

EXPERT SYSTEM FOR DIAGNOSIS OF DISEASES OF celery plants WITH FORWARD CHAINING METHOD IN GROUP SIMPORIK VILLAGE FARMER

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Abstract

This research is motivated by problems in Siamporik Village who have good celery planting skills, but lack knowledge about this celery plant disease. In the village of Siamporik, the skill of growing celery is due to the lack of detecting celery disease which makes the harvest unsatisfactory. To reduce yield losses, an expert system for diagnosing sop leaves (celery) was created so that it can detect plant diseases, using the Forward Channeling method, using the Web as an application, and using MySQL and Xampp databases.

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1. INTRODUCTION

Celery (*Apium graveolus* L) is a group of plants that are in great demand by the public, celery is usually used as lalaban or a cooking topping. People are interested in celery because it has a distinctive aroma with a distinctive aroma, this makes people, especially housewives, always use it as a cooking spice. This celery can also be sliced and then sprinkled on cooking.

Plant expert systems use computer artificial intelligence. With artificial intelligence, computers can do things that were previously only done by humans. Humans can make computers as decision makers based on how the human brain works in making decisions. One branch of artificial intelligence that is getting a lot of attention from scientists today is expert systems. One that is studied in artificial intelligence is an expert system using the Forward Chaining method.

In Siamporik village there is a celery field which is being cultivated by local farmers. Make farmers to prioritize these plants in their planting. However, the many problems experienced in planting celery leaves make farmers confused in diagnosing diseases or pests that this plant suffers from. Even so, it does not mean that celery cultivation in Siamporik village is safe from pest attacks. A number of celery farms in Siamporik village, North Sumatra were attacked by pests which resulted in celery farmers being dissatisfied with the results. Based on this research, it turns out that farmers often ignoring celery pests because of limited knowledge. Assuming that these pests are common during the planting season, difficulty consulting with experts in the field of pests and diseases of celery plants, lack of counseling in the field or location from the agricultural service about pests of celery plants, so they do not know how to control them which makes celery productivity decrease. Therefore an expert system is the right way to overcome this. Which can make a lack of crop yields and cause huge losses to the farmers themselves.

2. RESEARCH METHOD

According to Giarratano & Riley (2004), the forward chaining method is a method of expert systems that seeks or traces solutions through problems. This method is the opposite of the backward chaining method which performs a search starting from the hypothesis to the facts. The forward chaining method is a strategy for finding solutions to problems from a set of data or facts to generate future perceptions. Techniques that

are often used to determine which rules must be executed, then the rules are implemented. The forward chaining method looks for facts according to the IF part of the IF –THEN rules.

Forward-chaining is a search method or technique of tracking forward and merging rules to produce a conclusion or goal. An inference engine that uses forward-chaining will reason from a problem to its solution. The process is repeated until a result is found. If the premise clause matches the situation (values TRUE), then the process will state the conclusion.

Accuracy Weight Calculation of weights in this system uses knowledge of classical probability opportunities. Probability is used to determine the probability that is calculated from the presentation of the number of premises experienced from an event. The classical probability formula is defined as the probability $P(A)$ where n is the number of events, $n(A)$ is the number of outcomes of getting A. The relative frequency of occurrence of A. The first forward chaining step is the detected symptoms G008, G012, G013, G015, G019. Then look for the probability presentation value of an event with the formula :

$$PA = \frac{\text{number of selected symptoms}}{\text{total number of symptoms}} \times 100\%$$

Rules that have detected symptoms R3= IF G006, G007, G008 THEN D003 :

$$PA = \frac{1}{3} \times 100\% = 33\%$$

R5= IF G012, G013, G014, G015 THEN D005 :

$$PA = \frac{3}{4} \times 100\% = 75\%$$

R7= IF G019, G020, G021, G022 THEN D007 :

$$PA = \frac{1}{4} \times 100\% = 25\%$$

An example of implementing forward chaining is below

Rule:

R1= IF G001 AND G002 THEN D001

R2= IF G003 AND G004 AND G005 THEN D002

R3= IF G006 AND G007 AND G008 THEN D003

R4= IF G009 AND G010 AND G011 THEN D004

R5= IF G012 AND G013 AND G014 AND G015 THEN D005

R6= IF G016 AND G017 AND G018 THEN D006

R7= IF G019 AND G020 AND G021 AND G022 THEN D007

Diagnostics of possible diseases can be obtained with an accuracy of 75%. Diagnostic conclusions obtained based on the results of the highest value of each diagnosis of possible diseases that occur. So that the results of system diagnostics are obtained in accordance with the results of manual diagnostics.

3. RESULT AND DISCUSSION

In an expert system to detect celery plant diseases in Siamporik village farmer groups, system requirements are needed, the following are the system requirements to be used.

