

A map of Entity-Relationships model was established. It was used to represent the database architecture, the properties and conditions. The database of poisonous plants and mushrooms considered and analyzed as shown below:

1. PlantMush
2. Mushroom
3. Part
4. PmPart
5. Sub
6. PmSub
7. Symptom
8. PmSym
9. Reference
10. PmRefer
11. CharPlant
12. Science
13. Genus
14. Family

Data Dictionary

It was important to describe the details of the database after the data analysis and design. The followings showed names of tables and lists of data elements, data types, lengths, primary key, foreign key and the definitions.

Table 4.1 Data Dictionary

Family

No	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	FamID	Varchar	3	Y	-	Code of family
2	FamName	Varchar	80	-	-	Family

Mushroom

No	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	PmID	Varchar	5	Y	-	Code of plant/mushroom
2	Prominent	Varchar	300	-	-	characteristic of mushroom
3	OtherSpp	Text	16	-	-	Related species
4	Ltoxicity	Text	16	-	-	Level of toxicity

PlantMush

No.	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	PmID	Varchar	5	Y	-	Code of plant/mushroom
2	Charristic	Varchar	2000	-	-	Characteristics
3	PlNote	Text	16	-	-	Note
4	SynName	Varchar	200	-	-	Synonym
5	ThaiName	Varchar	30	-	-	Thai name
6	ThaiOther	Varchar	300	-	-	Local name
7	EngName	Varchar	300	-	-	English name
8	CharPlantID	Varchar	2	-	Y	Type
9	Toxicity	Text	16	-	-	Toxicity
10	Status	Char	20	-	-	Status of the data
11	EdPlDate	Datetime	8	-	-	Date
12	SciID	Varchar	3	-	Y	Code of species
13	Author	Varchar	40	-	-	Author

Science

No.	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	SciID	Varchar	3	Y	-	Code of species
2	GenusID	Varchar	3	-	Y	Code of genus
3	SciName	Varchar	150	-	-	Species

Genus

No	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	GenusID	Varchar	3	Y	-	Code of genus
2	FamID	Varchar	3	-	Y	Code of family
3	GenusName	Varchar	100	-	-	Genus

PmSub

No	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	PmID	Varchar	5	Y	-	Code of plant/mushroom
2	SubID	Varchar	3	Y	-	Code of toxic substances

PmPart

No	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	PmID	Varchar	5	Y	-	Code of plant/mushroom
2	PartID	Varchar	3	Y	-	Code of parts

PmRefer

No	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	PmID	Varchar	5	Y	-	Code of plant/mushroom
2	ReferID	Varchar	5	Y	-	Code of references

Part

No	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	PartID	Varchar	3	Y	-	Code of parts
2	PartName	Varchar	30	-	-	Plant parts
3	PartNote	Text	16	-	-	Note

Substance

No	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	SubID	Varchar	3	Y	-	Code of toxic substances
2	SubName	Varchar	30	-	-	Name of substance
3	SubNote	Text	16	-	-	Note

Reference

No	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	ReferID	Varchar	5	Y	-	Code of references
2	ReferName	Varchar	100	-	-	Name of references
3	ReferNote	Varchar	300	-	-	Full name of references

PmSym

No	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	PmID	Varchar	5	Y	-	Code of plant/mushroom
2	SymID	Varchar	3	Y	-	Code of symptoms
3	Symptom	Text	16	-	-	Symptoms
4	SymRetoxic	Text	16	-	-	Report of toxicities
5	Treat	Text	16	-	-	Treatments
6	SyNote	Text	16	-	-	Note

CharPlant

No	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	CharPlantID	Varchar	2	Y	-	Code of types
2	CharPlantName	Varchar	30	-	-	Types

Symptom

No	Data Element	Data Type	Length	Primary Key	Foreign Key	Definition
1	SymID	Varchar	3	Y	-	Code of symptoms
2	SymName	Varchar	50	-	-	Name of symptom
3	Route	varchar	20	-	-	Routes

To design the poisonous plants and mushrooms database, the data normalization, of which the attributes were breaking into smaller relation schema needed. The desirable relation schemas were conformed to 3 NF.

The relation (table) schema comprised relation (table) names and lists of attributes (Table 4.2).

Table 4.2 Table names and lists of attributes

Mushroom

PmID	Prominent	OtherSpp	Ltoxicity

PlantMush

PmID	Charristic	PlNote	SynName	ThaiName	ThaiOther	SciID
Status	CharPlantID	Toxicity	EngName	EdPlDate	Author	

Science

SciID	GenusID	SciName

Genus

GenusID	FamID	GenusName

Family

FamID	FamName

PmPart

PmID	PartID

PmSub

PmID	SubID

PmSym

PmID	SymID	Symptom	SymRetoxic	Treat	SyNote

PmRefer

PmID	ReferID

Part

PartID	PartName	PartNote

Substance

SubID	SubName	SubNote

Reference

ReferID	ReferName	ReferNote

Symptom

SymID	SymName	Route

CharPlant

CharPlantID	CharPlantName

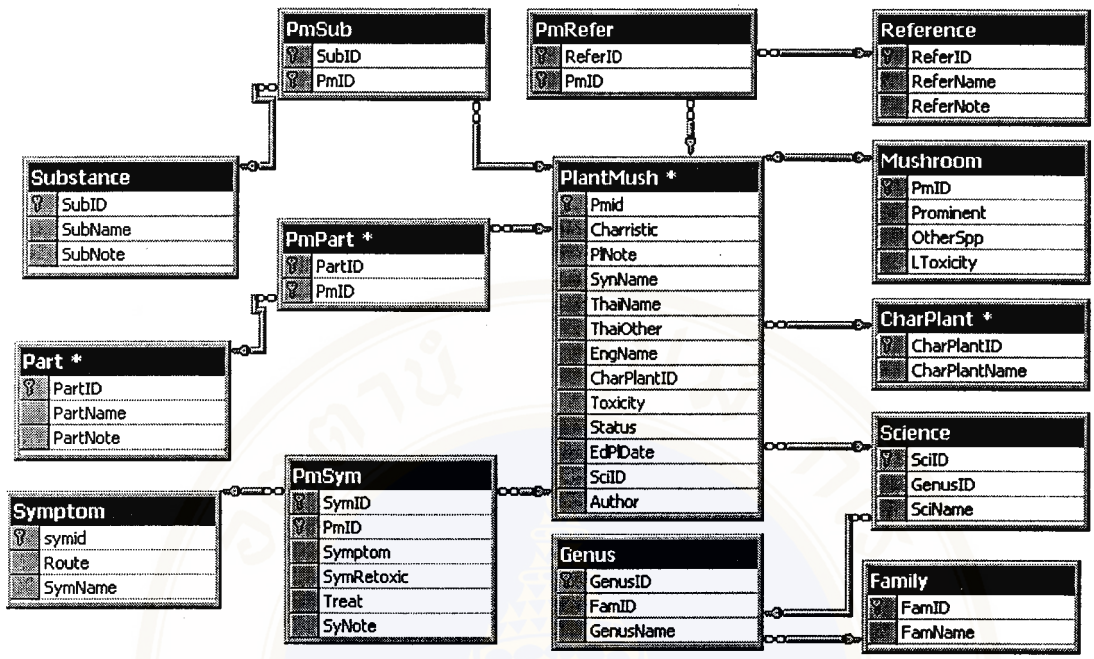

Figure 4.11 Database of poisonous plants and mushrooms showing the relationship edited by Microsoft SQL Server 7.0

Database security

The database security was very important to protect the data. Two applications were thus developed for the system.

The application for retrieval from web browser was run on the Internet. It was easy to connect and retrieve the information by using browser, but the browser users could not edit the data.

The application server was necessary to control the database security. The application server divided users into 2 groups.

- The database administrator group, who could enter the database for insert, update, delete and establish the permission for the researchers.
- The researcher group, who could enter the database to insert, update and delete the data.

Design User Interface

Design input/ output forms (screens) of the application server

Input and output screens were user friendly with GUI (Graphic User Interface) using MDI windows. It was a frame window that multiple document windows could be opened and moved among the sheets. Most of input and output screens were made from buttons, textboxes and labels. The application server consisted of 43 forms as shown below:

Table 4.3 Forms of the application server

Insert Data Forms	Edit Data Forms	Search Forms	Report Forms	Other Forms
BaCharPlant	EdCharPlant	SeAllName	Rpt	MDI
BaFam	EdFam	SeAllSym		About
BaGenus	EdGenus			Introduction
BaSpecies	EdSpecies			ShowAll
BaPart	EdPart			Logon
BaSub	EdSub			
BaSym	EdSym			
BaPlMu	EdPlMu			
BaRefer	EdRefer			
AMPart	SbaPlMu			
AMRefer	SMPart			
AMSub	SMRefer			
AMSym	SMSub			
Mpart	SMSym			
Mrefer	MedPart			
Msub	MedRef			
Msym	MedSub			
	MedSym			

The application server forms (screens) were linked and shown in Fig. 4.12.

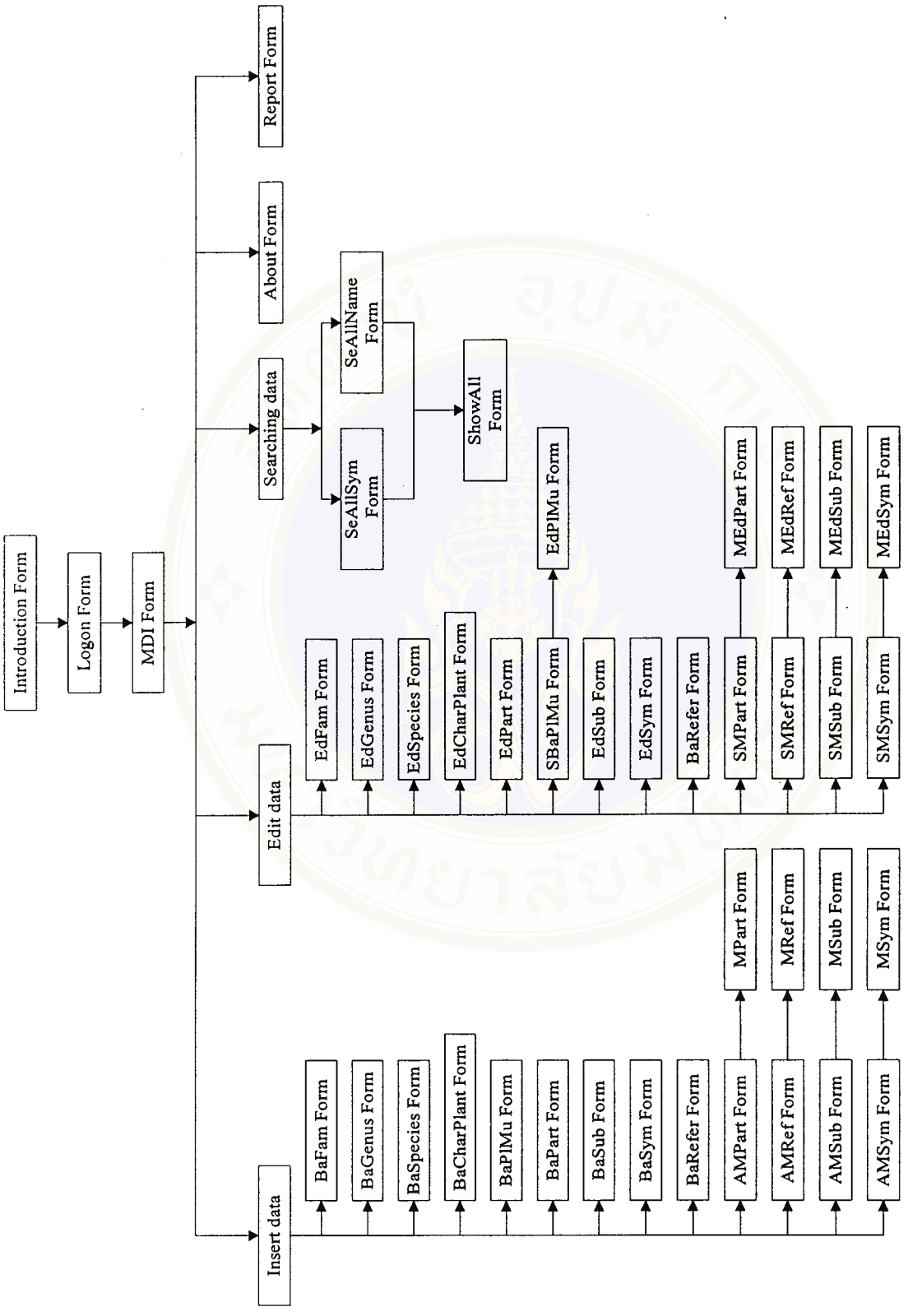

Figure 4.12 Forms of the application server

The components of designed forms (screens) were described in the Table4.4.

Table 4.4 Components of forms in the application server

Forms	Components
MDI	There were 30 menus.
About	There were 8 labels, 2 images and 2 buttons.
Introduction	There were 4 images, 2 labels and 1 button.
Logon	There were 2 textboxes, 4 labels, 2 buttons and 1 frame.
BaCharPlant	There were 2 textboxes, 2 frames, 3 labels, 6 buttons and 1 datagraid.
BaFam	There were 2 textboxes, 2 frames, 3 labels, 6 buttons and 1 datagraid.
BaGenus	There were 2 textboxes, 2 frames, 3 labels, 6 buttons, 1 combo box and 1 datagraid.
BaSpecies	There were 2 textboxes, 2 frames, 3 labels, 6 buttons, 2 combo boxes and 1 datagraid.
BaPart	There were 2 textboxes, 2 frames, 3 labels, 6 buttons and 1 datagraid.
BaSub	There were 2 textboxes, 2 frames, 3 labels, 6 buttons and 1 datagraid.
BaSym	There were 2 textboxes, 2 frames, 3 labels, 6 buttons and 1 datagraid.
BaPlMu	There were 19 labels, 16 textboxes, 7 buttons, 2 frames, 2 combo boxes and 1 calendar.
BaRefer	There were 2 textboxes, 2 frames, 3 labels, 6 buttons and 1 datagraid.
EdCharPlant	There were 2 textboxes, 2 frames, 3 labels, 6 buttons and 1 datagraid.
EdFam	There were 2 textboxes, 2 frames, 3 labels, 6 buttons and 1 datagraid.
EdGenus	There were 2 textboxes, 2 frames, 3 labels, 6 buttons, 1 combo box and 1 datagraid.
EdSpecies	There were 2 textboxes, 2 frames, 3 labels, 6 buttons, 2 combo boxes and 1 datagraid.
EdPart	There were 2 textboxes, 2 frames, 3 labels, 6 buttons and 1 datagraid.
EdSub	There were 2 textboxes, 2 frames, 3 labels, 6 buttons and 1 datagraid.
EdSym	There were 2 textboxes, 2 frames, 3 labels, 6 buttons and 1 datagraid.

