

# Geographic Information System – Based Plant Pests and Diseases Management System using Android Platform

Engr. Dennis S. Tibe, MIT

Leyte Normal University Tacloban City

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**Abstract-** The purpose of this study was to speed up the process of data commission to the RCPC, which would easily monitor the pest and disease that affects the plants. So, monitoring the pest and disease that affects the plants and mapping out their existence will be natural and be taken. And also to avoid the pest's migration from one place to another. And to generate comprehensive reports for monitoring the pest and diseases. Many conclusions were drawn based on the result of the research and survey. Provincial Offices in Region VIII", as RCPC, can send reports whenever they are on the field at home or on vacation as long as the person can connect to a Wi-Fi or any internet provider. In this way, there will be no longer waiting for a day or a month to get their surveillance form to solve or to add a possible solution to the current diseases on the plants and to prevent the migration of pests and diseases. The researcher recommends using an android tablet instead of a mobile phone since the website deals with charts and graphs (massive data) that require a bigger screen to see. Adding additional features like messaging focuses not just on the crops but also on other plants.

**Index Terms-** Pests, Diseases, Android, Mobile phones, Monitoring

## I. INTRODUCTION

Our world has dramatically changed with the aid of information technology, a general term that describes any technology that helps produce, store, communicate, and disseminate information. Once done manually or by hand, tasks have become computerized, and the job can be completed with a click of a mouse. With the aid of IT, the researcher wanted to streamline our business processes and to get information in 'real time' that is up to the minute and up to date. Data is the backbone of every system, thus playing a vital role in society today.

According to the Provincial Agriculture Office in Leyte, nine types of pests and 800 types of diseases currently exist in this province. With this, the farmers alone cannot identify the types of pests and diseases affecting their plants. The Agricultural Technologist needs help with a stand-alone computer to determine the types of pests and diseases in such a farm.

Provincial Agriculture Offices in Region VIII cover Biliran, Leyte, Southern Leyte, Samar, Northern Samar, and Eastern Samar. Biliran has 8 (eight) municipalities while Leyte has 40 (forty) districts including 3 (three) cities; Southern Leyte has 18 (eighteen) areas including 1 (one) city; Samar has 24 (twenty-four) municipalities and 2 (two) cities; Northern Samar has 25 (twenty-five) municipalities; Eastern Samar has 22 (twenty-two) towns and 1 (one) city. Each municipality has an Agricultural Technologist to let the farmers fill out the surveillance form. Then the Provincial Agriculturist will analyze the data.

The researcher decided to create a system to help the Department of Agriculture in Region VIII manage its transactions. The main goal is to create an Online Plants Pests and Diseases Management Information System with GIS for the Department of Agriculture: Provincial Offices in Region VIII. The current manual process in these Provincial Agriculture Offices delays the trending of the Plants Pests and Diseases that exists in every province because of the slow process of submitting the data to the Provincial Agriculturist and the RCPC.

The system will help the department to improve the monitoring of plant pests and diseases. Submission of comprehensive reports is secure and reliable, to have the data analysis in a short period and to have a fast generation

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of reports and visual representation of the data, thus enabling solutions to the pests and diseases to be implemented quickly as possible.

The system will make it easier and thus more convenient for the users to do their work on the go or in the field as it will provide the feature for users to access and use the system through their Android devices.

### Conceptual Framework

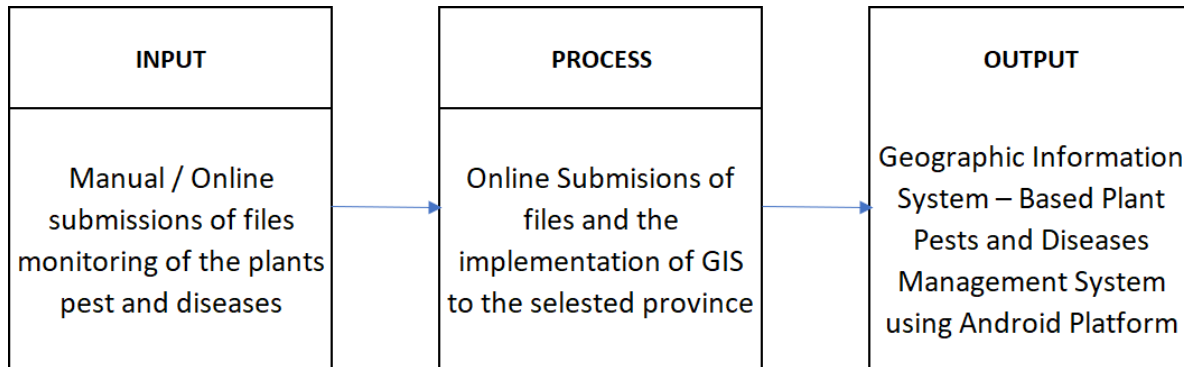


Figure 1: Input Process Output

The researcher used this kind of approach during the development of the system and the study to connect all the aspects of inquiries to solve the problem encountered by the recipient to identify what scheme to use to solve the problem.

## II. METHODOLOGY RESEARCH DESIGN

The research design utilized in this study is both a developmental and descriptive method. A fact-finding survey provides adequate and accurate findings through a survey questionnaire. The information gathered will be analyzed and presented to draw implications and inferences for the study.

### Research Locale

The research locale of the study is the Department of Agriculture and the Regional Crop Production Corp (RCPC) in Palo, Leyte. Samples are selected purposively. With this, the elements included in the sample are chosen based on unique characteristics, smooth cooperation among the respondents, and the researcher's convenience. The questionnaire comprises the respondent's profile and questions about the problems encountered in the existing system.