For software needs in building an application, some software is needed as follows:

Tabel 1.Software Requirements

No	Perangkat Lunak	Versi
1	Windows 11 Ultimated	11
2	Macromedia Dreamweaver	8.0
3	Xampp	2.5

For hardware requirements that will be used as a device in building an application, a device with the following specifications is needed:

Tabel 2. Hardware Requirements

No	Perangkat Keras	Spesifikasi
1	Laptop	Acer
2	Processor	Intel(R) Celeron(R) N5100@ 1.10GHz 1.11 Ghz
3	Hardisk	225GB
4	Ram	4 GB
5	LCD	14 Inci

In discussing the appearance of the program this time the author will provide several design drawings for the appearance of the program in accordance with the original design. In the discussion of input displays, here are some input displays which will be explained one by one in accordance with the previous design. The following is the design of the login input display for the admin, which is equipped with several columns, labels and buttons, as follows:

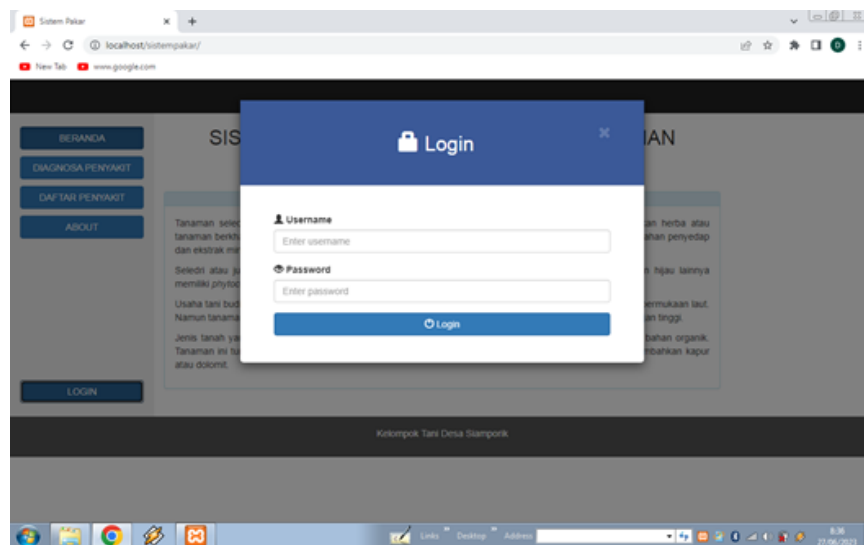


Figure 1. Login Page Display

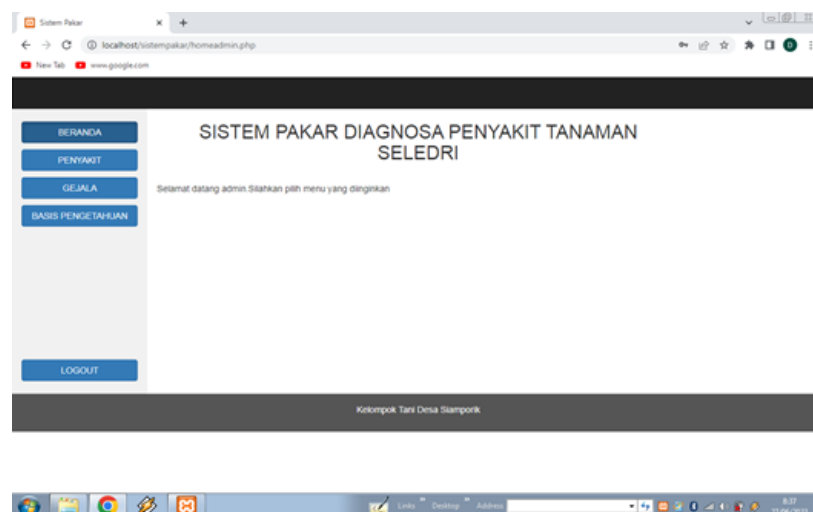


Figure 2. Main course

The main menu display above is a menu display that first appears when run or opened on a page on the system.

The next display is the input display for the disease list menu page.

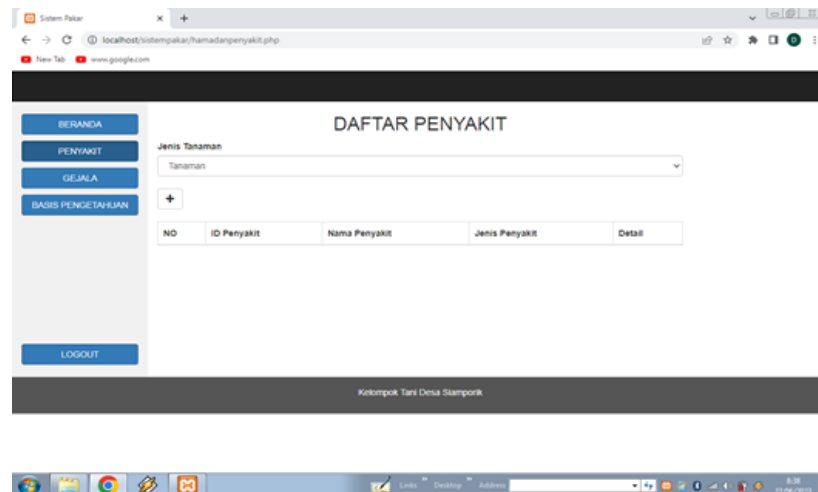


Figure 3.Enter Disease List Page

The following display describes the symptom list menu page.

