

Due time Alert System in Oil Palm Tissue Culture Laboratory via SMS and Email Notification

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Abstract— Malaysia Palm Oil Board (MPOB) is a government body that responsible for planning, researching and developing the oil palm industry. The culture room must be isolated from the external environment to maintain the appropriate temperature and the relative humidity and to avoid the entrance of contaminants. Cultivars in MPOB are often taking oil palm tissue culture vessel from laboratory. Sometimes, tissue culture vessel is taken and do not return back to the laboratory at the same day. This situation is not good for the growth of tissue culture. By allowing tissue culture at the inappropriate condition, it may cause tissue culture from contaminated by surrounding environment. Therefore, an alert system is required to remind cultivar and administrator to return the tissue culture vessel into the laboratory on the same day before they leave the office. This project is expected to be implemented in oil palm tissue culture department in order to monitor the tissue culture vessel taking in and out from the laboratory. The application of light detector resistor (LDR) in oil palm tissue culture vessel with alert system is the best solution to overcome problems that occurs in MPOB laboratory. Light detector resistor is used in order to detect the present of vessel tissue culture. For this propose the alert system via SMS and email is developed by using SMS Gateway and email server to monitor the tissue culture vessel in laboratory. Once the period of time is exceeded, the cultivar and administrator will trigger via SMS and email. To accomplish this alert system, several open source software such as mail server, SMS Gateway, WAMP is being used. WAMP stands for Apache, MySQL and PHP in Windows. By developing this alert system, it helps to reduce destruction of oil palm tissue culture and maintain the high quality of oil palm.

Keywords-component; MPOB; LDR sensor; SMS Gateway; Mail Server

I. INTRODUCTION

In vitro propagation of oil palm involves the exploitation of rapid multiplication and regeneration potential of plant cells in the laboratory to generate large number of clonal planting materials. This process has many stages and involves selection of expand, media composition, environmental conditions and personnel [1]. To provide high quality seedling oil palm tissue culture, the good environment is very important because it is very sensitive toward its environment. Oil palm tissue culture needs to be place at the room that is isolated from the external

environment to maintain he appropriate temperature and the relative humidity and to avoid the entrance of contaminants. Cultivars are often taking tissue culture vessel from laboratory to their workplace in order to improved and see the growth of tissue culture. To avoid them forgotten to return back the vessel tissue culture, an alert system via SMS and email is best solution to remind them about the vessel tissue culture they have taken. This is because, if vessel tissue culture is place at the environment which is not suitable with them, tissue culture might be destructed. Cultivar and administrator will be notified via SMS and email to return back the tissue culture vessel before they leave their office.

A. Tissue Culture

Tissue culture is the technique of in-vitro plant breeding. The introduction of tissue culture has proven to be useful in producing planting material and also the development of genetic engineering. Tissue culture technique consists of taking a seedlings or embryo culture and placing in a sterile and nutrient medium and is planted normally. Tissue culture has been exploited to create genetic variability from which crop plants can be improved, to improve the state of health of the planted material and to increase the number of desirable germplasms available to the plant breeder [2]. By using tissue culture, the favourable qualities of plants can be precisely controlled, so that each plant is identical for the particular quality. This makes tissue culture an important aspect in the development of the oil palm industry, especially in the generation of superior and uniform oil palm planting materials [3].

B. Alert System

'Alert' is defined as a period or condition of heightened watchfulness or the preparation to take an action. An alert system is characterized by its real time nature and originally based on telemetry system. Alert system can be accomplished by the instantaneous transmission of weather events primary by radio transmission to a lesser extent by satellite, telephone and cell phone transmission. Telemetry is a technology that allows remote measurement and reporting information [4]. Telemetry commonly refers to wireless data transfer mechanisms for example using radio or infrared system but it also encompasses

data transferred over the other media such as telephone or computer network, optical link or other wired communications. Many modem telemetry system using GSM network by using SMS to receive and transmit telemetry data because of the ubiquity and low cost of GSM.

C. SMS in GSM Networking

SMS is an acronym for Short Message Service. Short Message Service (SMS) is the text communication service component of phone, web or mobile communication system, using standardized communication protocol that allow the exchange of short text message between fixed line or mobile phone devices[6]. SMS was originated from radio telegraphy in radio memo pagers using standardized phone protocols and later defined as part of the Global System for Mobile Communication (GSM) series of standard in 1985 as a means of sending messages of up to 160 characters, to and from GSM mobile handsets[6]. GSM is considered as 2G mobile phone system which giving an advantage to consumers from the ability to roam and switch carriers without replacing phones and network operators [7]. GSM also pioneered low-cost implementation of the SMS which has since been supported on other mobile phone standards as well. GSM is working on the 900MHz-1800MHz frequency band.