Table 4.4 Components of forms the application server (continued)

Forms	Components
EdPlMu	There were 19 labels, 16 textboxes, 7 buttons, 2 frames, 2 combo boxes and 1 calendar.
EdRefer	There were 2 textboxes, 2 frames, 3 labels, 6 buttons and 1 datagrid.
AMPart	There were 2 labels, 1 frame, 1 combo box and textbox.
AMRefer	There were 2 labels, 1 frame, 1 combo box and textbox.
AMSub	There were 2 labels, 1 frame, 1 combo box and textbox.
AMSym	There were 2 labels, 1 frame, 1 combo box and textbox.
Mpart	There were 7 buttons, 9 textboxes, 9 labels, 1 datagrid, 1 combo box 1 frame and 1 image.
Mrefer	There were 7 buttons, 9 textboxes, 9 labels, 1 datagrid, 1 combo box and 1 frame.
Msub	There were 7 buttons, 9 textboxes, 9 labels, 1 datagrid, 1 combo box 1 frame and 1 image.
Msym	There were 11 buttons, 10 textboxes, 10 labels, 1 combo box 1 frame and 1 image.
SbaPlMu	There were 2 labels, 1 frame, 1 combo box and textbox.
SMPart	There were 2 labels, 1 frame, 1 combo box and textbox.
SMRefer	There were 2 labels, 1 frame, 1 combo box and textbox.
SMSub	There were 2 labels, 1 frame, 1 combo box and textbox.
SMSym	There were 2 labels, 1 frame, 1 combo box and textbox.
MedPart	There were 7 buttons, 9 textboxes, 9 labels, 1 datagrid, 1 combo box 1 frame and 1 image.
MedRef	There were 7 buttons, 9 textboxes, 9 labels, 1 datagrid, 1 combo box 1 frame and 1 image.
MedSub	There were 7 buttons, 9 textboxes, 9 labels, 1 datagrid, 1 combo box 1 frame and 1 image.
MedSym	There were 11 buttons, 10 textboxes, 10 labels, 1 combo box 1 frame and 1 image.

Table 4.4 Components of forms the application server (continued)

Forms	Components
SeAllName	There were 3 frames, 6 options, 6 combo boxes, 3 buttons, 9 labels and 1 text box.
SeAllSym	There were 3 frames, 6 options, 5 combo boxes, 3 buttons, 9 labels and 1 text box.
ShowAll	There were 24 labels, 22 textboxes, 5 buttons, 1 tab, 1 combo box and 1 image.
Rpt	There were 2 frames and 7 buttons.

Design input/ output pages (screens) of Application for retrieval from browser

The input and output screens were user friendly with GUI (Graphic User Interface) using HTML tags. Most of the input and output screens were made from images, buttons, textboxes, text and tables. It consisted of 25 pages as shown below:

Table 4.5 The pages of application for retrieval from browser

Search Pages	Sign Pages	Question Pages	Questionnaire Pages	Display Pages	Other Pages
Swsym	Signguestbook	Qanswer	PerQuestion	Pwsym	Default
Swall	Addnewguest	AddQanswer	PerQ	Pdetail	OthURL
Scpart				Pcsub	Aplant
Scsub				Pcpart	
Screfer				Pcrefer	
				Showpart	
				Showall	
				Showsub	
				Showsym	
				Showrefer	

The pages of application for retrieval from browser pages were linked and shown in Fig. 4.13

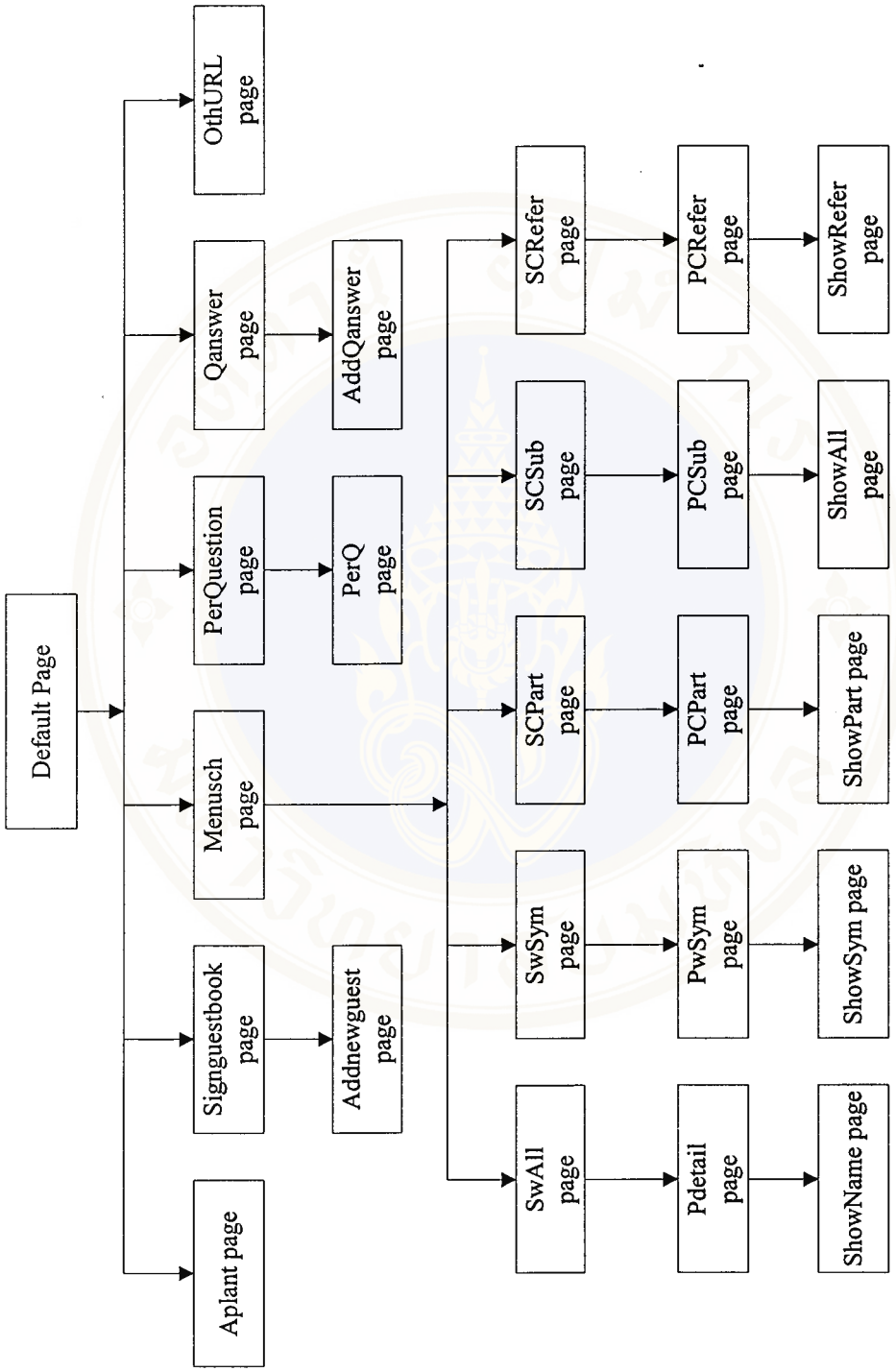

Figure 4.13 Pages of the application for retrieval from browser

The components of the designed pages were described in Table4.6.

Table 4.6 Components of pages in the application for retrieval from browser

Pages	Components
Default	There were 5 GIF animations, 5 images, 1 table and 7 hyperlink for images.
OthURL	There were 8 hyperlink for texts.
Aplant	There were 7 GIF animations, 8 images and 7 hyperlink for images.
Signguestbook	There were 7 GIF animations, 8 images, 7 hyperlink for images, 4 textboxes and table.
Addnewguest	There were 7 GIF animations, 8 images, 7 hyperlink for images, 4 textboxes and table.
Qanswer	There were 7 GIF animations, 8 images, 7 hyperlink for images, 5 textboxes and table.
AddQanswer	There were 7 GIF animations, 8 images, 7 hyperlink for images, 5 textboxes and table.
PerQuestion	There were 8 images, 7 hyperlink for images, 13 options, 11 textboxes, 4 combo boxes, 22 checkboxes and 2 buttons.
PerQ	There were 2 GIF animations, 8 images and 7 hyperlink for images.
MenuSch	There were 2 GIF animations, 8 images, 7 hyperlink for images and 5 buttons.
Swsym	There were 3 GIF animations, 8 images, 7 hyperlink for images, 2 buttons and 1 text box.
Swall	There were 2 GIF animations, 8 images, 7 hyperlink for images, 2 buttons and 1 combo box.
Scpart	There were 2 GIF animations, 8 images, 7 hyperlink for images, 2 buttons and 1 combo box.

Table 4.6 Components of pages the application for retrieval from browser (continued)

Pages	Components
Scsub	There were 2 GIF animations, 8 images, 7 hyperlink for images, 2 buttons and 1 combo box.
Screfer	There were 2 GIF animations, 8 images, 7 hyperlink for images, 2 buttons and 1 combo box.
Pwsym	There were 2 GIF animations, 8 images, 7 hyperlink for images, 1 hyperlink for text and tables.
Pdetail	There were 2 GIF animations, 8 images, 7 hyperlink for images, 1 hyperlink for text and tables.
Pcsub	There were 2 GIF animations, 8 images, 7 hyperlink for images, 1 hyperlink for text and tables.
Pcpart	There were 2 GIF animations, 8 images, 7 hyperlink for images, 1 hyperlink for text and tables.
Pcrefer	There were 2 GIF animations, 8 images, 7 hyperlink for images, 1 hyperlink for text and tables.
Showpart	There were 2 GIF animations, 8 images, 7 hyperlink for images and tables.
Showall	There were 2 GIF animations, 8 images, 7 hyperlink for images and tables.
Showsub	There were 2 GIF animations, 8 images, 7 hyperlink for images and tables.
Showsym	There were 2 GIF animations, 8 images, 7 hyperlink for images and tables.
Showrefer	There were 2 GIF animations, 8 images, 7 hyperlink for images and tables.

Application Development

The database was constructed by Microsoft SQL Server 7.0 , Microsoft Visual Basic version 6.0 was used as user interface in application server. There were several choices for connecting Microsoft Visual Basic to the SQL database Server. In this study the connection by ADO (ActiveX Data Objects) was performed. The functions of insert, update, delete and search were basic methods for modifying the database. There were examples for coding as follow:

Open Database:

```
Const StrcnADO = "Provider=SQLOLEDB.1; Integrated Security=SSPI;Persist
Security Info=False;Initial Catalog=Plant;Data Source=RUTCHANEE"
Private Sub Form_Load()
        Set cnADO = New ADODB.Connection
        cnADO.ConnectionString = StrcnADO
        cnADO.CommandTimeout = 30
        cnADO.CursorLocation = adUseClient
        cnADO.Open
End Sub
```

Function for inserts Data.

```
Private Sub cmdAdd_Click()
        'Declare variables
        'Receive the value from textbox for search in store procedure and check if
        found the same code don't insert data else insert them.
        Sql = "execute SP_insert_Charplant'" & Trim(TxtChplid.Text) & "', '" & Trim
        (TxtChplNa.Text) & "'"
        cmd.CommandText = Sql
        cmd.CommandType = adCmdText
        cmd.ActiveConnection = StrcnADO
        cmd.Execute (Sql)
End sub
```

Function for Update Data.

```
Private Sub cmdUp_Click()
        'Declare variables
        'Take the value from textbox to update in store procedure
        Sql = "UPDATE CharPlant SET CharPlantName  = '" & TxtChplNa.Text & "'
        WHERE CharPlantID = " & Val(TxtChplid.Text) & ""
        cmd.CommandText = Sql
        cmd.CommandType = adCmdText
        cmd.ActiveConnection = StrcnADO
        cmd.Execute (Sql)
End Sub
```

Function for Delete Data.

```
Private Sub cmdDel_Click()
        'Declare variables
        'Take the value from textbox to Delete in store procedure
        Sql = "DELETE FROM CharPlant WHERE CharPlantid = " & Val
        (TxtChplid.Text) & ""
        cmd.CommandText = Sql
        cmd.CommandType = adCmdText
        cmd.ActiveConnection = StrcnADO
        cmd.Execute (Sql)
End Sub
```

The application for retrieval from web browser used the same database, and HTML was used for displaying on the browser. VBScript for ISAPI (Internet Server Application Program Interface) was used as an interface between web server, database and users. The web server used IIS (Internet Information Server) to connect the database Server to ODBC (Open Database Connectivity). The search functions were basic method for modifying the application. There were examples for coding as given below.

Example: The statement of database connection of the application for retrieval from browser

```
<% 'connect database
        set conn=server.CreateObject("ADODB.Connection")
        conn.Open "SQLPlant", strcon
%>
```

Example: The statement of information search

```
<!—the statement for received value from swsym.asp and kept in the variable-->
<%
        g_SWname=Request.Form("txtSsym")
%>
<%      ' the statement of taken the data from variable and search the data from query
        sql="SELECT PmSym.Symptom, PmSym.SymRetoxic,
PmSym.Treat,PmSym.SyNote, CharPlant.CharPlantID, CharPlant.CharPlantName,
Family.FamID, Family.FamName, Science.SciID, Science.SciName, Genus.GenusID,
Genus.GenusName, Symptom.symid, Symptom.Route, Symptom.SymName,
PlantMush.Charristic, PlantMush.PlNote, PlantMush.SynName,
PlantMush.ThaiName, PlantMush.ThaiOther, PlantMush.Author,
PlantMush.EngName, PlantMush.Toxicity, PlantMush.Status, PlantMush.EdPlDate,
PlantMush.Pmid, Mushroom.Prominent, Mushroom.OtherSpp, Mushroom.LToxicity
FROM Genus INNER JOIN Family ON Genus.FamID = Family.FamID INNER JOIN
Science ON Genus.GenusID = Science.GenusID INNER JOIN PlantMush ON
Science.SciID = PlantMush.SciID INNER JOIN PmSym INNER JOIN Mushroom
ON PmSym.PmID = Mushroom.PmID ON PlantMush.Pmid = PmSym.PmID AND
PlantMush.Pmid = Mushroom.PmID INNER JOIN CharPlant ON
PlantMush.CharPlantID = CharPlant.CharPlantID INNER JOIN Symptom ON
PmSym.SymID = Symptom.symid "
   sql=sql & " where PmSym.symptom like '%" & g_sWname & "%'"
%>
```

```
<%    ' the loop for search data and kept in variable
      do while not rs2.EOF
      SPic="../images/"
      pm_id=rs2("Pmid")%>
      <%thai=rs2("Thainame")
%>
```

Example: The statement of display information

```
<!—display on browser -->
<table border=0>
<tr>
<td><img align=center alt="<%=rs("ThaiName")%>" src="<%=spic%><%=rs2
("pmid")%><%=exjpg%>"style="HEIGHT: 100PX; WIDTH:150PX">
<td><%=rs2("genusname")%><%=rs2("sciname")%><i></td>
<td><%Response.Write
("<a href='showsym.asp?pm_id="&rs2("pmid")&"'>"&thai&"</a>")%></td>
</tr>
</table>
</div>
```

During the application development, “bugs”, which were errors in coding, possibly caused the malfunction of the program or production of incorrect results. Bugs could be eliminated by the process of debugging, the debugger program. The program was designed to have stops through the program to examine the data and check the condition. The potential risks were debugged as much as possible before the system was implemented.

