



Schedule Making and Implementation of Preventive Maintenance on Fruit Fly Pest Catching Equipment

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ABSTRACT

This study aims to schedule and implementation preventive maintenance on fruit fly catching tools with a solar powered Arduino system. Maintenance of these tools is expected to be able to help chili farmers in eradicating fruit fly pests that can cause crop failure for chili farmers. The stages carried out by the research team in the process of making and implementing a maintenance schedule for fruit fly traps. This research is a type of development research. Making a preventive maintenance schedule starts with making observations, then grouping components, making schedules, expert validation and implementation. The data obtained from the observations were analysed qualitatively descriptively. The results showed that: (1) Making a maintenance schedule for fruit fly traps starting from observation, component identification, initial planning, validation and implementation of the maintenance schedule; (2) The implementation of a preventive schedule with inspection and small repair methods is carried out on the main frame and electrical system; (3) Implementation of Inspection on frame manufacturing with a total of 100' Minutes and Small Repair with a total of 80; minutes during a four-month machine maintenance schedule. Meanwhile, the implementation of Inspection on the electrical system with a total of 240 minutes.

Keywords: Chili Plants, Fruit Flies, Preventive Maintenance, Catching Tool

INTRODUCTION

Indonesia is an agricultural area where there are agricultural lands that are large enough so that they can be used as a source of livelihood for the population. One of the areas in Subang Regency, namely a village called Cigebang Village, utilizes agricultural land to grow chili plants and is a source of livelihood for a group of residents in the village.

Chili is a vegetable commodity that is often planted by the majority of farmers because it has a fairly high economic value. As the demand for chili increases in the market, the selling price of chili increases. The types of chili plants planted by farmers in Cigebang Village are castelo chilies, euro chilies, and serambi chilies. The quality and quantity of chili crop yields are very much considered at the time of planting to harvest yields with several efforts that have been made such as giving fertilizer to chili plants and controlling pests that attack the chili plants with the aim of getting maximum yields.

The fruit fly pest attack in 2021 made the farmers of Cigebang Village experience crop failure. Fruit flies leave eggs that hatch and then become larvae, the larvae damage the chili flesh and make the chili rot [1]. The chili becomes rotten and cannot be sold to the market. Damage to chili plants in Cigebang Village farmers due to fruit fly pests. Fruit flies lay their eggs on chilies which cause the fruit to rot and spoil.



Figure 1. Rotting chili plant

Various innovations for catching fruit fly pests have been made, ranging from traditional ones to using appropriate technology [2]. The manufacture of pest traps using solar cells as the main source is very effective in being applied to the agricultural sector [3]. In line with the above opinion, the Subang State Polytechnic research team has made a fruit fly trap using the Arduino system powered by solar cells.

The tools that have been through the design, manufacturing and testing processes have been applied to chili plantations. However, the problem that arises is that tools that are placed in the open will be easily damaged if they do not carry out regular maintenance on the tool. Currently the method used by farmers in overcoming fruit fly pests is with conventional tools made from used bottles. The bottle is scented so that flies are attracted to it and trapped in the plastic bottle. bottles filled with water will make fruit flies fall and die [3]. Treatment aims to extend the service life and facilitate the production process [4].

Maintenance is divided into two types, namely planned maintenance and

unplanned maintenance [5]. Added by [6] Preventive maintenance is planned maintenance carried out before failure or damage to a system or component of a tool occurs. So it can be concluded that preventive maintenance is needed to maintain the condition of the equipment to work optimally [7].

Preventive maintenance is needed in maintaining the condition of the equipment in both small and large scale industries [8]. The selection of preventive maintenance is because this pest trap is a new tool so that to maintain the condition of the tool, routine maintenance is needed. Added by [9] good condition of the machine will remain stable if the implementation of preventive maintenance is always carried out optimally. Periodic maintenance can prolong the condition of the machine, especially to prevent damage [10]. Preventive maintenance factors include monthly routine maintenance with inspection, small repair, medium and overhaul methods.

Routine maintenance needs to be applied and analysed so that conditions do not occur wasting of time and repetitive activities [11]. Added by [12] the application of inspection methods, small repairs, medium repairs, and overhauls are suitable methods to be carried out on appropriate technology tools. This is also reinforced by the results of observations and interviews with farmers, that a maintenance process is needed so that the tool can last a long time to be used, not to mention the fruit fly pest

attacks which are fairly frequent and occur continuously.