D. Email

Email is a protocol for receiving, sending and storing electronic messages. Email was one of the first uses of internet and is still the most popular today. E-mail can be exchanged between online service provider users and in networks other than the internet, both public and private [8]. E-mail can be distributed to lists of people as well as to individuals. There are two main protocols used to retrieved email which are POP3 (Post Office Protocol) and IMAP (Internet Message Access Protocol). A popular protocol for sending email is simple mail transfer protocol and for retrieving email is POP3. The advantages of using email are the cost of sending email is zero and it can accessible anywhere, anytime through multitude devices such as computers, laptops and cell phones as long as an active internet connection is available[9].

II. METHODOLOGY

This project is extended of the hardware of wireless application using light detect resistor. The objective of this project is to develop an alert system to the MPOB staffs. The staff of MPOB will be alert by SMS and email in order to give quick information to them. In this project, a GSM mobile phone is connected to the computer and act as a modem. The real modem will cost highly compare to GSM phone. Besides getting an alert via SMS, cultivars also will be alert via email. Figure 1 show the process of developing alert system starting from the hardware which light detector resistor will detect the present of tissue culture vessel until the software that giving an alert to the cultivars to return back the vessel if they are not doing so before 5pm.

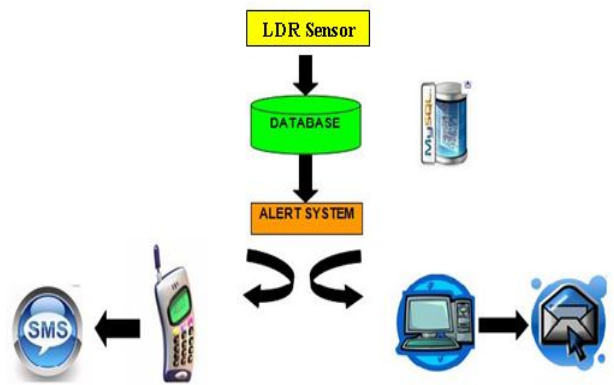


Figure 1. Process of monitoring the oil palm tissue culture

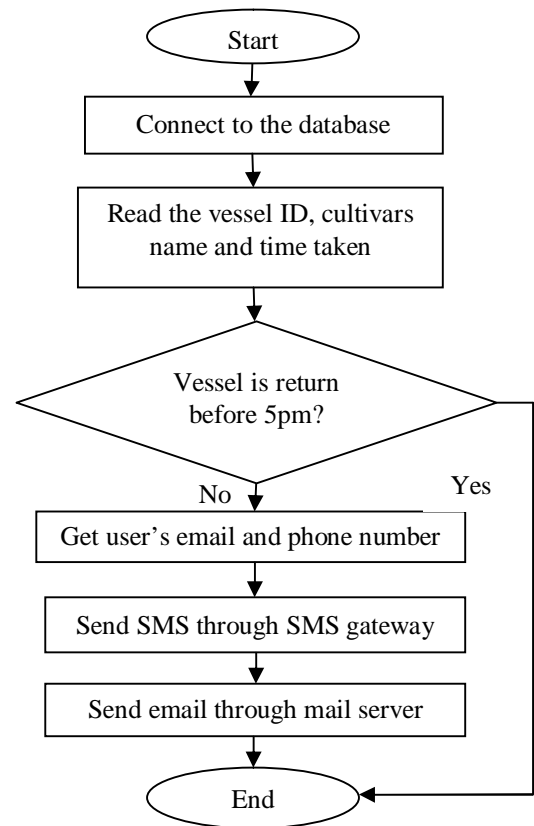


Figure 2. Flow chart of alert system

Figure 2 shows the process of alert system. The process starts with connecting the hardware to database. Database contains of data regarding on the cultivars name, vessel identification (ID) and time that vessel is taken from growth room. The system will do the looping until 5pm where cultivars should return back the vessel that they have taken. If tissue culture vessel is return back before 5pm, there will be no notification message send to cultivars. Alert system is idle during this period. If the tissue culture vessel is not return back until 5pm, alert system is activated by sending notification to cultivars to remind. The system will obtain the email address and phone number of the cultivars and alert system will be

triggered instantly. SMS and email notification will be sent out to the cultivars.

The intention of this project is to implement the application of an alert system into the oil palm tissue culture vessel in order to maintain the quality of tissue culture itself. Apache, PHP and MySQL are the most important tools to develop this alert system. Apache is used as the web server that is connected to the PHP scripts and MySQL database system. Figure 3 shows the control panel of the application Apache and MySQL that running and ready to be used. Figure 4 shows the list of table that available in “notification” database.