Implementation

The application for web browser had the IP Address 10.8.2.204, gateway of Mahidol University and the implementation was performed of Medicinal Plant Information Center, Faculty of Pharmacy, Mahidol University. The implementation was experimented for 4 weeks.

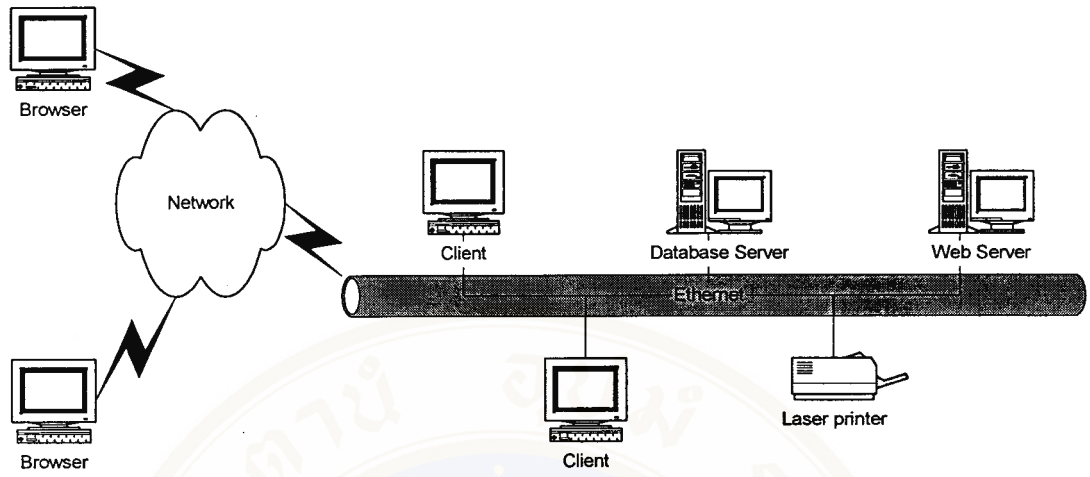

Figure 4.14 Illustration of the system network of applications

For this study, Thre are 2 categories of the test.

1. Three expert pharmacists proved the correction of the data in the database.
2. Fifteen users tested the applications using the questionnaires. The result was shown in Table 4.7.

Table 4.7 Result of the questionnaires

Titles	Excellent % (person)	Good % (person)	Fair % (person)	Failed % (person)
Details of data about:				
1. All names	53.33 (8)	40 (6)	6.67(1)	-
2. General data	33.34 (5)	53.33 (8)	13.33 (2)	-
3. Symptoms	60 (9)	40 (6)	-	-
4. Treatments	26.66 (4)	66.67 (10)	6.67 (1)	-

Table 4.7 Result of the questionnaires (cont.)

Titles	Excellent % (person)	Good % (person)	Fair % (person)	Failed % (person)
Details of user interface				
1. Forms to represent	20 (3)	80(12)	-	-
2. Background color	20 (3)	66.67 (10)	13.33 (2)	-
3. Font color	13.33 (2)	66.67 (10)	20 (3)	-
4. Font size	-	80 (12)	13.33 (2)	-
5. Images	33.34 (5)	53.33 (8)	13.33 (2)	-
6. Menus	40 (6)	46.67 (7)	13.33 (2)	-
Details for search				
1. select word	46.67 (7)	40 (6)	13.33 (2)	-
2. input word	40 (6)	60 (9)	-	-
3. speed of select word	26.66 (4)	66.67 (10)	6.67 (1)	-
4. speed of input word	40 (6)	53.33 (8)	6.67 (1)	-

Fifteen persons evaluated the applications. Most of them were female (13 persons), 33 years old of average age. They had different occupations, they are 9 persons from governmental section, 4 persons from the private sector, 1 programmer and 1 tour leader. The users evaluated the application as follows:

Details of data:

- name: 55.33 percent for excellent
- general data: 55.33 percent for good
- symptom: 60.00 percent for excellent
- treatment: 66.67 percent for excellent

Details of user interface

- form: 80.00 percent for good
- background color: 66.67 percent for good
- font color: 66.67 percent for good
- font size: 80.00 percent for good
- image: 53.33 percent for good
- menu: 46.67 percent for good

Details of searching

- select word: 46.67 percent for excellent
- input word: 60.00 percent for good
- speed of select word: 66.67 percent for good

CHAPTER V
DISCUSSION

The result of the study could achieve the goal to provide a development of Web Database system for Poisonous Plants and Mushrooms in Thailand. The users, who are interested in poisonous plant and mushroom information and the health personnel could make use of it. The application program was easy to use. The database consisted of 100 species of poisonous plants and 50 species of poisonous mushrooms in Thailand. It allowed the users to get the information by selecting names of plant/mushroom (scientific names, synonyms, common names or English names, local names and families), descriptions of poisonous plants and mushrooms, characteristics poisonous mushrooms, toxic substances, poisonous plant parts, symptoms and references. There were 2 applications, i.e. the application server and the application for retrieval from browser according to the user requirement and the protection of the assimilated data.

Concepts of application development

1. The application for retrieval from web browser

Users can use Internet to access web database that contain poisonous plants and mushrooms information in Thailand. The application was easy to use. Although the people who accidentally got the poison from plants or mushrooms were far away, they could retrieve information from Internet, because Internet was World Wide and used easily.

2. The application server

The application server was developed to validate and secure the data. The information and the applications are very useful. The pharmacological data together with references were benefitial to personnel health in the treatment. The information

of poisonous plants and mushrooms data were inserted and updated by the staffs of Medicinal Plant Information Center, Faculty of Pharmacy, Mahidol University.

Database of poisonous plants and mushrooms

The analysis and the design of the application was performed by using Microsoft SQL Server 7.0, as RDBMS (Relational Database Management System). It comprised 14 related tables (see page 33), relating to 100 species of poisonous plants and 50 species of poisonous mushrooms. Only the staffs of Medical Plant Information Center were in charge of inserting and editing the data via the application server with security access control.

Techniques used in the system

Programming

1. The application for retrieval from web browser was developed by using VBScript as a tool to construct the interface between web server, database and users. It was easy to test the debugged and guide the developer a way to build the web application. For the database access, VBScript provided a powerful for linking an RDO (Remote Data Access), using ODBC (Open Database Connectivity) for the database server connection. The web browser displayed the results generating from HTML. The application program could also be improved by other new techniques, such as ActiveX, JavaScript, Perl, Jscript and web-editors. They could be used to create more interesting homepages for the presentation on the web browser. The web server could also be either Personal Web Server (PWS) or Personal Peer Web Server (PPWS), which were performed on Windows 95/98 and Windows NT 4.0 Workstations, respectively.

2. The application Server was developed by using Visual Basic 6.0, as a tool to construct user interface between database server and users. It was easy to test the debugged and guided the developer the way to build the application server. For the

database access, Visual Basic 6.0 provided a powerful object-oriented method for linking an ADO (ActiveX Data Objects), using OLE (Object Linking and Embedding) DB for the database server connection. The use of Microsoft SQL Server 7.0 for building up the database and Crystal Report for presenting the report of the application server. We could also use others RDBMS instead of Microsoft SQL Server 7.0, such as Oracle.

Searching

The search applications differed from other system. For example; users could search the information by either selecting the ComboBox or typing in the textbox. The ComboBox provided the lists of toxic substances, plant parts and references. The textbox provided plant/mushroom names (scientific names, synonyms, common names or English names, local names, genus, species and families), descriptions of poisonous plants and mushrooms, characteristics of poisonous mushrooms and symptoms.

System performance

Response time

The response time of the application server was tested and approved. Each query took about 4-10 seconds and the web application took about 2-4 seconds. The system had good response time, such as the search by selecting the ComboBox and typing in the textbox. However, the response time of the system depended on the hardware performance. The specification of the server computer hardware used for the system was conformed to Pentium 166 MMX, 64 MB RAM and HD 7.6 GB hard disk.

Resolution

The application was designed to display the information with the resolution on 800x600 pixels, 24 bit colors and 15–inch monitor. The users could set the data for printing from the menu of the web browser.

Storage

The storage site in the system was quite small. The system used the storage for storing the single database (backup. BAK file), which was developed by using

Microsoft SQL Server 7.0. The database file needed the space less than 10 Mega bytes in the application. VBScript execute file, HTML web page and image were not included in the database.

Complexity

The applications in the system were not complicated. The users could easily retrieve the information. It was user-friendly interface.

Others

Some comments were made on the interactive images, which were not sharp, the changing animation images, the background color, and icon. The screens of applications were improved.

CHAPTER VI
CONCLUSION AND RECOMMENDATION

Conclusion

Two application programs to support Web database for poisonous plants and mushrooms information in Thailand have been developed. They are, the application for retrieval from the browser in order that many users could to find the information easier and quicker, and the application server for researchers to insert and edit the data of poisonous plants and mushrooms.

The developed information system was tested, debugged until it gave the following satisfactions:

- The applications could support the users to retrieve information from the database server.
- The application for web browser could use easily by selecting or typing the words, buttons, and hypertext link. The user could learn by themself.
- The applications could present information through Internet. It provided the users convenience in getting the information whenever they needed.
- The application server for researcher's interface was designed for the friendly use and meet the requirements of the users.
- The application program related to the database management and operating system of Medicinal Plant Information Center, Faculty of Pharmacy, Mahidol University.
- The database contained 100 species of poisonous plants and 50 species of poisonous mushrooms.

Recommendation

1. More poisonous plant and mushroom information should be assimilated in the database.
2. For the more effective processing, the application for retrieval from browser should have the web page for editing the information from other researchers and health personnel.
3. The levels of the toxicity of the poisonous plants should be given in the database.
4. In order to prevent the error the scientific names of the poisonous plants and mushrooms should be given on the images.
5. There should be a web linked between universities.

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APPENDIX A

Lists of poisonous plants and mushrooms

พืชพิษจำแนกตามการบริโภคและการสัมผัส

ชื่อ	ชื่อวิทยาศาสตร์	วงศ์	บริโภค	สัมผัส
กลอย	*Dioscorea hispida* Dennst.	Dioscoreaceae	Y	N
ราตรี	*Cestrum nocturnum* Lam.	Solanaceae	Y	N
ลำโพงขาว	*Datura metel* Linn.	Solanaceae	Y	N
ฝิ่น	*Papaver somniferum* Linn.	Papaveraceae	Y	N
กระท่อม	*Mitragyna speciosa* Korth.	Rubiaceae	Y	N
พลับพลึงดอกขาว	*Crinum asiaticum* Linn.	Amarylidaceae	Y	N
พลับพลึงดอกแดง	*Crinum amabile* Donn.	Amarylidaceae	Y	N
แสลงใจ	*Strychnos nux-vomica* Linn.	Loganiaceae	Y	N
มะแว้งนก	*Solanum nigrum* Linn.	Solanaceae	Y	N
ดองดึงส์หัวขวาน	*Gloriosa superba* Linn.	Liliaceae	Y	N
เถาเงาะ	*Passiflora foetida* Linn.	Passiforaceae	Y	N
ปรงป่า	*Cycas circinalis* Linn.	Cycadaceae	Y	N
มันสำปะหลัง	*Manihot esculenta* Crantz.	Euphorbiaceae	Y	N
สลอด	*Croton tiglium* Linn.	Euphorbiaceae	Y	N
สามเหลี่ยมญี่ปุ่น	*Euphorbia trigona* Haw.	Euphorbiaceae	Y	Y
สาวน้อยประแป้ง	*Dieffenbachia sequine* Schott	Araceae	Y	Y
ชวนชม	*Adenium obesum* Balf.	Apocynaceae	Y	N
ซาก	*Erythrophleum succirubrum* Gagnep.	Caesalpiniaceae	Y	N
ยี่โถ	*Nerium indicum* Linn.	Apocynaceae	Y	N
รำเพย	*Thevetia neriifolia* Juss.	Apocynaceae	Y	N
ก้ามปู	*Samanea saman* Merr.	Mimosaceae	Y	N
มะคำดีควาย	*Sapindus emarginatus* Vahl	Sapindaceae	Y	N
มันแกว	*Pachyrhizus erosus* Urbar.	Papilionaceae	Y	N
สบู่ขาว	*Jatropha curcas* Linn.	Euphorbiaceae	Y	Y
รักดอกม่วง	*Calotropis gigantea* R. Br.	Asclepiadaceae	Y	Y
รักหลวง	*Melanorrhoea usitata* Wall.	Anacardiaceae	Y	Y
กระดาด	*Alocasia indica* Schott	Araceae	Y	Y
หางไหลแดง	*Derris elliptica* Benth.	Araceae	Y	Y
มะกล่ำตาหนู	*Abrus precatorius* Linn.	Papilionaceae	Y	N

