IDENTIFICATION AND DIAGNOSIS EXPERT SYSTEM DESIGN FOR OIL PLANT DISEASE USING FORWARD CHAINING

Iskandar*[1], Adyanata Lubis[2], Elyandri Prasiwinigrum[3], Sabda Maulana[4]

University of Pembangunan Panca Budi[1]
STKIP Rokania [2,3,4]
E-mail: iskandargayo@gmail.com[1], adyanata@gmail.com[2], eprasiwiningrum@gmail.com[3], sabdamaulana766@gmail.com[4]

Abstract: This research was conducted to create an expert system expert system that can identify and diagnose major diseases of oil palm trees with chaining forward method. The system is designed to analyze a disease that can strike at the nursery stage, the plants in the field, both at the stage of immature plantations (TBM) and crop yield (TM). The result of this research is a learning system to provide knowledge regarding the disease of oil crops by utilizing a computer.

Keywords: Forward Channing, Diagnosis, Disease, Expert System

1. Introduction

Computer based information system has become a primary thing for the fulfillment of the needs of the business community informasi.Mulai up with academics / education utilizing the computer as a tool to facilitate the work.

The development of science and technology (science and technology) lead many people to seek alternative solutions to problems in the field of information systems technology.[1] The use of computers as a tool for the completion of work in the field of information technology systems increasingly prevalent and growing in all areas. Computer is considered to have many advantages, why a computer can be programmed so that it can be adapted to the wishes of the user (users) it.

An expert system is one branch of artificial intelligence to learn how to "adopt" an expert way of thinking and reasoning in solving a problem, and make decisions and draw conclusions from a number of facts.[2] In this the author got the idea to devise an expert system that can identify and diagnose major diseases of oil palm. Where the disease can strike at seedling stage, the plants in the field, both at the stage of immature plantations (TBM) and crop yield (TM)[3].

Because the expert system is a computer system that is capable of mimicking the reasoning an expert with expertise in a domain or region tetentu knowledge. So the important role of an expert may be replaced by a computer program which in principle works program seeks to provide a solution such as that carried out by the experts, it is necessary the creation of a "IDENTIFICATION AND DIAGNOSTIC SYSTEM DESIGN EXPERT FOR DISEASE PLANT OIL USING FORWARD CHAINING" and provided supplies knowledge and learning-related diseases in the palm trees by utilizing the computer as a learning medium.

1.2 Problem Formulation

Based on the above it can be concluded that there are some problems that exist in this thesis research [4], namely:

a. How to design an expert system for identifying plant disease control along with suggestions on plant oil palm.
b. How the program can provide information that is accurate and up to date on plant diseases palm.

1.3 Limitations

Problems caused a disease is wide and varied because there are many factors that influence the outside and in, that the discussion in this paper is more focused then carried to such restrictions as mentioned below:

a. Disease diagnosed is a major disease of oil palm trees is a disease that often attacks the plant oil palm in Indonesia.

b. The system does not determine pests of oil palm plantations.
c. Plant diseases especially biotic diseases or parasites.
d. Control engineering plants (cultivation) and chemically.
e. This expert system will only diagnose physical symptoms that appear on oil palm plantations.
f. Using the rules of production ie if-then rules (if-then) for the representation of knowledge.
g. Expert system inference method used is the method of forward chaining.

1.4 Research Objectives

The author's purpose in detail can be described as follows are doing is

a. To facilitate the authors in the
b. formulation of the problem
b. Moving kepengetahuan someone into a program
c. Providing solutions to farmers and land managers about the disease that is likely to occur

1.5 Benefits Research

Benefit from expert system making identification and diagnosis of diseases of oil crops are:

a. Makes it easy for the user to diagnose the disease based on symptoms of oil palm trees that looked
b. The system will provide means of controlling the disease, both in engineering and chemistry, especially for plantation workers and did not rule out this expert system used by the extension-extension agent who is not in the field of plant diseases that can replace the role of an expert on plant diseases, especially diseases of oil palm.
c. Speeding up the process of healing the disease so that the disease has not spread, yields satisfactory.
d. Public order can anticipate and healing when disease against diseases that occur with fertilizers and using expert system identification and diagnosis of plant diseases palm.

