

IDENTIFICATION OF ORANGE PESTS USING THE METHOD CERTAINTY FACTOR

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Abstract: Pests are a major problem for citrus farmers, until now the pests that attack citrus plants vary widely. One of the pests on citrus plants is the trunk beetle where this pest attacks the old leaves on the lower branches or branches as a result of which the leaves fall and the young branches die. For this reason, an expert system was designed to identify pests in citrus plants. The method used in this research is the certainty factor method. The results based on the symptoms experienced by the citrus plants showed that the pests affected on the citrus plants were Aphids with an expertise level of 0.8 and a percentage of 80% and had a fairly good aquaculture value.

Keywords: citrus plant pest; certainty factor; expert system

Abstrak: Hama merupakan masalah utama bagi para petani jeruk, hingga saat ini hama yang menyerang tanaman jeruk sangat bervariasi. Salah satu hama pada tanaman jeruk adalah kumbang belalai dimana hama ini menyerang daun tua pada ranting atau dahan bagian bawah akibatnya daun gugur dan ranting muda mati. Untuk itu dirancang suatu sistem pakar mengidentifikasi hama tanaman jeruk. Metode yang digunakan pada penelitian kali ini ialah metode faktor kepastian (CF). Hasil berdasarkan gejala-gejala yang dialami oleh tanaman jeruk tersebut bahwa hama yang terkena pada tanaman jeruk adalah Kutu Daun dengan tingkat kepastian 0,8 dan persentase 80 % dan memiliki nilai akuasi yang cukup baik.

Kata kunci: faktor kepastian; hama tanaman jeruk; sistem pakar;

INTRODUCTION

Oranges are fruits that contain vitamin C. In North Sumatra, it is a citrus fruit-producing area [1]. The problem that occurs is that farmers sometimes make mistakes in identifying what types of pests are found in these citrus plants.

Pests are a problem that damages roots, stems, leaves or other plant parts and makes plants unable to grow properly or die [2][3]. One of the pests on citrus

plants is the trunk beetle which attacks the old leaves on the branches/branches which results in the leaves falling and the young branches dying.

This expert system becomes an expert in answering questions in solving a problem [4][5]. The method used is the certainty factor method. This method is by proving the uncertainty of an expert's thinking in identifying existing problems [6][7].

Several previous studies were also carried out using the same method that produced a fairly good percentage of confidence in identifying these problems [8][9][10].

METHOD

Image 1 describes the research framework contained in this study.

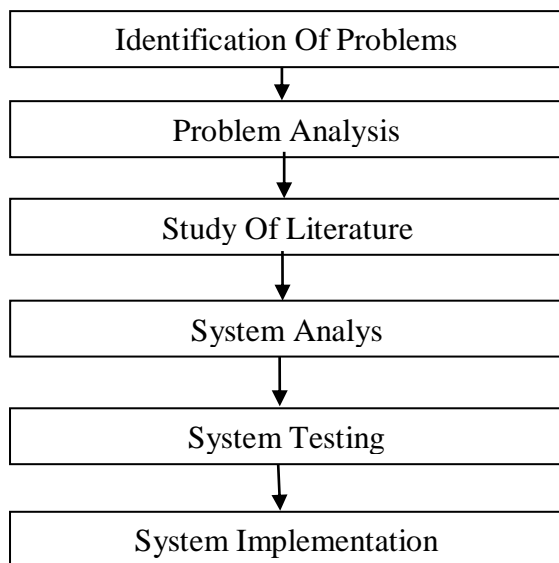


Image 1. Research Framework

Identification of problems

The problem that occurs is that farmers sometimes make mistakes in identifying what types of pests are found in these citrus plants.

Problem analysis

Analysis of problems in identifying pests on citrus plants where service facilities are limited for farmer consultation with the Department of Agriculture.

Study of literature

Collection of data and information, namely interviews with sources who are experts in their fields, in addition to literature study to strengthen the information

and data that has been collected through literature/journals related to this research.

Certainty Factor is defined:

$$Cf(Hi, Ev) = MB(Hi, Ev) - MD(Hi, Ev) \quad (1)$$

The formula for calculating the CF value of 1 symptom:

$$CF(D) = MB - MD \quad (2)$$

The formula for calculating CF values for more than 1 symptom is as follows:

$$CF(D1, D2) = [CF(D1) + CF(D2) * [1 - CF(D1)]] \quad (3)$$

System analysis

By analyzing the weaknesses and feasibility of the system

System testing

By testing the application whether the system is running properly.

System implementation

By implementing the VB. Net and sql server 2008.

RESULTS AND DISCUSSION

Symptom data that corresponds to the identification symptoms of citrus pests are then entered into the system to be processed based on the specified symptoms

Symptom data on citrus plants is shown in Table 1.

Table 1. Symptom data

Symptom	Hama			
	Aphids	Skip Flea	Whitefly	White Lice
Rolled Leaves	√			
Makes plants stunted	√			
Curly young shoots		√		
Stunted growth		√	√	
Yellow spots on leaves			√	
A black mealy mildew appears			√	
Leaves curl			√	
Yellow/brown spots on leaves				√
Cotton appears on leaves, stems and fruit				√
Caterpillar Leaves				√

Table 2 is pest data and solutions for citrus plants.