ชื่อ	ชื่อวิทยาศาสตร์	วงศ์	บริโภค	สัมผัส
หมามุ่ย	*Mucuna pruriens DC.*	Papillionaceae	Y	Y
หิงหายใบเล็ก	*Crotolaria albida* Heyne	Leguminosae	Y	N
หญ้าถอดปล้อง	*Equisetum debile* Roxb.	Equisetaceae	Y	N
ระย่อมน้อย	*Rauvolfia serpentina* (Linn.) Benth. Ex Kurz	Apocynaceae	Y	N
มะเขือเทศ	*Lycopersicon esculentum* Mill.	Solanaceae	Y	N
กูดเกี๊ยะ	*Pteridium aquilinium* Kuhn.	Dennstaediaceae	Y	Y
ถั่วราชมาด	*Phaseolus lanatus* Linn.	Papilionaceae	Y	N
อูน	*Sambucus nigra* Linn.	Caprifoliaceae	Y	N
ยางน่องต้น	*Antiaris toxicaria* Lesch.	Moraceae	Y	N
โคกกระสุน	*Tribulus terrestris* Linn.	Zygophyllaceae	Y	N
ถั่วเหลือง	*Glycine max* Merr.	Papilionaceae	Y	N
เทียนหยด	*Duranta erecta* Linn.	Verbenaceae	Y	N
เผือก	*Colocasia esculenta* (Linn.) Schott	Araceae	Y	N
ยางน่องเครือ	*Strophanthus scandens* Roem. & Schult.	Apocynaceae	Y	N
กระซับ	*Xanthium strumarium* Linn.	Compositae	Y	N
คูณ	*Cassia fistula* Linn.	Caesalpiniaceae	Y	N
ว่านหางจระเข้	*Aloe vera* (Linn.) Burm.F.	Liliaceae	Y	Y
ฝิ่นต้น	*Jatropha multifida* Linn.	Euphorbiaceae	Y	N
คริสต์มาส	*Euphobia pulcherrima* Willd.	Euphorbiaceae	N	Y
โพธิสัตว์	*Aleurites moluccana* Willd	Euphorbiaceae	Y	Y
มะเกลือ	*Diospyros mollis* Griff	Ebenaceae	Y	Y
โพธิ์ฝรั่ง	*Hura crepitans* Linn.	Euphorbiaceae	Y	Y
ละหุ่ง	*Ricinus communis* Linn.	Euphorbiaceae	Y	N
บอนสี	*Caladium bicolor* Vent.	Araceae	Y	Y
บุก	*Amorphophallus campanulatus* Bl. Ex Decne	Araceae	Y	Y
ส้มเช้า	*Euphorbia ligularia* Roxb.	Euphorbiaceae	Y	Y
อุตพิต	*Typhonium trilobatum* (Linn.) Schott	Araceae	Y	N
พญาไร้ใบ	*Euphorbia triucalli* Linn.	Euphorbiaceae	Y	Y
มะม่วงหิมพานต์	*Anacardium occidentale* Linn.	Anacardiaceae	Y	Y
สลัดได	*Euphorbia antiquorum* Linn.	Euphorbiaceae	Y	Y
ผกากรอง	*Lantana aculeata* Linn.	Verbenaceae	Y	Y

ชื่อ	ชื่อวิทยาศาสตร์	วงศ์	บริโภค	สัมผัส
โคคลาน	*Anamirta cocculus* (Linn.) Wight et Arnott	Menispermaceae	Y	Y
ตาตุ่มทะเล	*Excoecaria agallocha* Linn.	Euphorbiaceae	Y	Y
เลี่ยน	*Melia azedarach* Linn.	Meliaceae	Y	Y
แสยก	*Pedilanthus tithymaloides* (Linn.) Poit	Euphorbiaceae	N	Y
มะม่วง	*Mangifera indica* Linn.	Anacardiaceae	N	Y
ฮักไก่	*Rhus succedania* Linn.	Anacardiaceae	N	Y
ยางน่องเถา	*Strophanthus caudatus* (Burm.f.) Kurz	Apocynaceae	N	Y
บานทน	*Strophanthus gratus* Franch.	Apocynaceae	N	Y
กุ่มน้ำ	*Crateva magna* (Lour.) DC.	Capparaceae	N	Y
ตำแยแมว	*Acalypha indica Linn.*	Euphorbiaceae	N	Y
ตำแยช้าง	*Cnesmone javanica* BL.	Euphorbiaceae	N	Y
น้ำนมราชสีห์	*Euphorbia hirta* Linn.	Euphorbiaceae	N	Y
กำลังกระบือ	*Excoecaria cochinchinensis* Lour.	Euphorbiaceae	N	Y
ตังตาบอด	*Excoecaria bantamensis* Muell. Arg.	Euphorbiaceae	N	Y
โพบาย	*Sapium baccatum* Roxb.	Euphorbiaceae	N	Y
ข่อย	*Streblus asper* Lour.	Moraceae	N	Y
ทุเรียนผี	*Neesia altissima* (Bl.) Bl.	Bombacaceae	N	Y
ช้างแหก	*Neesia malayana* Bakh.	Bombacaceae	N	Y
เสม็ด	*Melaleuca cajuputi* Powell	Myrtaceae	N	Y
สถาน	*Jasminum grandiflorum* Linn.	Oleaceae	N	Y
ลูกชิด	*Arenga pinnata* (Wurmb.) Merr.	Palmaceae	N	Y
เต่าร้างแดง	*Caryota mitis* Lour.	Palmaceae	N	Y
หานช้างฮ้อง	*Dendrocnide basilotunda* Chew	Urticaceae	N	Y
กะลังตังช้าง	*Dendrocnide sinuata* Chew	Urticaceae	N	Y
สามแก้ว	*Dendrocnide stimulans* (Miq.) Chew	Urticaceae	N	Y
ขี้กาแดง	*Gymnopetalum integrifolium Kurz*	Cucurbitaceae	Y	N
หานสา	*Girardinia diversifolia* (Link.) Friis	Urticaceae	N	Y
ลังตังช้าง	*Laportea bulbifera* (Sieb. & Zucc.) Wedd.	Urticaceae	N	Y
หาน	*Laportea disepala* (Gagnep.) Chew	Urticaceae	N	Y
ตำแยตัวเมีย	*Laportea interrupta* Chew	Urticaceae	N	Y
จุ๊ยเซียน	*Narcissus tazetta* Linn.	Amaryllidaceae	Y	N

ชื่อ	ชื่อวิทยาศาสตร์	วงศ์	บริโภค	สัมผัส
น้อยหน่า	*Annona squamosa* Linn.	Annonaccae	Y	N
บานบุรีเหลือง	*Allamanda cathartica* Linn.	Annonaccae	Y	N
พังพวยผรั่ง	*Catharanthus roseus* G. Don	Annonaccae	Y	N
ตีนเป็ดทราย	*Cerbera manghas* Linn.	Annonaccae	Y	N
ตีนเป็ดทะเล	*Cebera Odoratum* Gaertn.	Annonaccae	Y	N
ลั่นทมแดง	*Plumeria rubra* Linn.	Annonaccae	Y	N
โหรา	*Homalomena aromatica* Schott	Araceae	Y	N
ไฟเดือนห้า	*Asclepias curassavica* Linn.	Asclepiadaceae	Y	N
ตะบา	*Hoya coronaria* Blume.	Asclepiadaceae	Y	N

Y = Yes

N = No

รายชื่อเห็ดพิษที่พบในประเทศไทย อาการพิษเกิดจากการรับประทาน

ชื่อ	ชื่อวิทยาศาสตร์	วงศ์
เห็ดกรวยแดง	*Cookeina tricholoma* (Mont.) Kuntze	Sarcoscyphaceae
เห็ดกรวยทองตากู	*Microporus xanthopus* (Fr.) Kuntze	Polyporaceae
เห็ดกระด้ง	*Inocybe napipes* Lange	Cortinariaceae
เห็ดกระด้าง	*Daedaleopsis confragosa* (Bolt. ex. Fr.) Schroet.	Polyporaceae
เห็ดกระด้างสีขาว	*Lenzites vespacea* (Pers.) Ryv.	Polyporaceae
เห็ดกระถินพิมาน	*Phellinus rimosus* (Berk.) Pilat	Phellinaceae
เห็ดกระสือ	*Filoboletus manipularis* (Berk.) Sing.	Tricholomataceae
เห็ดนิ้วดำ	*Xylaria polymorpha* (Pers.) Grev.	Xylariaceae
เห็ดกำมะหยี่แดง	*Pycnoporus coccineus* (Fr.) Bond. et Sing.	Polyporaceae
เห็ดเกร็ดดาว	*Amanita pantherina* (DC. ex Fr.) Secr.	Amanitaceae
เห็ดขอนแดง	*Pycnoporus sanguineus* (Fr.) Murr.	Polyporaceae
เห็ดขี้ควาย	*Psilocybe cubensis* (Earle) Sing.	Strophariaceae
เห็ดขี้วัว	*Copelandia cyanescens* (Berk.et Broome) Sing.	Coprinaceae
เห็ดไข่	*Amanita pilosella* Corner et Bas	Amanitaceae
เห็ดไข่เน่า	*Clarkeinda trachodes* (Berk.) Sing.	Agaricaceae
เห็ดไข่เปื่อย	*Amanita virosa* Secr.	Amanitaceae
เห็ดไข่หงส์	*Scleroderma citrinum* Pers.	Selerodermataceae
เห็ดคลิโตซัยเบ เซอรัสคาต้า	*Clitocybe cerussata* (Fr.) Kummer	Tricholomataceae
เห็ดคลิโตซัยเบ เดลบาต้า	*Clitocybe dealbata* (Sow. ex Fr.) Kummer	Tricholomataceae
เห็ดคลิโตซัยเบ ริวัลโลซา	*Clitocybe rivulosa* (Pers. ex Fr.) Kummer	Tricholomataceae
เห็ดชงโค	*Lepista nuda* (Bull. ex Fr.) Cooke	Tricholomataceae
เห็ดดันหมี	*Daldinia concentrica* (Bolt. ex Fr.) Ces et De Not.	Xylariaceae
เห็ดดาวหาง	*Geastrum stipitatus* Solms.	Lycoperdaceae
เห็ดแดงกุหลาบ	*Russula rosacea* Pers. ex. S.F. Gray	Russulaceae
เห็ดแดงน้ำหมาก	*Russula emetica* (Schaelf ex Fr.) Pers. Ex S.F. Gra	Russulaceae
เห็ดต้นหอม	*Lencocoprinus cepaestipes* (Sow ex Fr.) Pat.	Agaricaceae
เห็ดตะกร้อแดง	*Clathrus ruber* Pers. forma kusanoi Kobayashi	Phallaceae
เห็ดแตร	*Leutinus connatus* Berk.	Polyporaceae
เห็ดถ้วยชมพู	*Tarzetta rosea* (Rea) Dennis	Pyronemataceae
เห็ดเทียนแดง	*Phallus rugolosus* (Fisch.) Kuntze	Phallaceae
เห็ดนางเล็ด	*Lepiota phaeosticta* Morgan	Agaricaceae

ชื่อ	ชื่อวิทยาศาสตร์	วงศ์
เห็ดน้ำมูก	*Entonema splendens* (Berk. et Curt.) Lloyd	Xylariaceae
เห็ดน้ำหมึก	*Coprinus atramentarius* (Bull. ex Fr.) Fr.	Coprinaceae
เห็ดบลีทัส ลูริคัส	*Boletus luridus* Schff. ex Fr.	Boletaceae
เห็ดใบตองแห้ง	*Stereum lobatum* (Kunze) Fr.	Stereaceae
เห็ดประทัดจีน	*Hygrocybe firma* (Berk. et Broome) Sing.	Hygrophoraceae
เห็ดปะการังชมพู	*Scytinopogon echinosporus* Berk. Et Broome	Clavariaceae
เห็ดปะการังพิษ	*Clavaria formosa* Fr.	Clavariaceae
เห็ดเปลือกไม้	*Stereum fasciatum* (Schw.) Fr.	Stereaceae
เห็ดพุงหมูใหญ่	*Russula fortens* Fr.	Russulaceac
เห็ดยวงขนุน	*Leucocoprinus birnbaumii* (Corda) Sing.	Agaricaceae
เห็ดระโงกหิน	*Amanita verna* (Bull.ex Fr.) Vitt.	Amanitaceae
เห็ดรังมิ้ม	*Hexagonia apiaria* (Pers.) Fr.	Polyporaceae
เห็ดร่างแห	*Dictyophora indusiata* (Pers.) Fisch.	Phallaceae
เห็ดหอยเบี้ย	*Cryptoporus volvatus* (Peck) Shear	Polyporaceae
เห็ดหัวกรวดครีบเขียวอ่อน	*Chlorophyllum molybdites* (Meyer ex Fr.) Mass.	Agaricaceae
เห็ดหิ้งน้ำตาลอมเหลือง	*Paxillus panuiodes* Fr.	Paxillaceae
เห็ดหูปลาช่อน	*Polyporus picipes* Fr.	Polyporaceae
เห็ดอะแมนนิต้ามัสคาเรีย	*Amanita muscaria* (L. ex Fr.) Hocker	Amanitaceae
เห็ดอานม้าพิษ	*Gyromitra esculenta* (Pers.) Fr.	Helvellaceae

APPENDIX B

Manual of the application server

Manual of the application server

The application server is used to edit the information. The system security shows in the application server when the system is opened. Then the introduction appeared. The users click on "เริ่มเข้าสู่ระบบ" (Fig. B.1). After that the logon screen comes up (Fig. B. 2), the users type the username and password.

- Introduction screen appears and then click on "เริ่มเข้าสู่ระบบ".

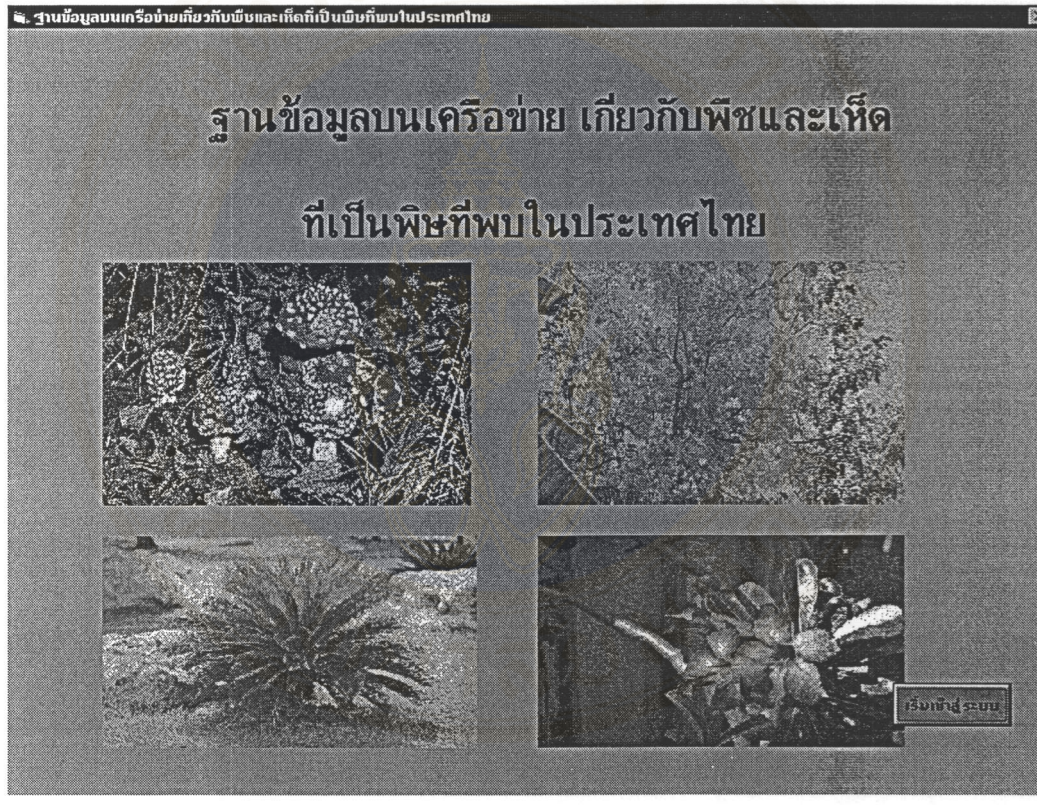

Figure B. 1 Introduction screen

- Logon screen appears, then type the username and password.