1.6 Research Methods

In preparing this study the authors with research in data collection are as follows:

a. Interview Method

In this case I have to each other and exchange ideas to other farmers or also the question and answer to the land managers to provide information or data that is accurate.

b. Observation

This observation is done is done directly from the field to get the data more exact and highly accurate. The study also made directly to the manager of the garden and see first hand how the land managers who undertake vaccine plant.

c. Studies Kepustakan

Type of this research is done by collecting data that has to do with this theoretical thesis is partly drawn from Internet browsing and materials kulian learned in lectures related to researchers

2. Review of Literature

In this chapter will discuss the basic theory related to the title of this thesis is Design Expert System Identification And Oil Plant Disease Diagnosis Method Using Forward chaining.[5] Matters to be discussed include the basic theory of artificial intelligence, theory of expert systems, knowledge representation, and many other theories

2.1 Artificial Intelligence

Artificial Intelligence Artificial intelligence is one part of computer science that make the machine (computer) can do the job and is as good as done by humans. Intelligence or the intelligence is a man who knows implement their knowledge.

The main part is the application of artificial intelligence knowledge (knowledge), an understanding of some of the subject areas gained through education and experience. Although computers are unlikely to get pengalamn they need it through the efforts exerted by the human experts. (Sri Kusumadewi, Artificial Intelligence / Techniques and Applications).

2.2 Expert System (Expert System)

Expert systems (expert systems) is: trying to adopt a system of human knowledge to the computer so that the computer can resolve the issue as was done by experts. (Sri Kusumadewi, Artificial Intelligence / Techniques and Applications)[6].

2.3 Benefits expert system

Below is described some of the benefits of expert systems include,

a. Reliable, expert systems have never been sick, bored or tired. Expert systems also consistently viewed in detail and will not pass the relevant information and potential solutions.[7]
b. Increase output and productivity, because the expert system can work faster than humans.

c. Flexible.

d. Negating tool expensive.

e. Ability to work with incomplete information or uncertain different from conventional computer systems, expert systems can work with incomplete information. Users can respond with "do not know" or "not sure".

f. Kepengetahuan easy access.

2.4 System chaining Forward (Forward Chaining Systems)

A multiplication inference that connects a problem with a solution called the chain (chain). The inference engine computer program that provides a methodology for reasoning about the information in the knowledge base and in the workplace, and formulate conclusions nutuk (Turban, 1995).[8]

2.5 Microsoft Visual Basic 2008

Visual Basic is also one of the development tools to build applications in a Windows environment. Visual Basic uses a visual approach to designing the user interface in form, while for lodingnya using Basic language that is easy to study. In Visual programming, application development begins with the formation of the user interface, and then set the properties of objects that are used in the user interface, and do writing new code to handle events. Thus the application development stage known as application development with Bottom Up approach[9].

2.6 Microsoft Access

Microsoft Access (or Microsoft Office Access) is a computer program a relational database application that is intended for home and small to medium-sized companies. This application is a member of several Microsoft Office applications, in addition to Microsoft Word, Microsoft Excel, and Microsoft PowerPoint. This application uses the database engine Microsoft Jet Database Engine, and also using an intuitive graphical display that allows users. The current version is Microsoft Office Access 2007 that is included in Microsoft Office System 2007.[10]

3. Analysis and Design

Analysis is an early stage should be done to solve the problem at hand. This stage is very important because the process will lead to an accurate analysis of the development of software satisfy users.

3.1 Analysis of Needs Feedback

Needs input (input) in the application of expert system are as follows:

1. Patient Data consist of:

a. Names, each inputting patient data must first be undertaken is the name of the patient where the charging data. Useful to facilitate the passage of these systems and the introduction of identity.

b. Age, in this expert system application is not limited to terms of age. But age is required in order to know its use to facilitate the introduction of the patient.

c. Gender, presence in the need to facilitate the introduction of the patient.

d. Address, is needed so that any required time can immediately know where the origin of the existence of living.

e. Employment, as necessary to facilitate the introduction.