### Research Procedures

The researcher considered conducting an interview inquiring about the current system and the processes the Department of Agriculture commits to fulfill its duties under the current policy. Then, a survey – a self-styled questionnaire, would be conducted with sample respondents purposefully taken from the research locale.

Research using the internet allowed the researcher to identify the cause and effect of the processes and the problems and solutions for this study. The researcher also considers published materials that can be downloaded from the internet, like e-books, as the source of information, especially for creating thesis manuscripts, software, and hardware development tools.

### Research Instruments

The researcher used a self-structured survey questionnaire and an interview to collect data in this research. The researcher used the questionnaire to gather data on the respondent's opinions and judgments towards their existing system and the proposed method. The proponents also conducted unstructured interviews with the respondents for clarification, verification, and further information for the study.

### Research Respondent

The respondents of this study are the Agricultural Technologist and Provincial Agriculturist. The opinions of the respondents are essential for the completion of this study. In this study, the proponents chose a small population since they only wanted to determine the respondents' reaction toward their existing system and the proposed method. The proponents used a sample of 20 respondents since the type of sampling used is purposive. Purposive sampling

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is a non – probability sampling in which the researcher chooses the example based on who would be appropriate for the study.

**Statistical Treatment of Data**

The researcher used the percentage and frequency of distribution in computing the data gathered.

$$\text{Percentage (\%)} = \frac{\text{Scores in the Distribution}}{\text{Number of Respondents}} \times 100$$

III. RESULTS AND DISCUSSIONS

**Table 1. Responses in terms of Effectivity and Reliability of the system.**

Preferences	Frequency (Number of Respondents)	Total Number of Respondents	Percentage
No	9	9	45
Yes	11	11	55
<b>Total</b>	<b>20</b>	<b>20</b>	<b>100</b>

Table 1 shows that 55% of the respondents agreed that the current system is effective and reliable, while 45% said that the system is not that reliable and competent.

**Table 2. Time taken before the Provincial Agriculturist can take action under the current system.**

Choices	Frequency (Number of Respondents)	Percentage (%)
Day	0	0
Week	1	5
Month	19	95
<b>Total</b>	<b>20</b>	<b>100%</b>

Table 2 shows the experience of the respondents in terms of the speed of responding to a farmer's request. A clear majority shows that it takes about a month for the request to finish.

This response confirmed the information gathered from the interview with the Provincial Agriculturist.

**Table 3. Responses on the improvement of the system.**

Preferences	Frequency (Number of Respondents)	Total Number of Respondents	Percentage (%)
Yes	17	17	85
No	3	3	15
<b>Total</b>		<b>20</b>	<b>100</b>

In table 3, 85% of the respondents, a clear majority of the respondents, opinion that the current system needs to be improved, while only 15% were satisfied with the functionality of the system.

**Table 4. Response on the immediate usage of the system.**

Preferences	Frequency (Number of Respondents)	Total Number of Respondents	Percentage (%)
Yes	18	18	90
No	2	2	10
<b>Total</b>		<b>20</b>	

Ninety percent of the respondents in table 4 are in favor of implementing the usage of the system, while only 10 percent of the respondents disagree.

**Table 5. Suggested Additional Features for the System**

Choices	Frequency (Number of Respondents)	Percentage (%)
Stable Server (Web Hosting Site)	19	95

Android Application	14	70
Good and Simple User Interface	16	80
Other: Fast Internet Connection	3	15

This table shows the respondent's recommendations for additional features of the system. 95% of the respondents want a Stable server (Hosting Web site); this feature of the system will provide stability and reliability as the system and its database will be online, so no matter what circumstances happen to the offices of the Department of Agriculture, the system won't be affected.

Eighty percent of the respondents want an excellent and straightforward user interface and to be able to get on with their activities instead of spending time studying how to use the system. Seventy percent of the respondents want an android application so that they can access and use the system in the field if needed instead of requiring a PC or Laptop. And 15 percent of the respondents answered that faster internet is an addition to the speed of the system.

#### IV. SUMMARY OF FINDINGS

This study aims to develop a website/system that will allow users such as the RCPC (Regional Crop Protection Corp) will be able to quickly receive full comprehensive reports from all the Provincial Agriculturists of Region VIII instead of the current one-month or even longer waiting period of the current system. And thus, be able to accurately know what diseases are affecting a particular province or municipality and react quickly instead of whereby the time the RCPC or Provincial Agriculturist acts to help the farmer, the disease or pest has already damaged the farm and moved on to a new farm.

The system will make it easier and thus more convenient for the users to do their work on the go or in the field as it allows the users to access and use the system through an Android app using an Android device.

With the results of the interviews and survey questionnaires, it is clear that the target users perceived the advantages of the "Geographic Information System – Based Plant Pests and Diseases Management System using Android Platform" as 80% find the system providing convenience, saving time, providing reliability and security and the DAR VIII office want it implemented as soon as possible.

#### V. CONCLUSION

The researcher concluded that the "Geographic Information System – Based Plant Pests and Diseases Management System using Android Platform," as an RCPC, will be able to send reports whenever they are on the field at home or on vacation as long as the person can connect to a Wi-Fi or any internet provider. In this way, there will be no longer waiting for a day or a month to get their surveillance form to solve or to add a possible solution to the current diseases on the plants and to prevent the migration of pests and diseases.

#### VI. RECOMMENDATION

The researcher provided the following recommendations based on the findings and conclusions made:

1. Developing the additional features not just focuses on the crops but also focuses on the other plants.
2. The researcher recommends using an android tablet instead of a mobile phone since the site (website) deals with charts and graphs (massive data) that require a bigger screen to see.
3. Add more additional features like messaging system and other stuff.

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#### AUTHORS

**First Author** – Engr. Dennis S. Tibe, MIT Leyte Normal University Tacloban City