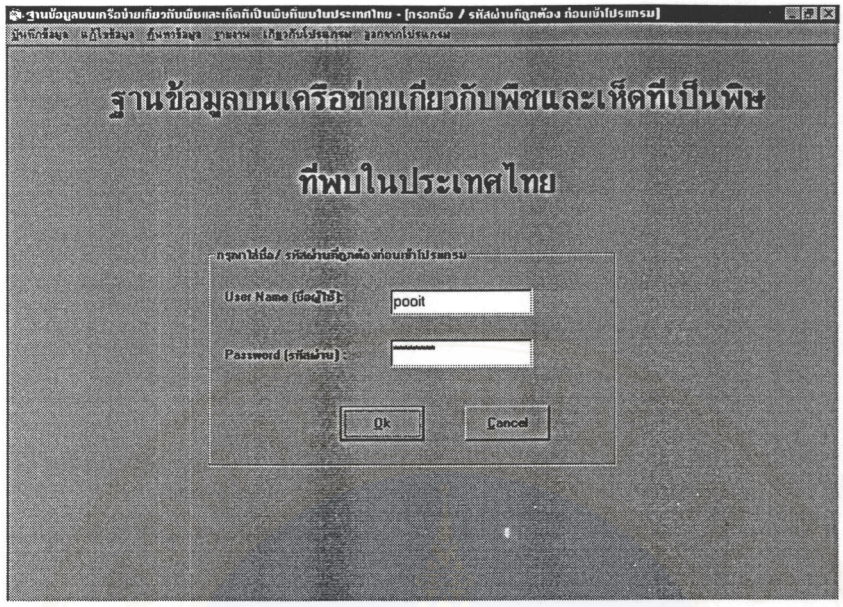

Figure B. 2 Logon screen

- When the username and password are correct, the message box is shown for "ยินดีต้อนรับเข้าสู่โปรแกรม" (Fig. B. 3). If the users click "OK" button, the MDI form appears (Fig. B. 4).

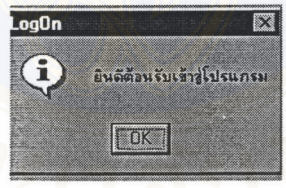

Figure B. 3 Message box screen

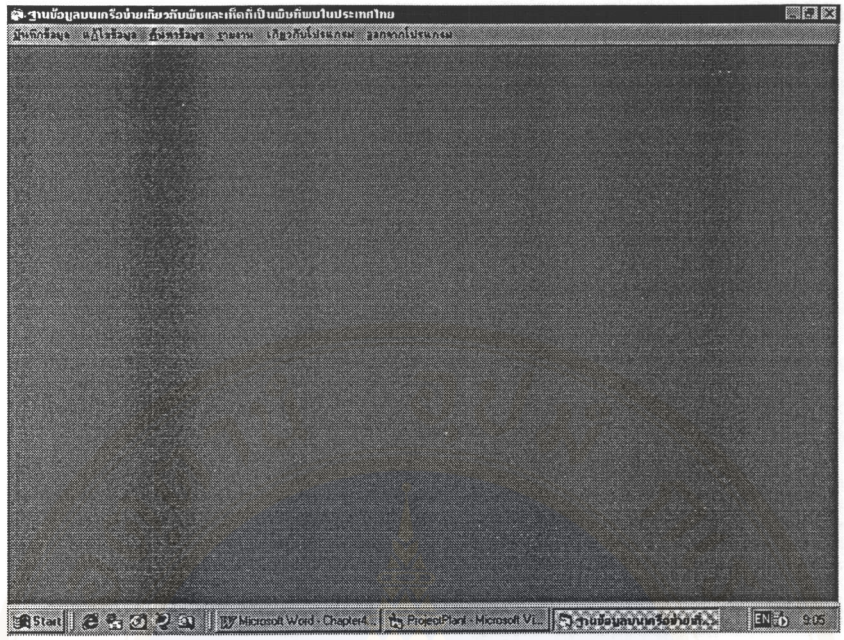

Figure B. 4 MDI screen

- Select the menu to insert the data in the science screen (Fig. B. 5)

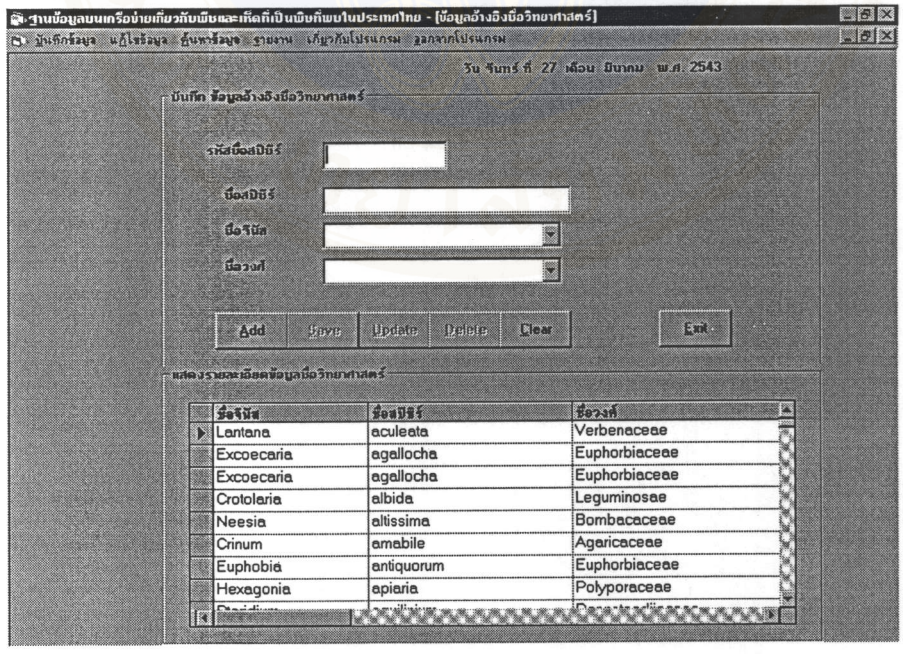

Figure B. 5 The science screen for insert the data

- Or select the menu to edit the data in the science screen (Fig. B. 6)

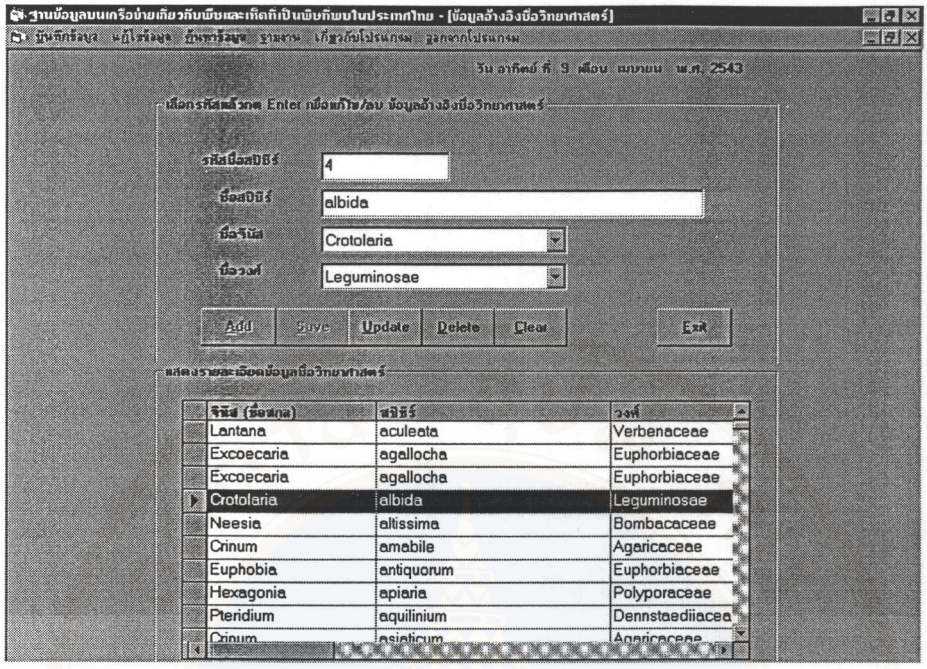

Figure B. 6 The science screen for edit the data

- Select the menu to search, when Thai plant/mushroom name option is clicked and one Thai plant/mushroom name is selected information screen appears as follows (Fig. B. 7-8)

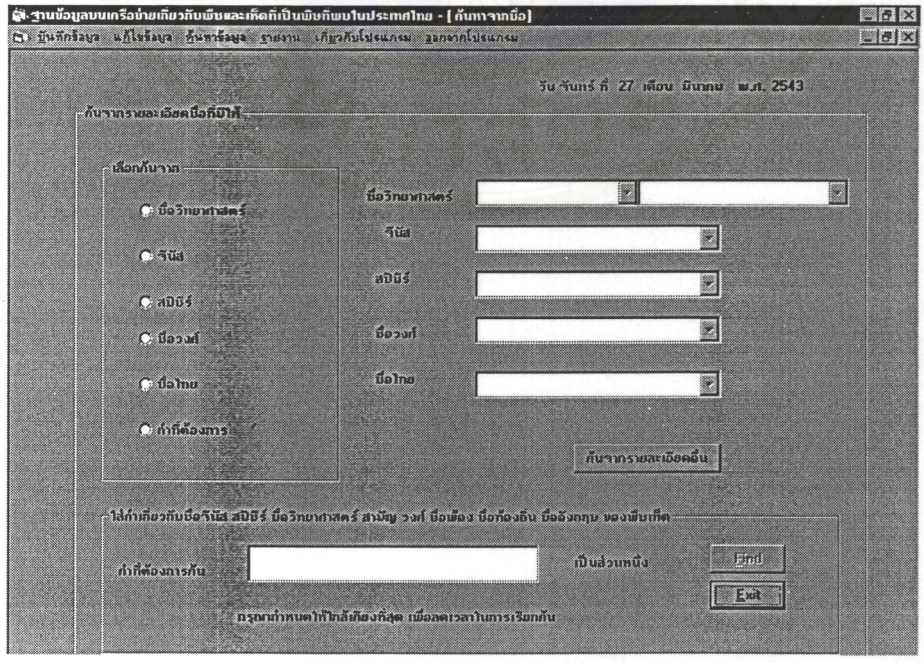

Figure B. 7 Search screen

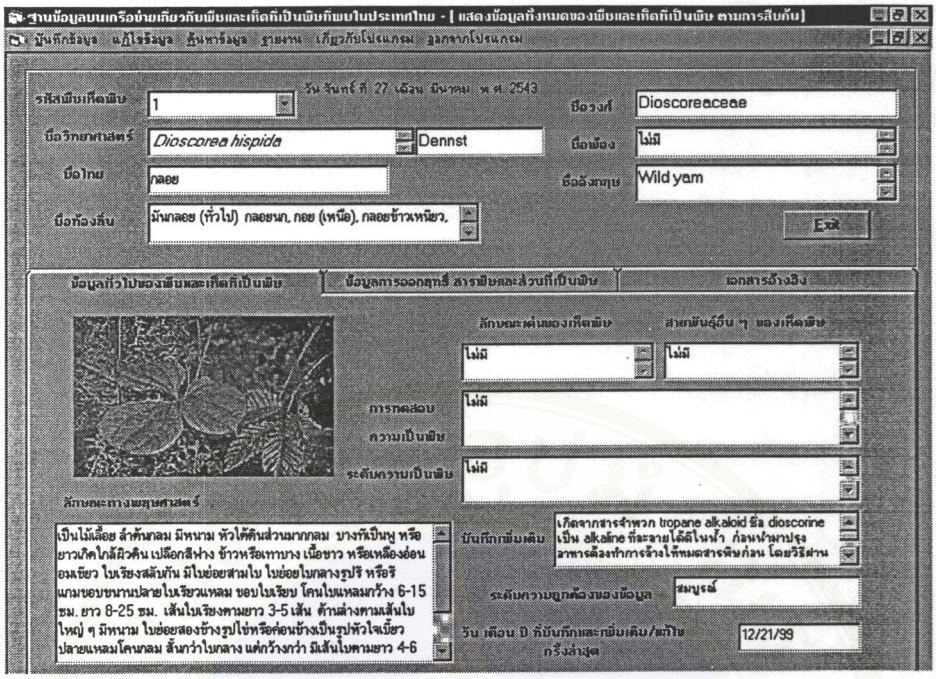

Figure B. 8 The information screen

- Select the menu from MDI screen to report screen (Fig. B.9)

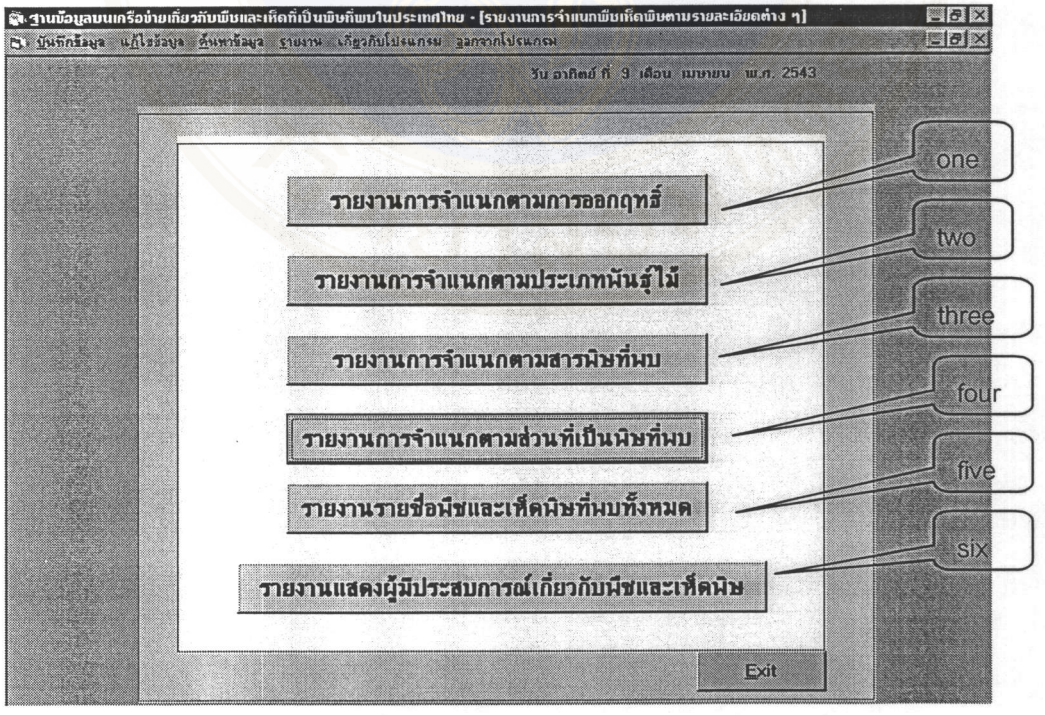

Figure B. 9 Report screen

- When the report screen comes up the button one is clicked (Fig. B.10).