Table 2. Pests and Solutions

Code Pest	Name Pest	Solutions
PY1	Aphids	Spray water regularly on all parts of the plant
PY2	Skip Flea	By providing insecticides with active ingredients by spraying them before and when shoots appear
PY3	Whitefly	By spraying using the active ingredient buprozeffin pesticide
PY4	White Lice	Removing leaves infested with mealybugs to suppress the spread of pests

Where CF(D1,D2) is the combined certainty factor for symptom 1 and symptom 2, CF(D1) is the certainty factor for symptom 1, CF(D2) is the certainty factor for symptom 2. Table 3 of MB weights and MD weights:

Table 3 MBWeights

Certainty Term	MB
Tidak(T)	0
TidakTahu(TT)	0,2
SedikitYakin(TY)	0,4
CukupYakin(CY)	0,6
Yakin(Y)	0,8
SangatYakin(SY)	1

Tabel 4 Bobot MD

Certainty Term	MD
Sangat Yakin(SY)	0,31-0,4
Yakin(Y)	0,11-0,2
Sedikit Yakin(TY)	0-0,10

Table 5 Data Gejala dan Bobot

Code Sympton	Sympton	Cf Weight	
		MB	MD
GE1	Rolled Leaves	1	0,2
GE2	Makes plants stunted	0,8	0,2
GE3	Curly young shoots	0,6	0,3
GE4	Stunted growth	1	0.4
GE5	Yellow spots on leaves	0,6	0,2
GE6	A black mealy mildew appears	1	0,2
GE7	Leaves curl	1	0,2
GE8	Yel-low/brown spots on leaves	1	0,2
GE9	Cotton appears on leaves, stems and fruit	1	0,2
GE10	Caterpillar Leaves	0,6	0,2

From table 5 above in the form of symptom data and the CF weight of each symptom, it can be seen in table 6 the symptom and pest decision data.

Table 6 Sympton Decision And Pets

Code Sympton	Code Pets			
	PY1	PY2	PY3	PY4
GE1	√			
GE2	√			
GE3		√		
GE4		√		
GE5			√	
GE6			√	
GE7			√	
GE8				√
GE9				√
GE10				√

From the case of pests on citrus plants, it can be seen that the handling of pests has symptoms. The following is a calculation of the CF value of the pest symptoms on the citrus plant:

$$CF(D1, D2) = [CF(D1) + CF(D2) * [1 - CF(D1)]]$$

If the following symptoms are selected:

GE1 : Rolled Leaves

GE3 : Curly young shoots

GE10 : Caterpillar Leaves

Then the calculation will be processed:

Aphids

GE1 : Rolled Leaves

$$\begin{aligned} CF(\text{Aphids}) &= MB-MD \\ &= 1-0,2 \\ &= 0,8 \end{aligned}$$

Skil Flea

GE3 : Curly young shoots

$$\begin{aligned} CF(\text{Skil Flea}) &= MB-MD \\ &= 0.6-0,3 \\ &= 0,3 \end{aligned}$$

White Lice

GE10 : Caterpillar Leaves

$$\begin{aligned} CF(\text{White Lice}) &= MB-MD \\ &= 0.6-0,2 \\ &= 0,4 \end{aligned}$$

So from the calculation of the largest CF is:

=Max (CF Aphids, CF Skip Flea, White Lice)

=Max (0.8, 0.3, 0.4)

=0.8 (Aphids)

So it can be concluded that the pests affected on citrus plants are Aphids with an expertise level of 0.8 and a percentage of 80%.

Image 2 is a consultation page display where the user can make an application based on the selected symptoms.

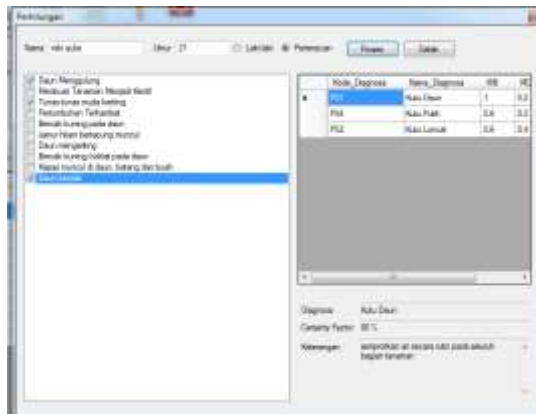


Image 2. Consultation Page

Image 3 explains the results of the diagnosis which is the result of a consultation which contains symptoms of citrus pests and solutions.



Image 3. The results of the diagnosis

CONCLUSION

From the test results obtained based on the symptoms experienced by the citrus plants that the pests affected on the citrus plants are Aphids with an expert level of 0.8 and a percentage of 80% and have a fairly good acuity value with solution spray water regularly on all parts of the plant

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