Maintenance is needed on large scale machines or small industrial scale machines [13]. Replacement components are needed to prevent damage to a machine [14]. It is explained by [15] that making a regular schedule is the solution for this. A similar study was conducted by [16] who made a regular maintenance schedule on the pressing machine to prevent engine damage.

Based on the problems above, the researcher will schedule and implement preventive maintenance on the fruit fly trap so that the condition of the equipment is more optimal in helping chili farmers in Cigebang Village, Subang Regency.

RESEARCH METHOD

This research is a type of development research. The data obtained from the observations were analyzed qualitatively descriptively. Making a preventive maintenance schedule starts with making observations, then grouping components, making schedules, expert validation and implementation.

Figure 2 shows the steps taken by the research team in the process of making and implementing a maintenance schedule for fruit fly traps. The activity began with observations in Cigebang Village, then the team identified components with the aim of grouping the components of the fruit fly catching tool based on its working system. The schedule plan that has been made will

then be validated by experts to ensure that the preventive maintenance schedule is in accordance with the standard. The final step is to implement a preventive maintenance schedule on fruit fly catching tools.

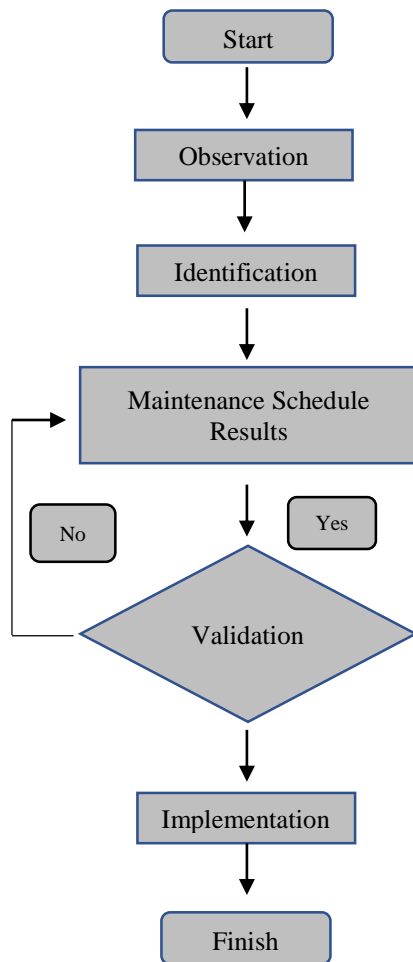


Figure 2. Research flowchart

RESULT AND DISCUSSION

Observation

Researchers carried out observation activities in Cigebang Village to see the current condition of the equipment, this was to ensure that the technological tools were appropriate before a preventive maintenance schedule was made on the equipment. The results obtained in

conducting observations are environmental conditions that can cause damage to fly traps and the effectiveness of the tools in solving problems faced by farmers.



Figure 3. Observation of fruit fly traps

Identification Component

The identification and classification of components aims to make it easier during the maintenance process for fruit fly traps with the Arduino Uno system to deal with chili pests in Cigebang Village. The components that are identified and grouped are as follows the main frame of the fruit fly trap. In the main frame, there are several parts that must be considered for regular or scheduled maintenance, namely: The entire surface of the frame and welded joints. Meanwhile, in the electrical component section there are several parts that must be considered for maintenance which is carried out regularly or on a scheduled basis, namely: solar panels, batteries, cable connections.

Table 1. Monthly schedule plan (January, February, March, April)

| System | Job | January | | | | February | | | | March | | | | April | | | | Tools and Materials | | PPE |
|----------------------------|-------------------------------------|-----------------|----------------|----------------|-----------------|-----------------|----------------|----------------|-----------------|-----------------|----------------|----------------|-----------------|-----------------|----------------|----------------|-----------------|---|---|--|
| | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | Inspection | Small Repair | |
| Frame Manufacturing System | Maintenance of Frame Welding Joints | I ₅ | I ₅ | I ₅ | S ₁₀ | I ₅ | I ₅ | I ₅ | S ₁₀ | I ₅ | I ₅ | I ₅ | S ₁₀ | I ₅ | I ₅ | I ₅ | S ₁₀ | Tool: Brush Cloth Material: Hamplas | Tool: Rag Paintbrush Material: Putty Pilox | Wearpack Safety shoes Shake hands Glasses Mask |
| | Frame Surface Maintenance | S ₁₀ | I ₅ | I ₅ | S ₁₀ | S ₁₀ | I ₅ | I ₅ | S ₁₀ | S ₁₀ | I ₅ | I ₅ | S ₁₀ | S ₁₀ | I ₅ | I ₅ | S ₁₀ | Tool: Brush Cloth Material: Hamplas | Tool: Wire brush Rag Welding Machine Material: Hamplas Electrodes | Wearpack Safety shoes Shake hands Glasses Mask |