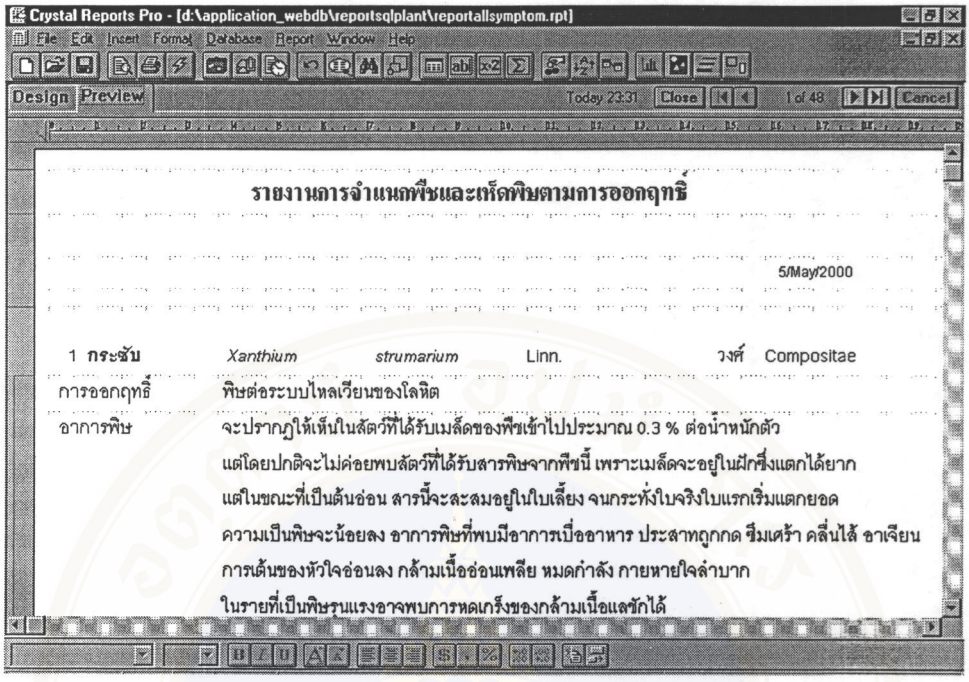

Figure B. 10 Plant/mushroom groupped by symptoms screen

- When the report screen comes up the button two is clicked (Fig. B.11).

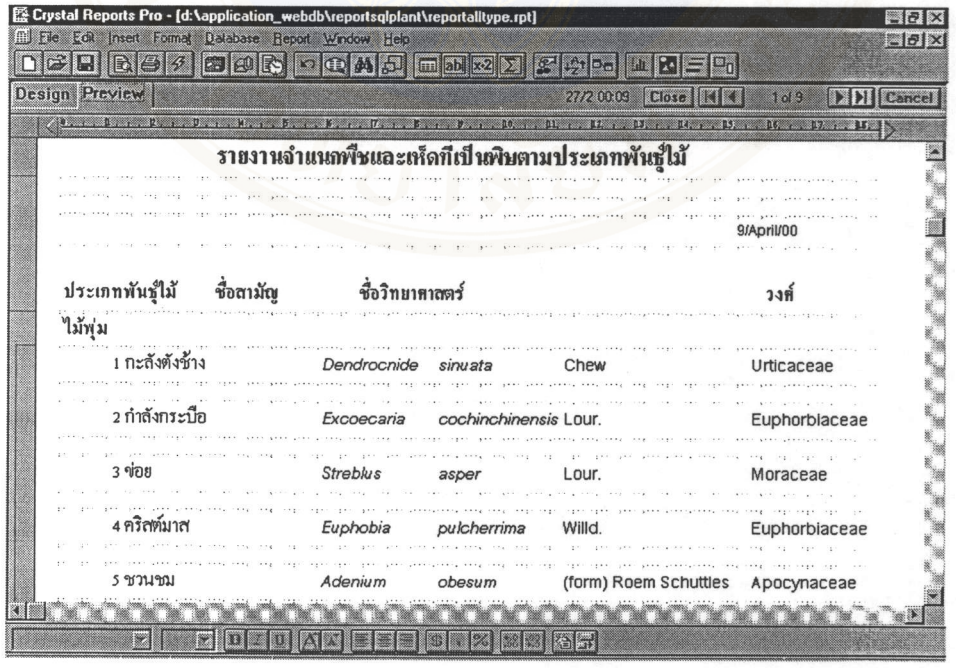

Figure B. 11 Plant/mushroom groupped by types screen

- When the report screen comes up the button three is clicked (Fig. B.12).

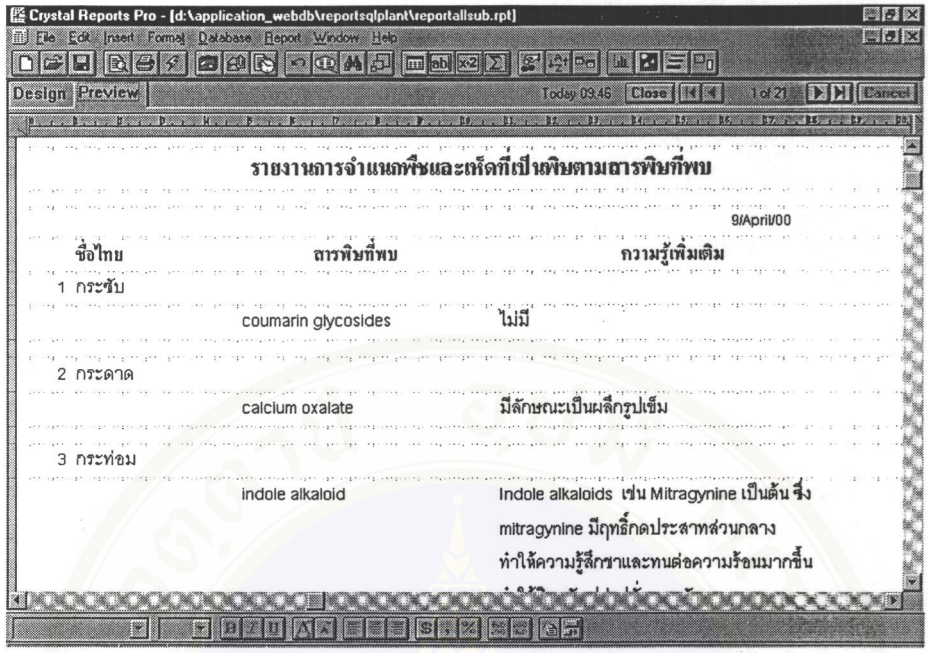

Figure B. 12 Plant/mushroom groupped by toxic substances screen

- When the report screen comes up the button four is clicked (Fig. B.13).

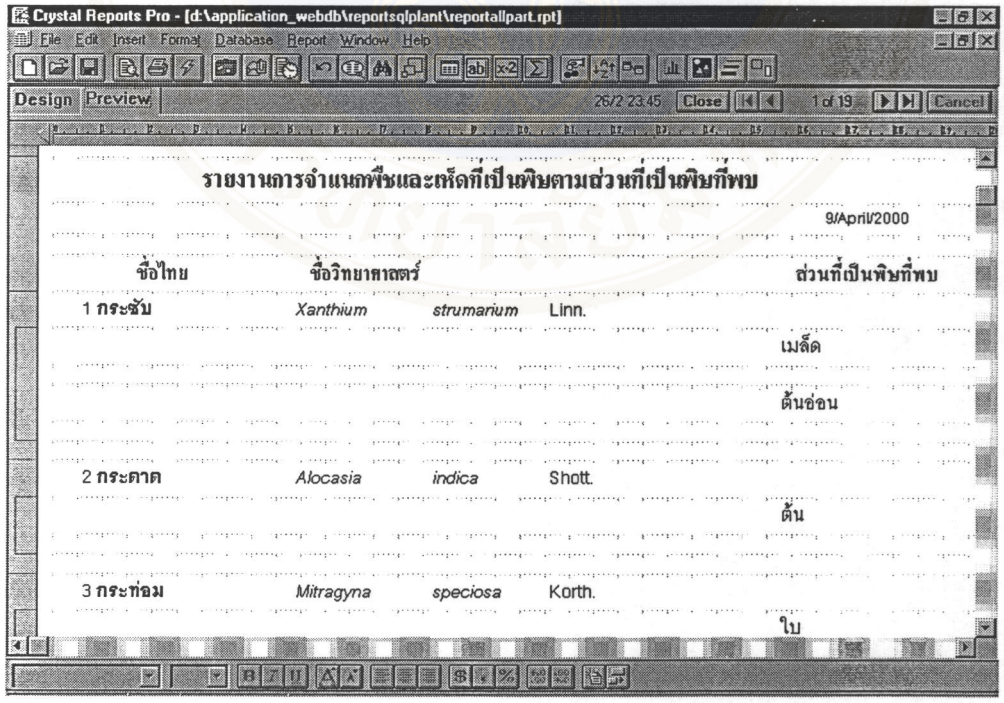

Figure B. 13 Plant/mushroom groupped by toxic plant parts screen

- When the report screen comes up the button five is clicked (Fig. B.14).

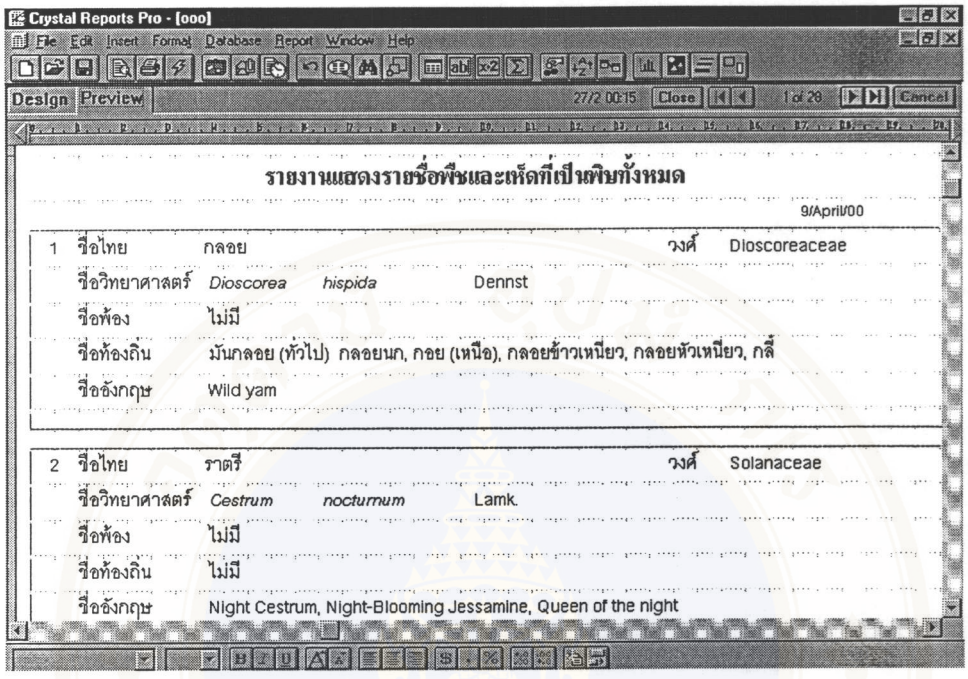

Figure B. 14 List of all plant/mushroom names in the database screen

- When the report screen comes up the button six is clicked (Fig. B.15).

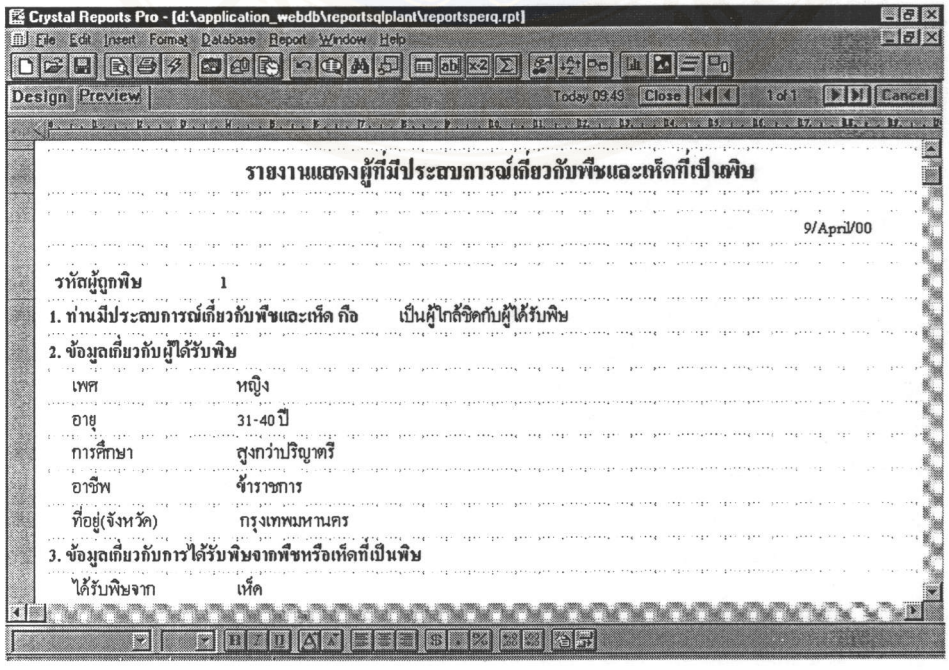

Figure B. 15 questionnaires answered by people or health personnel screen

APPENDIX C

Manual of the application for retrieval from browser

Manual of the application for retrieval from browser

1. The database is named "Plant" (Fig. C.1). Click the database at the folder lists to create the "New Database" in SQL Server Enterprise Manager screen, which uses Microsoft SQL Server 7.0, type "Plant", then the desired database comes up.