3.1.1 Requirements Analysis

Needs output (output) in the application of this expert system is the result of the analysis of the answers to the questions that have been in charge and observations in the field. The output from the analysis is the percentage value of symptoms and diseases of plants and solutions for oil crops.

3.1.2 Process Requirements Analysis

Needs in the process of disease identification oil has applications expert system as follows:

1. The rule-making process, in which each character can be seen in daily productivity of the plant. Allows the author to create a groove (rule) make it easier to run applications made by the author.

2. The process of testing a rule, the symptoms of which have been obtained by the author, it is easier to identify disease oil. Thus the authors obtained the results of the analysis of the test.

From the analysis of this process will help run the system for identifying the disease in the palm.

3.2 System Design

In the knowledge gained by the author will be the data that is needed expert system.[11] To the authors require techniques supporters even need writers in the results.

2. Data Symptoms, needed to know the origin, and cope efficiently determine what should be done.

3.2.1 Knowledge Base Design Rule

Knowledge Base Rule is a rule-based knowledge representation techniques or rule this method is used because it is more easily understood by the knowledge engineer compared with other knowledge representation techniques. Data from the symptoms of any disease then the following representation of the knowledge base of knowledge-based rules (rules) expert system.[12]

NO	SYMPTOMS	DISEASE / PEST
1	D1 decline in production D2 Loss of leaves (defoliation) at a certain point	Z1 Fire and caterpillar caterpillar pests Pockets
2	D3 form of attrition, the holes in the base of the frond. D4 sheaths are broken. D5 rats eat the fruit (pulp) D6 Plants die	Z2 Hama Rat
3	D7 presence of termites hallway made of soil. D8 Visible dashed leaves wither and dry. D9 sheaths at the bottom are left with a pale yellow color or dried	Z3 pests Termites
4	D10 presence of tears leaves at the edge of the leaf blade.	Z4 Beetle pest Adoretus and Apogonia
5	D11 demolition occurred in the soil around the plant and the pressing point in the growth of new plants.	Z5 Hama Boar
6	D12 Attacks leaf diseases that occur on newly planted crops.	Z6 Pests Mushrooms Antraknosa and Curvularia.
7	D13 There decaying fruit bunches	Z7 Rot Hama Bunches (Marasmius)
8	D14 Death at the growing point of the decay.	Z8 Foul Hama Pucuk

From the table above facts, the rule that can be taken are:

Rule 1: If symptoms of decline in production output and symptoms of leaf loss (defoliation) at certain points Then Diseases and Pests Caterpillars Caterpillars Fire Sleeve

Rule 2: If symptoms such as attrition, the holes in the base of the frond And symptoms midrib broke And the symptoms of rats eat the fruit (pulp)
And the symptoms of dead plants
Then Hama mice

Rule 3: If symptoms of a hallway termite earthen And visible symptoms faded leaves wither and dry And symptoms midrib bottom only left with a pale yellow color or dried And the symptoms of dead plants Then Diseases Pests Termites

Rule 4: If symptoms existence of tears leaves at the edge of the leaves Then Hama Beetles Adorentus and Apongonia

Rule 5: If the symptoms occur in the soil around the plant dismantling and suppress the growing point at the new plant Then Diseases Pests wild boar

Rule 6: If symptoms of leaf diseases that occur in the new crop planting Antracnosa Then Hama Mushrooms and Curvularia

Rule 7: If symptoms occur decaying fruit bunches Then Hama bunch rot (Marasmius)

Rule 8: If symptoms of death at the growing point of the decomposing And symptoms of boron deficiency (lack of boron)

Then Hama Foul Pucuk
From the collection of the above it didapatlah groove rule of inference as below Oil diseases