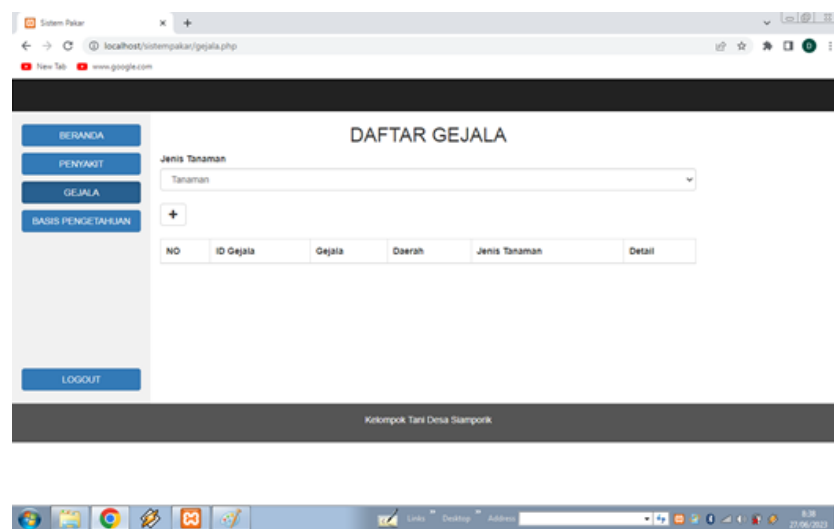


Figure 4.Symptom List Menu page

In discussing the output display, here are some output displays which will be explained one by one in accordance with the previous design. The following is the design of the output display on the admin, which can be printed. Knowledge base menu page output display:

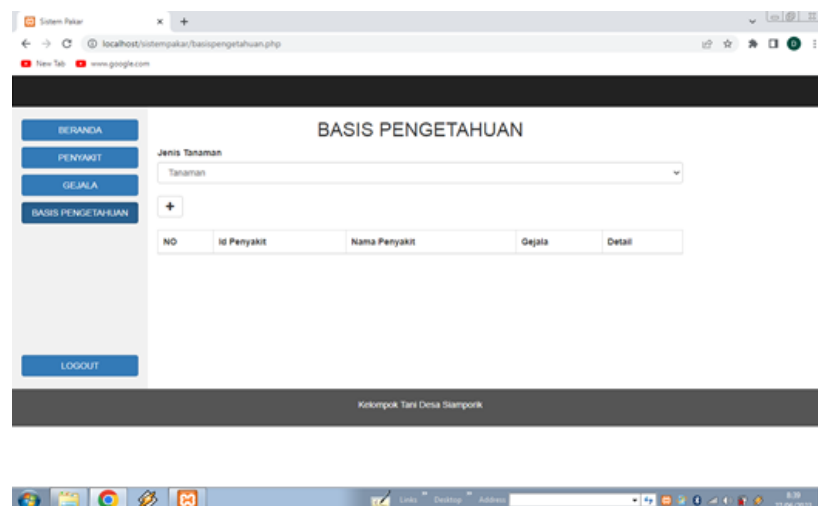


Figure 5. Knowledge Base Menu Page Output

This view explains how the admin can process the knowledge base. This view is the Report view, in which the admin can print the report directly.

in testing Black box testing, namely testing the system against the software to be designed, as in the table below:

Tabel 3.Black Box Testing

Testing Activity	Results	Information
Admin page		
Click the login with button wrong username and password is correct	Couldn't get to the page main admin	Succeed
Click the login with button correct username and wrong password	Couldn't get to the page main admin	Succeed
Click the login with button wrong username and wrong password	Couldn't get to the page main admin	Succeed
Click the login with button do not fill in the name user and password	Couldn't get to the page main admin	Succeed
click the Login with button correct username and password is correct	go to page main admin	Succeed

4. CONCLUSION

Based on the research conducted, several conclusions can be drawn. The application of an expert system for diagnosing celery plant diseases using the web-based Forward Chaining method can provide information and advice on diseases experienced by farmers. Then, the application of an expert system for diagnosing diseases in celery plants can be used as an alternative solution for farmers to make an initial diagnosis of diseases suffered by celery plants.

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