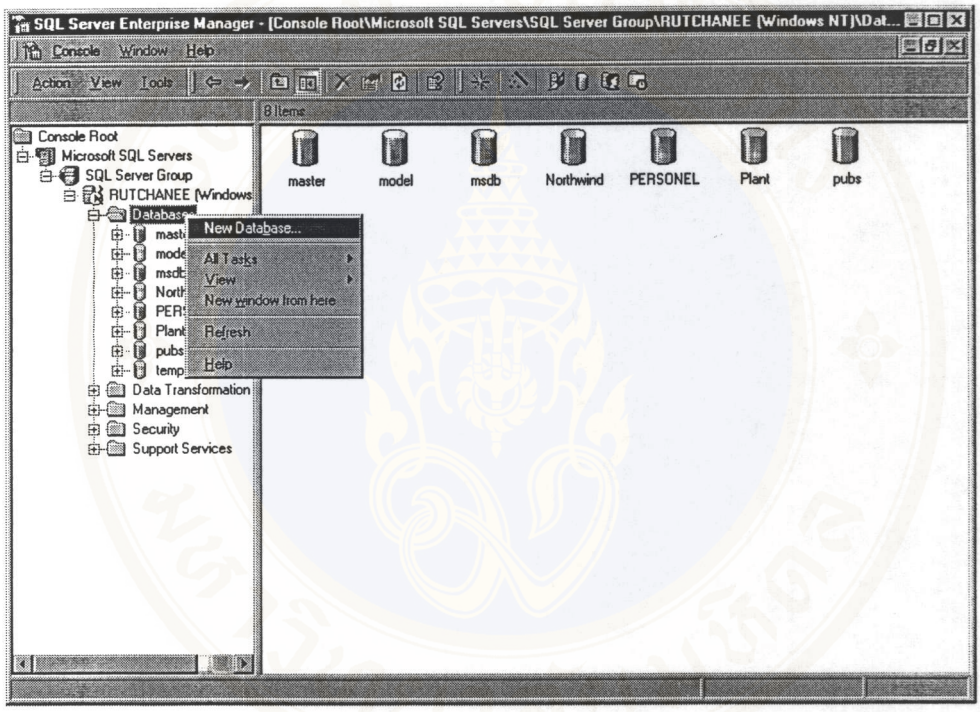

Figure C. 1 SQL Server Enterprise Manager screen

2. Create PlantWeb as folder at the subdirectory "Inetpub\wwwroot".
3. Copy all files from the folder PlantWeb from Drive A to PlantWeb folder under the subdirectory "Inetpub\wwwroot".
4. Create new ODBC by double clicks at "ODBC Data Sources (32 bit)" icons in Control Panel that showing in figure (Fig. C. 2).

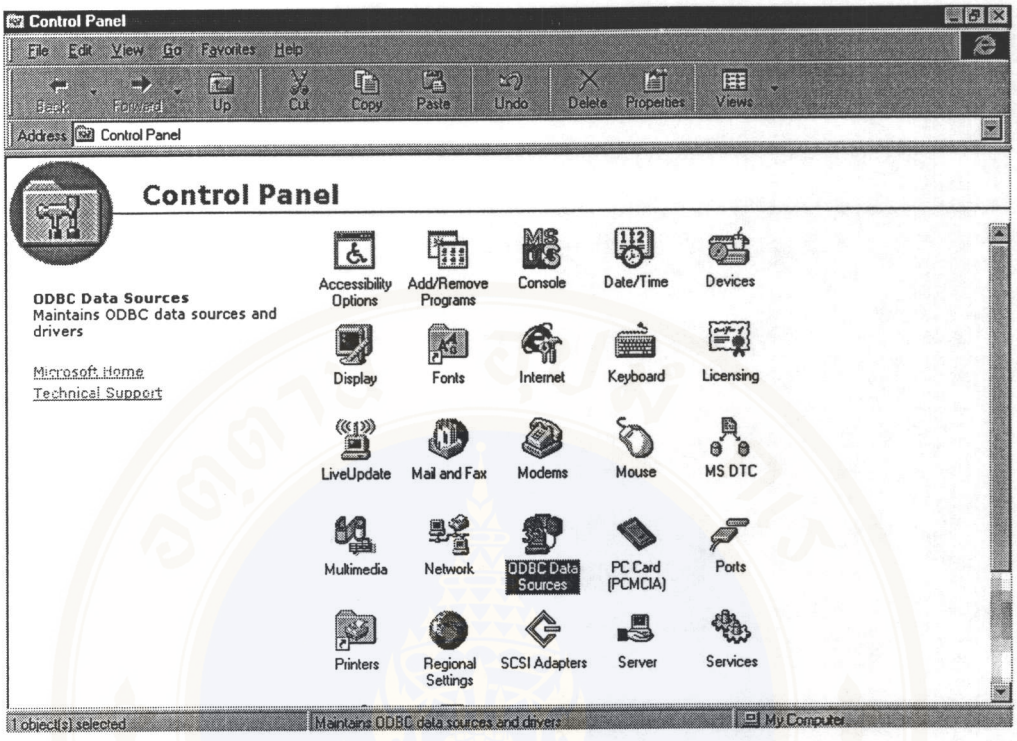

Figure C. 2 Control Panel screen

5. System DSN tab is selected and clicked on Add button showing in Fig. C. 3.

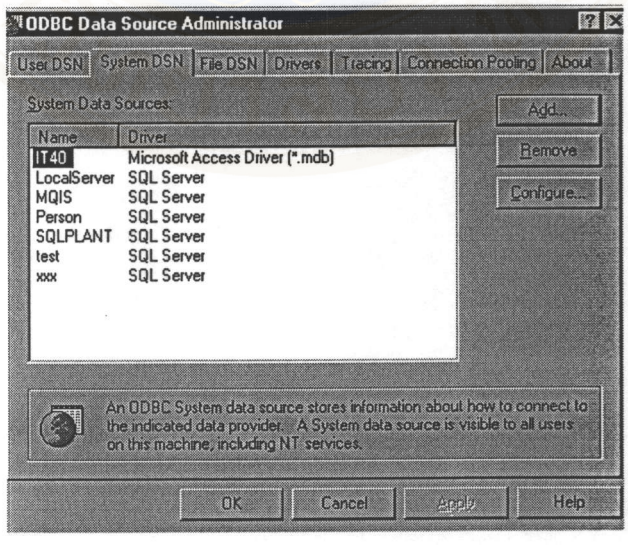

Figure C. 3 ODBC Data Source Administrator screen

6. SQL Server is selected and clicked on Finish button showing in Fig. C. 4.

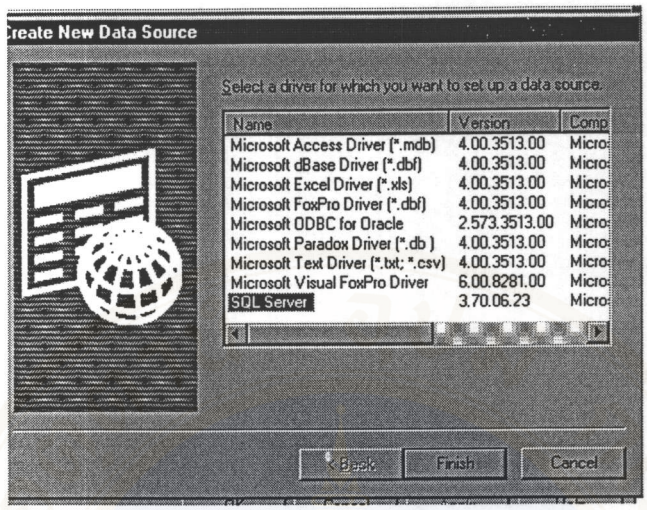

Figure C. 4 Create New Data Source screen

7. Fill "SQLPLANT" in Name box of the data source, then SQL Server is selected and clicked Next button showing in Fig. C. 5.

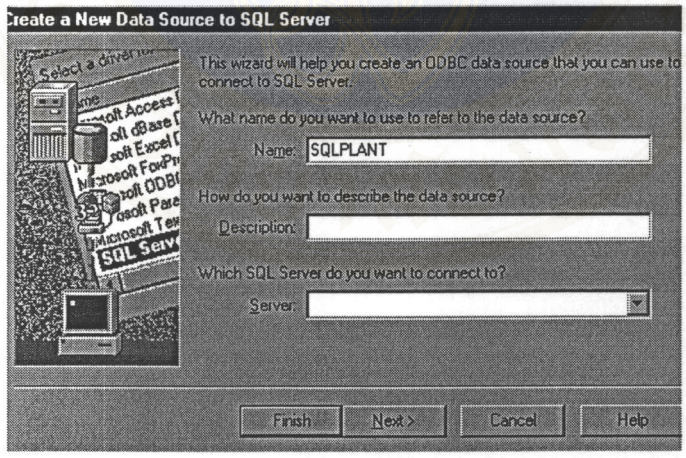

Figure C. 5 Create a New Data Source to SQL Server screen

8. "With Windows NT authentication using the network login ID" option is selected (Fig. C. 6).

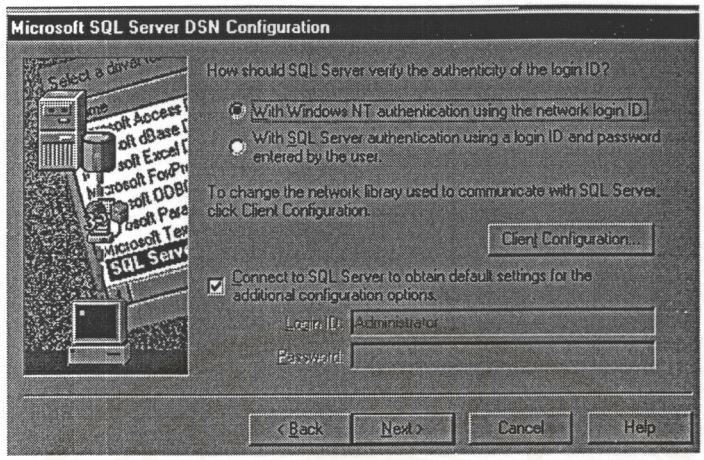

Figure C. 6 Microsoft SQL Server DSN Configuration

9. "Change the language of SQL Server system messages to" option is selected (Fig. C. 7). Finish button is clicked and then a new ODBC data source has been created.

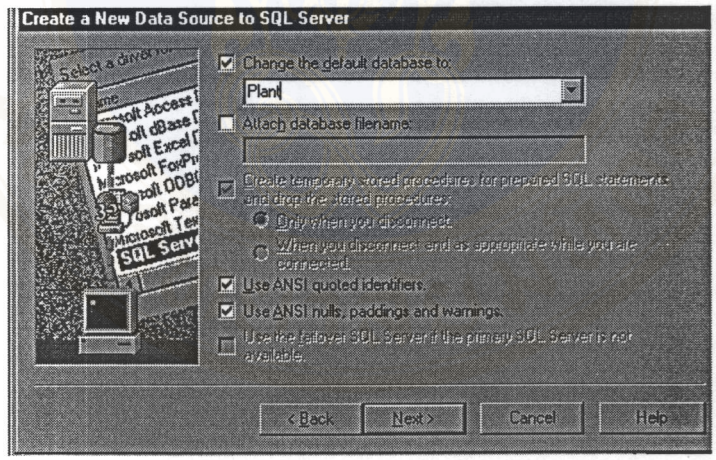

Figure C. 7 Create a New Data Source to SQL Server screen

The access steps to the application for retrieval from browser is showing in Fig. C. 8 – 15.

1. Open your web browser.
2. Typing URL "http://" + server name + "/PlantWeb/default.asp" or "http://localohost/PlantWeb/default.asp" in location window showing in Fig. C.8

Figure C. 8 Introduction page

Hyperlink "ค้นหา" is selected and clicked search screen comes up (Fig. C. 9).

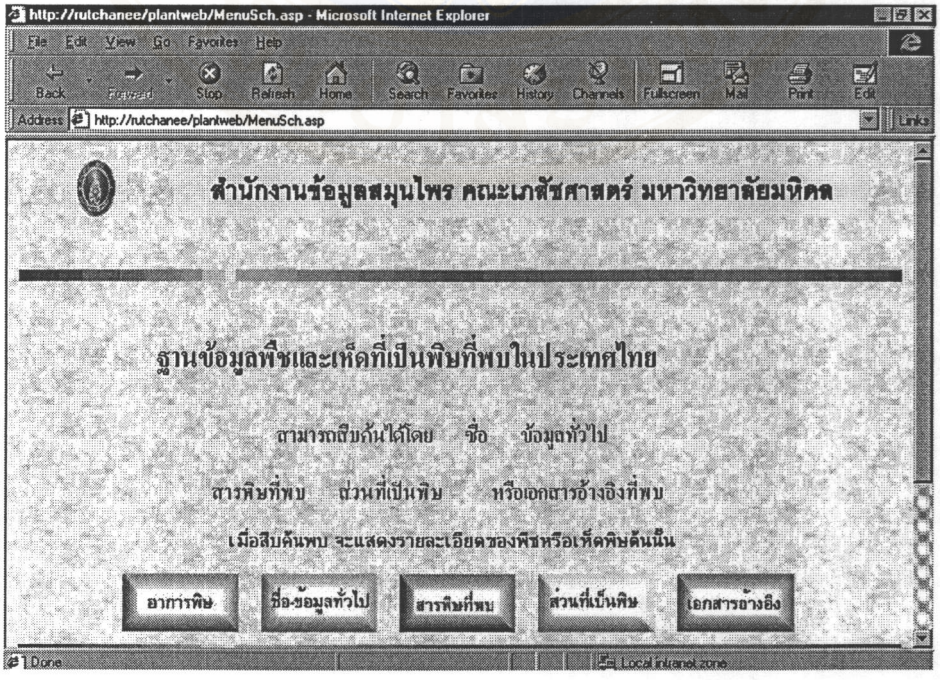

Figure C. 9 Menu search page

- When "สารพิษที่พบ" button is selected and clicked, Fig. C. 10 appears. Each toxic substance is selected and "ค้น" is clicked, the information comes up (Fig. C. 11).