| | | | | | | | | | | | | | | | | | | | |
|---------------------------|----------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---|--|
| Electricity system | Solar Panel Condition Check | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | Tool: Cloth Avometer Material: Water | Wearpack Safety shoes Shake hands Glasses Mask |
| | Battery Condition Check | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | Tools : Brush Cloth Avometer Wrench 10 mm Kain majun Material: Hamplas | Wearpack Safety shoes Shake hands Glasses Mask |
| | Cable Connection Condition Check | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | I ₅ | Tools : Cloth Avometer Hamplas |

Note: I for inspection
S for Small Repair

Validation

Valid Validation is carried out by a lecturer who teaches machine maintenance practice courses at the Subang State Polytechnic campus. The validation results conclude that: (1) the types of methods used are inspection and small repair; (2) monthly maintenance; (3) the schedule instrument is appropriate to be applied or declared valid. The validation process is needed to strengthen the results of the maintenance schedule analysis [17]. The schedule is based on the selection of materials and the type of appropriate technology machine used [18].

Implementation of Maintenance Schedule

The implementation of a preventive maintenance schedule on fruit fly traps is divided into the preparation and implementation stages of the schedule. Preparation includes preparing personal protective equipment and tools used in the preventive maintenance process. The implementation of the schedule is carried out to create a schedule that focuses on engine performance [19]. Added by [20] that this concept is called preventive maintenance.

Implementation of Inspection on frame manufacturing with a total of 100' Minutes and Small Repair with a total of 80; minutes during a four-month machine maintenance schedule. Meanwhile, the implementation of Inspection on the electrical system with a total of 240 minutes.



Figure 4. Maintenance application preparation

Manufacturing System Maintenance Aspects

1. Maintenance Aspect
 - a. Checking the condition of the manufacturing system
 - b. Cleanliness of the entire surface of the frame
 - c. Welding joint check
2. Aspects of obstacles that will occur if you do not carry out maintenance:
 - a. Corrosion on the entire surface of the frame
 - b. Corrosion at joints
 - c. Dirty petrageunol liquid

Welding Joints and Frame Surface Maintenance Procedures

1. Clean the welded joints and the rusty surface of the frame is cleaned using a wire brush, coarse abrasive material, PPE used by wear packs, safety shoes, masks, gloves.
2. After cleaning, make sure that the surface of the frame and welding joints does not have corrosion and holes. If there are corrosion and holes, a small repair will need to be done

3. Painting of the surface of the frame is done when small repair is carried out aiming to extend the life of the tool



Figure 6. Frame maintenance

Aspects of Electrical System Maintenance

1. Maintenance of Electrical System
 - a. Checking the Condition of the Solar Panel
 - b. Checking the condition of the battery
 - c. Checking Cable Connection Conditions
2. Aspects of obstacles that will occur if you do not perform maintenance:
 - a. The solar panel is dirty and doesn't work again
 - b. Dirty battery pole and weak current
 - c. Connection Disconnected and Component Not Working

Solar Panel Maintenance Procedure

Maintenance of solar panels is carried out by adjusting the maintenance schedule that has been made, namely cleaning the surface of the panel using cloth.



Figure 7. Electrical system maintenance

Battery Maintenance Procedure

Maintenance of the battery is done by cleaning the positive and negative poles on the battery and looking at the battery voltage



Figure 8. Battery checking

Battery Check Steps

1. Prepare tools and materials
2. Open the skin using a 10 mm ring wrench
3. Do cleaning on the skin using sandpaper

4. If the skun is clean then put it back on the positive and negative poles
5. Voltage checks are carried out using an avo meter
6. Place the avo positive connector to the battery positive pole and vice versa put the avo meter negative connector to the negative pole
7. Look at the measurement results, if the results of the battery voltage measurement are not up to standard, a small repair must be carried out by giving charger to the battery

CONCLUSION

The results showed that: (1) Making a maintenance schedule for fruit fly traps starting from observation, component identification, initial planning, validation and implementation of the maintenance schedule; (2) The implementation of a preventive schedule with inspection and small repair methods is carried out on the main frame and electrical system; (3) Implementation of Inspection on frame manufacturing with a total of 100' Minutes and Small Repair with a total of 80; minutes during a four-month machine maintenance schedule. Meanwhile, the implementation of Inspection on the electrical system with a total of 240 minutes.

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