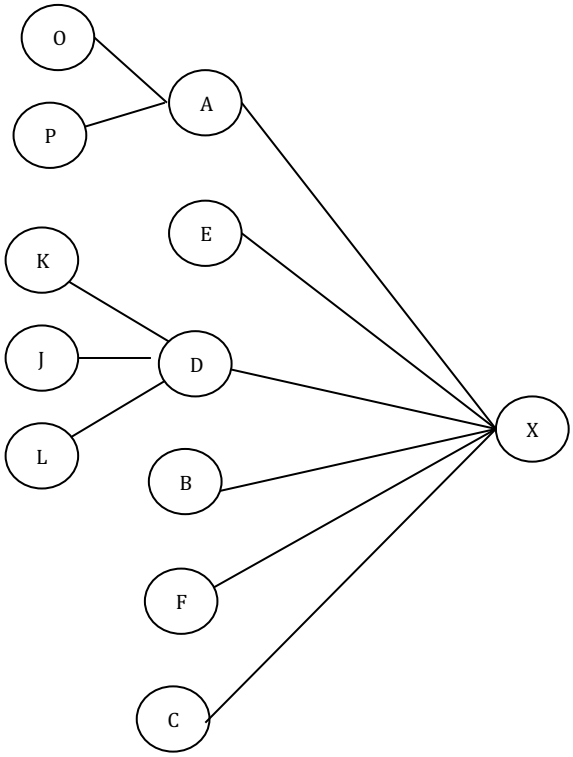

Figure 1. Structure Inference

3.1 Figure Flow Inference Oil Disease Diagnosis

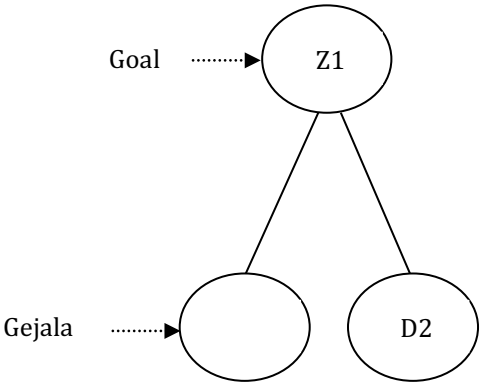

Figure 1.2 Flow Inference (a)

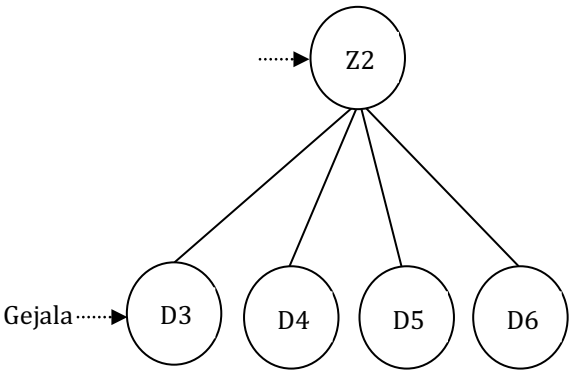

Figure 1.2 Flow Inference (b)

3.2.3 Design Flowchart

The flowchart of the program are as follows:

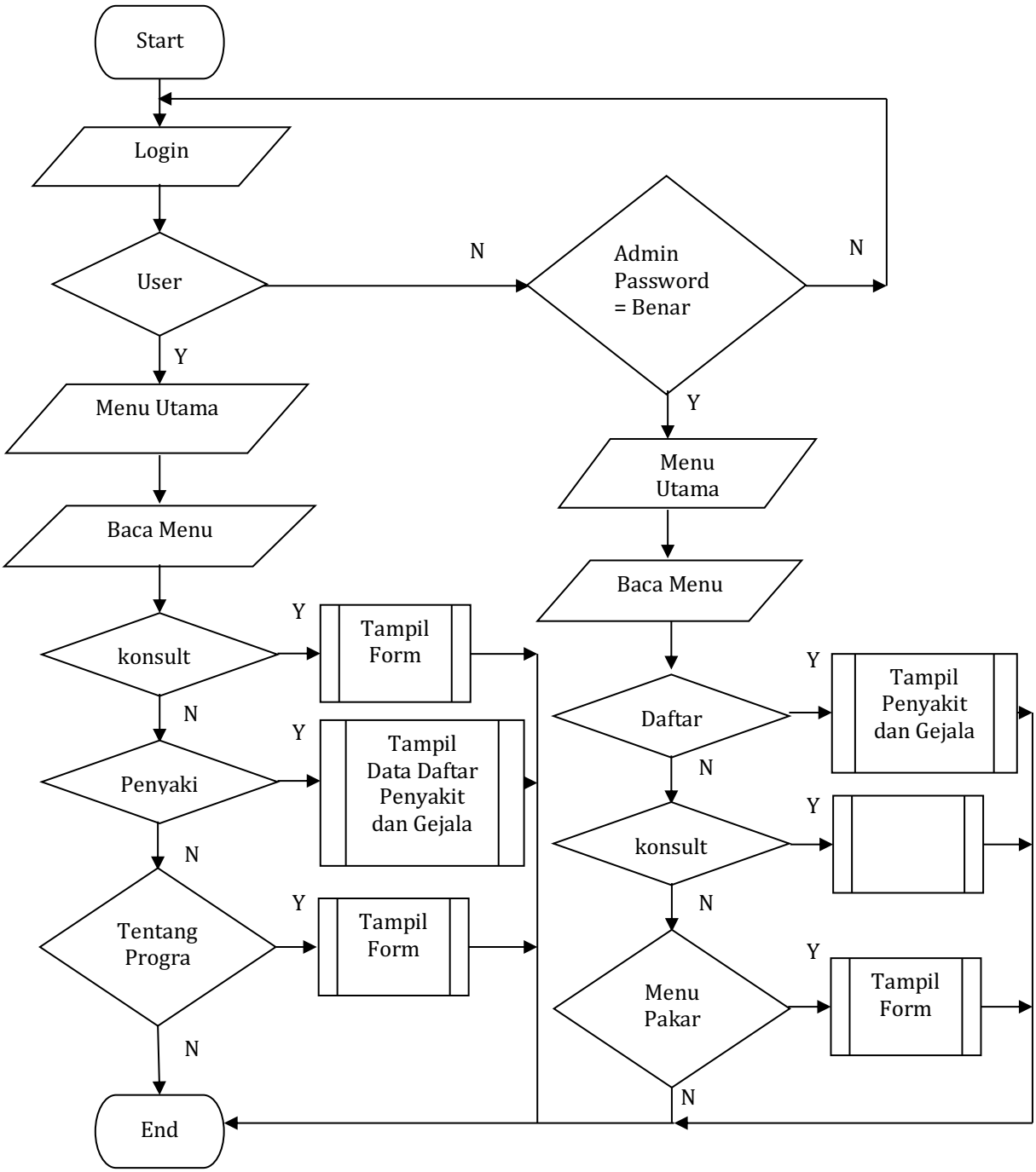

Figure 2. Flowchart

4.1 Stages of Development Expert System Diagnosis of diseases of oil crops

In this case I will describe about the steps to create the program's implementation is done in completing the draft Expert system to diagnose diseases of oil crops are:

1. Complete System Design Where the author must prepare data flow diagrams, decision tables, input and ouput models for disease diagnosis expert system of oil crops that become the object of research.

2. Provide hardware (hardware) and Perngkat (software)

This stage is tahapa where the author must provide all software tools including computer operating systems, programming languages used and the hardware needed, including DVDROM (Digital Video Disc Read-only

Memory), besides Disc Drive (Floppy Disc) as a medium for installation the operating system or other software and hardware as well as data entry (input device) is needed so that the computer can be operated successfully and implementation of the completion of the program can be resolved as much as possible

3. Writing a program listing to a Computer
At the time of the software (Software) and hardware (hardware) Computers has been prepared, the authors will copy or typing instructions (listing) to the computer system design in accordance with the programming language used.
4. Test System
This stage is a step that is indicated to evaluate whether the system has been made in accordance with the procedures that have been set.
5. Guidance Measures Against Operating
System
At this stage, the author malakukan some guidance on the system operator of the operator or the user program (user).

6. Care System
Although the implemented system has been running well, maintenance (maintenance) of the system is a matter of no less importance to the system, the system will not be forever berjaln well.

1. Main Form
The main form is the first form displayed after login to display a menu selection on disease diagnosis expert system of oil crops. This form contains the system, knowledge base, diagnosis, and on.