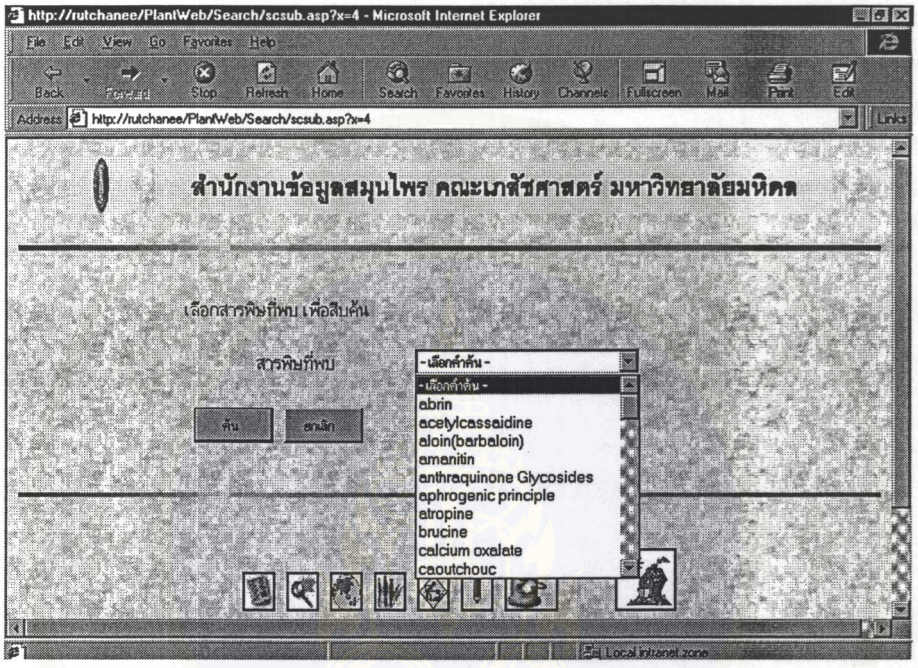

Figure C. 10 Search page of toxic substances

The information includes scientific name, Thai name and image.

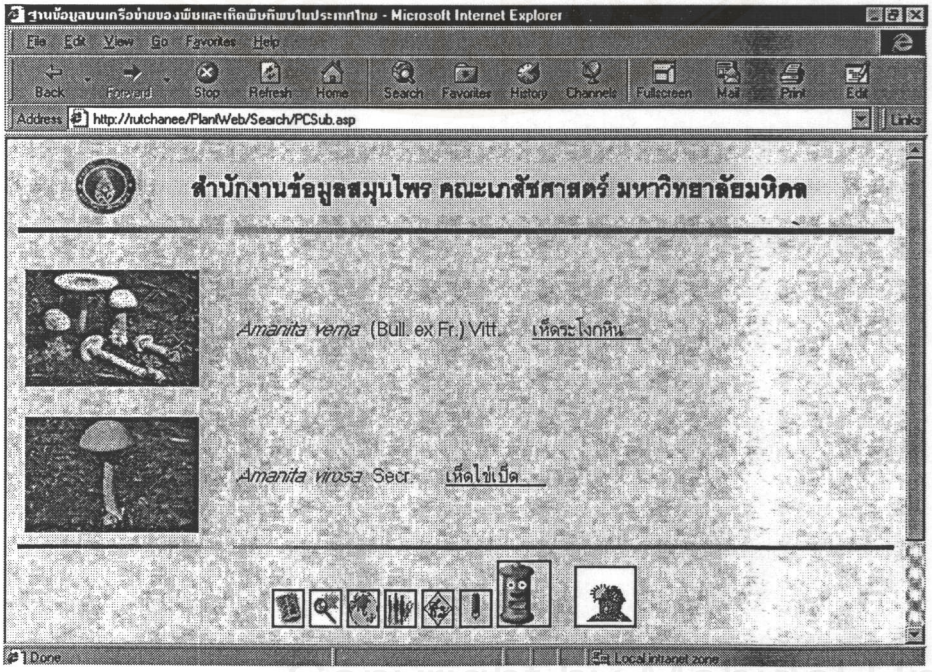

Figure C. 11 Display plant/mushroom names page

If the users click at Thai name ("เห็ดระโงกหิน", Fig. C. 11) then all information of poisonous plants or poisonous mushrooms appear (Fig. C. 12-15). The information include Thai name, English name, local name, synonym, genus, species, family, descriptions, characteristic of mushroom, toxicity, toxic substances, plant parts, symptoms, treatments and references (Fig. C. 12-15).

Figure C. 12 Display the information of plant/mushroom page

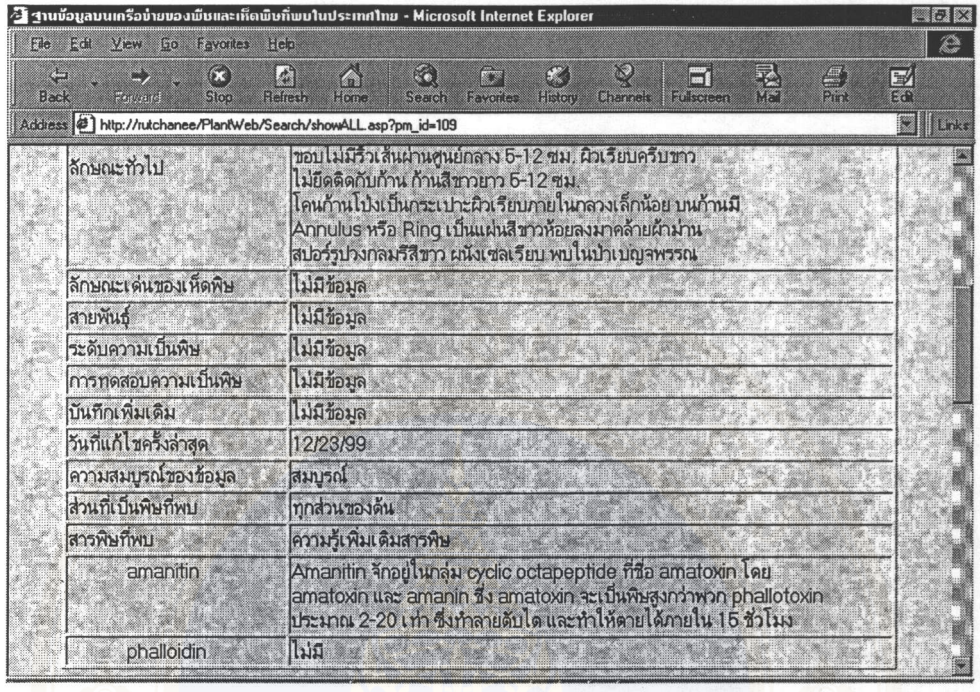

Figure C. 13 Display the information of plant/mushroom page (continued)

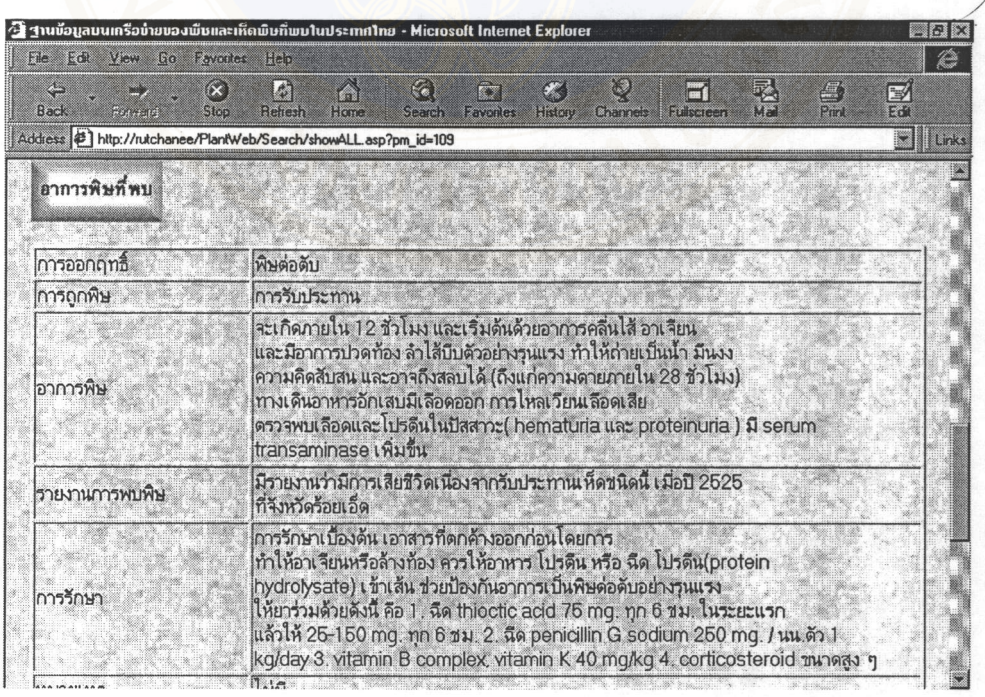

Figure C. 14 Display the information of plant/mushroom page (continued)

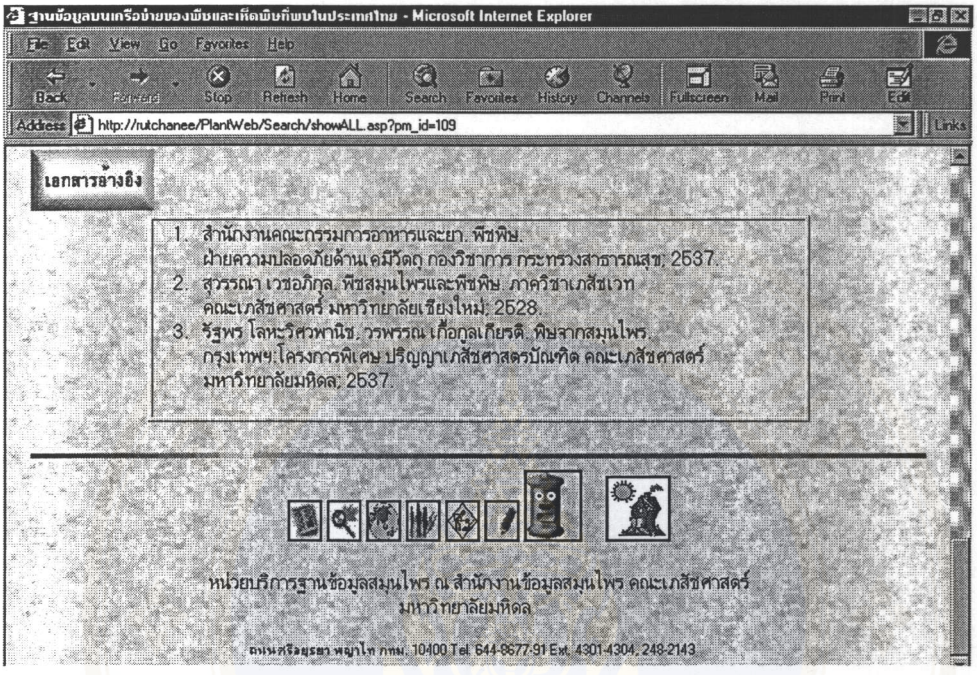

Figure C. 15 Display the information of plant/mushroom page (continued)

APPENDIX D

Questionnaires

แบบสอบถามความคิดเห็น
สำหรับผู้ใช้โปรแกรม

คำชี้แจงก่อนการตอบแบบสอบถาม

แบบสอบถามความคิดเห็นสำหรับโปรแกรมฐานข้อมูลบนเครือข่าย เกี่ยวกับพืชและเห็ดที่เป็นพิษที่พบในประเทศไทย เป็นส่วนหนึ่งของการทำวิทยานิพนธ์ในระดับปริญญาโท หลักสูตรเทคโนโลยีการจัดการระบบสารสนเทศ มหาวิทยาลัยมหิดล

ตอนที่ 1: ข้อมูลส่วนตัวของผู้ตอบแบบสอบถาม

1.1. เพศ [ ] ชาย [ ] หญิง

1.2 อายุ ..... ปี

1.3 อาชีพ .....

ตอนที่ 2: ความคิดเห็นในการใช้งานโปรแกรม

2.1 ความคิดเห็นในด้านรายละเอียดของพืชและเห็ดพิษที่พบในประเทศไทย

1. รายละเอียดเกี่ยวกับชื่อพืชและเห็ดพิษที่พบ

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

2. รายละเอียดเกี่ยวกับข้อมูลทั่วไปของพืชและเห็ดเช่น ลักษณะต้น แหล่งที่พบ สารพิษ ส่วนที่เป็นพิษ ลักษณะสปอร์ เป็นต้น

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

3. รายละเอียดเกี่ยวกับการออกฤทธิ์ อาการพิษ ของพืชและเห็ดพิษ

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

4. รายละเอียดเกี่ยวกับการรักษาอาการที่เกิดจากการได้รับพิษ ของพืชและเห็ดพิษ

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

2.2 ความคิดเห็นเกี่ยวกับหน้าจอการใช้งาน

1. ความเหมาะสมของรูปแบบหน้าจอในการนำเสนอ

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

2. ความเหมาะสมของสีพื้นบนหน้าจอที่ใช้

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

3. ความเหมาะสมของสีตัวอักษรที่ใช้

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

4. ความเหมาะสมของขนาดของตัวอักษรที่ใช้

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

5. ความเหมาะสมของภาพประกอบที่ใช้ ในการนำเสนอ

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

6. ความเหมาะสมของเมนูการใช้งาน ในการนำเสนอ

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

2.3 ความคิดเห็นเกี่ยวกับการสืบค้น

1. ความเหมาะสมของวิธีการสืบค้นโดยการเลือกค้น ของพืชและเห็ดพิษ

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

2. ความเหมาะสมของวิธีการค้นโดยการใส่คำที่ต้องการค้นของพืชและเห็ดพิษ

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

3. ท่านคิดว่าการสืบค้นเนื้อหา โดยการเลือกค้น ในโปรแกรมชุดนี้สามารถสืบค้นได้รวดเร็วเหมาะสมในระดับไหน

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

4. ท่านคิดว่าการสืบค้นเนื้อหา โดยการใส่คำที่ต้องการค้น ในโปรแกรมชุดนี้สามารถสืบค้นได้รวดเร็วเหมาะสมในระดับไหน

[ ] ดีมาก [ ] ดี [ ] พอใช้ [ ] ควรปรับปรุง

ความคิดเห็นเพิ่มเติมในส่วนที่ต้องการให้ปรับปรุง.....

.....

.....

.....

BIOGRAPHY

NAME MISS RUTCHANEE CHANTRAKET

DATE OF BIRTH 6 March 1968

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INSTITUTIONS ATTENDED

Mahidol University, 1987-1991
Bachelor of Nursing Science, 1997-2000:
Master of Science (Technology of Information System Management), Mahidol University, Thailand.

POSITION HELD & OFFICE

1991-1995 Nurse, Siriraj Hospital, Faculty of Medicine at Siriraj, Mahidol University, Thailand.

1995-present Researcher, Medicinal Plant information center, Faculty of Pharmacy, Mahidol University, Thailand.