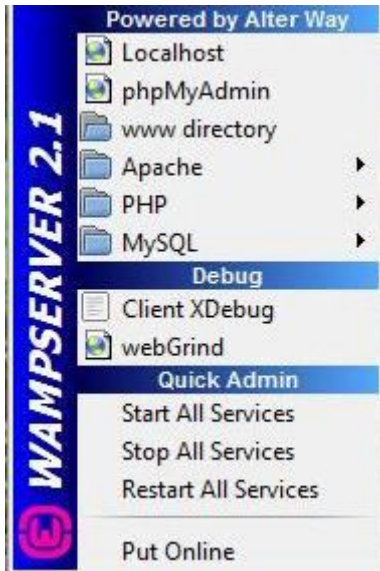


Figure 3. WAMP control panel application

Table	Action	Records	Type	Collation	Size	Overhead
currenttime		3	InnoDB	latin1_swedish_ci	16.0 K	B
device		0	InnoDB	latin1_swedish_ci	16.0 K	B
lending		0	InnoDB	latin1_swedish_ci	16.0 K	B
testing		2	InnoDB	latin1_swedish_ci	16.0 K	B
user		0	InnoDB	latin1_swedish_ci	16.0 K	B
validtime		1	InnoDB	latin1_swedish_ci	16.0 K	B
6 table(s) Sum		6	InnoDB	latin1_swedish_ci	96.0 K	0 B

Figure 4. MySQL database

A new email account for each of the MPOB cultivars are created using internet service provider. Google mail or Gmail is used because it has many advantages over others. It has capacity storage up to 1GB. Figure 5 shows the username and password of email that created for MPOB cultivars. Each of cultivars has their own email account.



Figure 5. Google email account

NOW.SMS is the SMS Gateway that is used to develop an alert system via SMS. Now.sms is used because it is affordable for development and testing. Besides that it gives fee trial for the first 6 month. Figure 6 shows the control panel of Now.sms gateway that has been activated to sending SMS to users. Alert system will be triggered the email address, phone number and present date and time to send the notification. Figure 7 shows a diagram on how email and SMS are sending from PHP through MySQL database.



Figure 6. Activate SMS Gateway service



Figure 7. SMS and email through PHP and MySQL database

III. RESULT AND DISCUSSION

There a lot of SMS Gateway application that is free and easily downloaded from internet nowadays. One of the most popular SMS Gateway is NOW.SMS. Now.SMS can work well in both Linux and Windows. In this project, a GSM mobile phone, W350i is used in order to replace a modem and connecting to the laptop or computer. Configuration process is very important in order to make sure that the message is received to users. For the first process, mobile phone needs to be connected to the laptop using USB cable. Figure 8 shows the connection between GSM mobile phone with the laptop.



Figure 8. Connection between GSM mobile phone and laptop

Database will read the cultivars name, time taken and id number for tissue culture vessel from the Visual Basic programmed which is connected to the database. System start to compare the time of cultivars take the tissue culture vessel and time of them to return it back. Figure 9 shows the Visual Basic program which display and read the cultivars name, vessel ID and time vessel is taken.

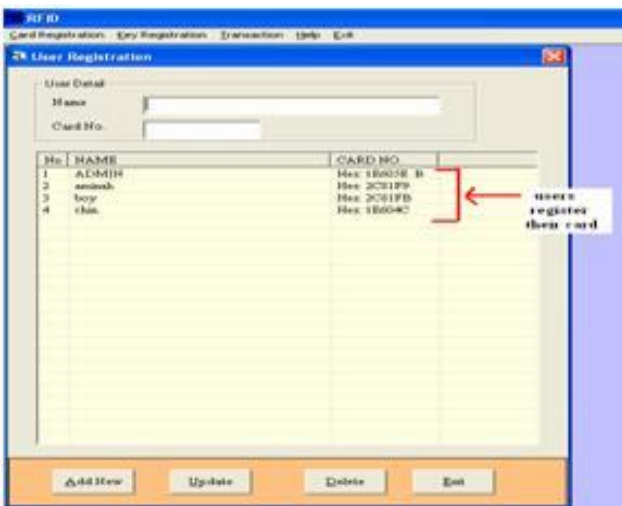
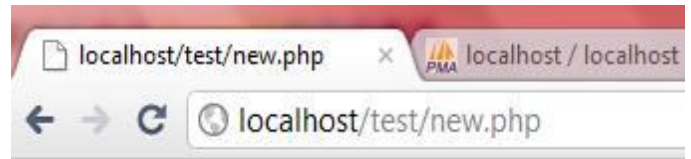