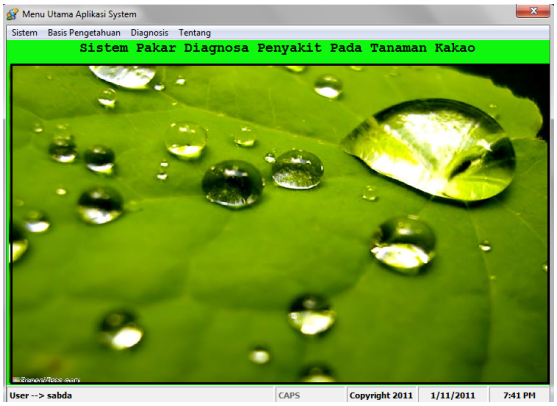

Figure 3. Top Form

2. Form Login
Login form is a form to display user data before the program's main window is displayed.
As for the look of the login form is shown in Figure 4 below:

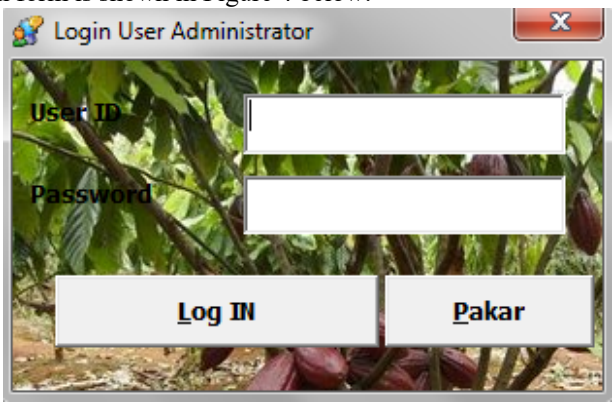

Figure 4. Form Login

3. Form Knowledge Base
Form a data base of knowledge is the display for entering data into the database knowledge.

The appearance of the form a knowledge base is shown in Figure 5 below:

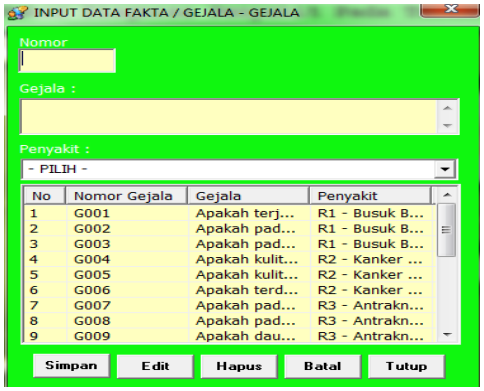

Figure 5. Form Knowledge Base

4. Form Diagnosis

Form Form diagnosis is to diagnose diseases of cocoa plants, this form shows symptoms of the fact that in the cocoa plant diseases and the user can diagnose illness cocoa plants.
The display of diagnosis data form is shown in Figure 5 below:

4. Form disease data

Form disease data is display to enter data into the database Diseases.
The display form data is a disease in figure 6 below

Figure 6 Form input diseases

5. Form a solution

Form solution is a form for the administrator to enter the data solutions cocoa crop disease prevention.
The appearance of the form solution is shown in Figure 7 below:

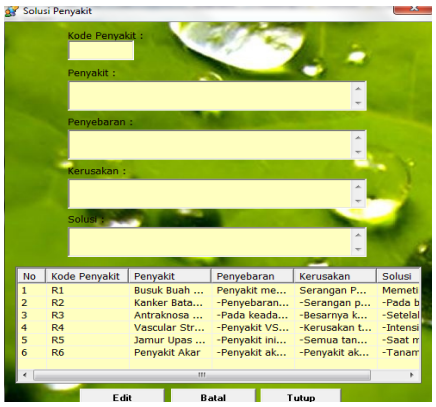

Figure 7 Form Solution

5. Conclusion

Based on the research that has been done, the authors conclude that the presence of Design Expert System Identification and Diagnosis of Plant Diseases Sawit Method Using Forward Chaining, can be used to speed up the search and tracking of science by land managers or the public (people) who require identification information as well as healing disease palm trees. So no need to wait for an expert (specialist doctors) or should mancari books or plant disease protection of oil. In the expert system identification and diagnosis of disease oil crops can also be used as a guide for owners of the garden when the manager (farmer) The garden will forget the disease that is being experienced, and determining the likelihood of the disease occurring in the palm trees.

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