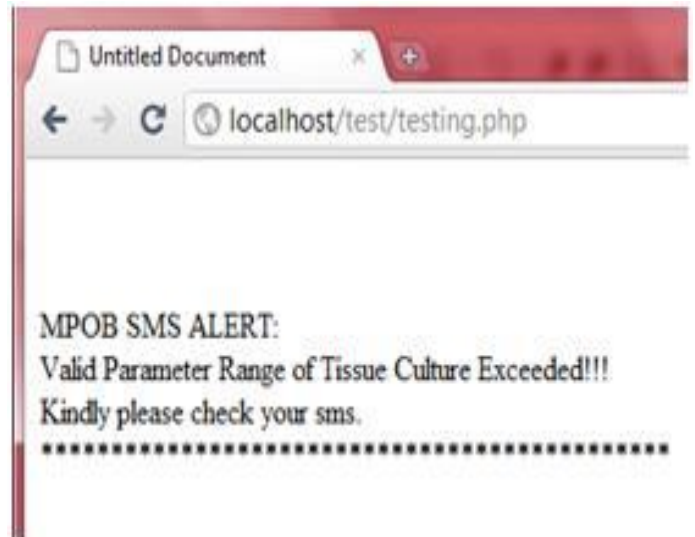
Figure 7. Visual basic database

Figure 8 and Figure 9 show the notification that can be seen at the localhost. While doing the testing, this notification is come out in order to let the programmer knows that the message has successfully send to the email and mobile phone.



MPOB EMAIL ALERT:
Valid Parameter Range Of Tissue Culture Exceeded!!
Kindly please check your email

Figure 8. Email notification on localhost



MPOB SMS ALERT:
Valid Parameter Range of Tissue Culture Exceeded!!!
Kindly please check your sms.

Figure 9. SMS notification on localhost

If vessel is not return back before 5pm, notification will be send to the cultivar to remind them. An alert can be terms into SMS and email. Figure 10 shows the example of a notification via email that is sending out to the one of cultivar. If the tissue vessel is return before 5pm, there is no notification will send to the cultivar. Figure 11 shows the example of notification that send through SMS mobile phone.

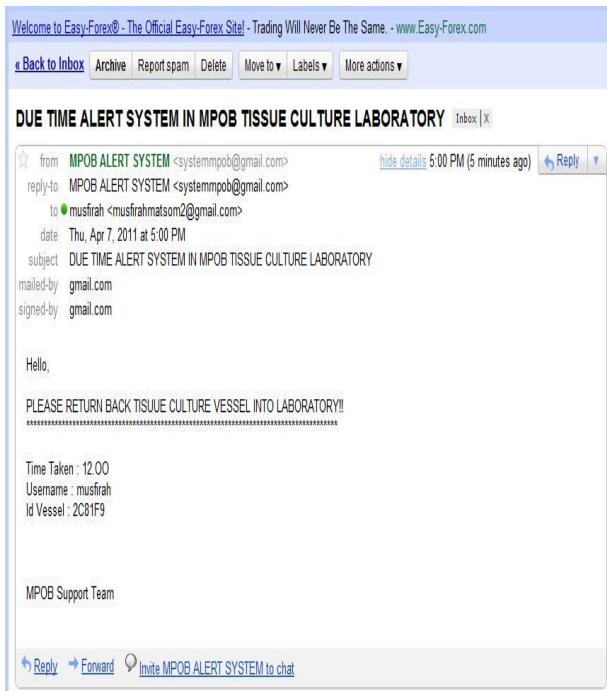


Figure 10. Email notification in Google



Figure 11. SMS notification using SMS Gateway

IV. CONCLUSION

As the conclusion, alert system is successfully achieved the objective of study. Alert system is capable to notify cultivars via email when the tissue culture vessel is not returning back before 5pm. SMS and email is the backbone of the alert system. Each of the application has their own advantage. For SMS, the time consuming to send a text message is less than to

make a phone call. Besides that, it cheaper compare to voice message. For email, the cost of sending it is zero and negligible besides it can be access at anywhere and anytime as long as it connected to the internet connection. Email can be kept as track record for future reference. This system is developed by using open source software that can be access and download from the internet besides it free. By using this alert system, it reminds the MPOB cultivars and administration to return back the vessel into the laboratory and indirectly it helps MPOB to maintain the quality of oil palm tissue culture that they produce.

V. RECOMMANDATION

The due time for tissue culture alert system in oil palm tissue culture laboratory via SMS and email is success. But, there are some improvement can be done for future development. In future, website that contains all the necessary information such as name of cultivars, time that vessel is taken and time for the vessel return back the vessel can be display on the website. Through this website, only authenticate users can be access the database. Hence, high security mechanism and validation process need to be done.

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