

Effectiveness of Air Freshener Modification with the Use of Natural Pesticides as an Automatic Tool in Repelling Rice Eating Bird Pests

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Abstract:- Bird pests are one of the main enemies of farmers. Increasing bird populations cause crop yields to decline. Birds can eat rice with an average of 5 g a day. Increasing rice production can reduce the amount of 30-50%. Various methods have been carried out manually and traditionally farmers to have to go directly to control the attack. Of course this is very tiring and troublesome to do alone in a large area of rice fields. One way to overcome this is to use an automatic bird pest control tool. How to use automatically obtained from using air freshener using natural pesticides containing jengkol, garlic and bintaro fruit. Rice-eating bird pest. This test was carried out in Paddinging, Tonasa Village, Sanrobone, Takalar Regency, South Sulawesi, Indonesia. The method of carrying out the test is complete the manufacture of tools and testing consisting of testing of natural pesticides and application of tools in the field. Observation of the time interval of spraying the air freshener modification tool and the effectiveness of natural pesticide ingredients. The results obtained by natural pesticides from jengkol extract became the best material with 10 minutes spraying intervals that were very able to repel bird pests. Make modifications to air freshener combined with natural pesticides into an automatic tool that has the meaning of driving away rice-eating birds

Keywords:- Automatic Repellent, Air Freshener, Bird Pest, Natural Pesticides.

I. INTRODUCTION

Bird pest is one of the main enemies of farmers who can reduce rice production. Increasing bird populations cause crop yields to decline. According to Salsabila (1991), bird pests can eat an average of 5 grams of rice a day. The attack of the bird group has troubled many farmers. The attack carried out by bird pests in the form of eating grains on rice panicles that have entered the period of cooking milk or rice with a planting period of 70 days. As a result of bird attacks rice production has decreased by 30-50%. The attack occurred during shady weather conditions and birds attacking in groups (Ziyadah, 2011). The impact of the attack caused the rice to dry up and even empty seeds. This causes a decrease in rice production at harvest, causing huge losses for farmers.

Various methods are carried out by farmers to prevent bird pests from attacking rice plants, namely by making scarecrow or ropes which are tied at a certain distance so that the ropes can be shaken when shaken the rope is expected to be able to frighten bird pests. If this method does not work, it is not uncommon for farmers to jump directly into paddy fields to repel birds who perch on rice. Surely this method is very tiring and troublesome if done alone on a large rice field. When the rice plants turn yellow, farmers will usually be more active in safeguarding especially during critical hours, namely 6-10 am and 2 - 6 pm, which is the time for the birds to look for food. Even because of the vast land some farmers employ people to look after the fields. This is seen from an economic perspective, this method is less effective and efficient because farmers have to pay additional fees to pay their wages (Syahminan, 2017). Because of the unrest, so it is not uncommon for farmers to use alternative methods, one of which is by using chemicals in repelling bird pests.

Excessive use of chemicals in eradicating or repelling pests, can cause adverse effects on plants so that they experience unfavorable conditions when consumed which also adversely affect health. Therefore the use of biological resources can be an alternative in controlling pests. The use of natural pesticides made from jengkol, garlic, and bintaro fruit is one alternative that can be done in controlling pests. The distinctive aroma caused by jengkol, garlic, and bintaro fruit is the main weapon that is not liked by a variety of bird pests.

Based on some of these problems, it is very important to make a tool that can help farmers in repelling birds that have become pests that often attack their rice plants. Therefore this test is carried out as the main solution in the form of an automatic-based tool utilizing natural pesticides made from jengkol, garlic, and bintaro fruits as the main weapons that are environmentally friendly which the tool is expected to reduce the amount of damage caused by bird pests so that it can increase rice production in supporting the development of modern agriculture in Indonesia. The advantage of this tool is that it is practical, easy to operate, more economical, has an investment value, can be controlled according to the level of bird attack and is safe or does not endanger the environment and health so it is very relevant if used by farmers.

This automatic method is obtained by combining the tool with an automatic air freshener spraying machine. In general, air freshener is a neutralizer of various kinds of unpleasant odor in the room. But on the other hand room air freshener can also be used to become a variety of the latest innovations that are beneficial to the community, one of which is used in agriculture which is as a means of repelling pests of rice-eating birds. Modification of this air freshener is done to get a new discovery in the field of agricultural technology, especially in the manufacture of pest repellent media on renewable plants and can ease the burden of farmers in repelling pests.

This test aims to determine the potential influence of the modification of room air freshener into an automatic tool with a combination of natural pesticides jengkol, garlic, and bintaro fruit in repelling rice-eating bird pests as an effort to overcome the problems of farmers due to bird pests on rice.

II. METHODS

This test was carried out in Paddinging, Tonasa Village, Sanrobone, Takalar Regency, South Sulawesi, Indonesia. This test is carried out within a period of three months. The tools used are screwdrivers, 20 cc spout, multifunctional pliers, electric terminals, meters, rulers, buckets, hammers, elbows, grinders, over falls (locking devices) and cameras. Materials used are stainless steel hinges, air freshener machines, stainless steel plates, stainless steel round pipes, acrylic padlock latches, AA4 batteries, markers, jengkol, garlic, bintaro fruit, lass well wire, grinding eyes, grinding eyes A5 8 %, SS bolts, SS 304 M ring plate, empty perfume bottles, Korean glue, iron glue, 95% alcohol, zinc rubber adhesive glue, A4 paper and clear plastic.

The steps for implementing the test are as follows:

A. Stages of Making Tools

This tool is made by collaborating with Las & Aluminium partners. The steps of making tools include the initial design process of the tool design and then making a 34 cm diameter circle scheme which has been designed on a stainless steel plate as a base on the main tube, then cutting. Next make a rectangular scheme on the stainless steel plate as the main tube with a length of 108 cm and width of 35 cm, then cut and then each unite the two surface angles to form a circle. Make a rectangular scheme on a stainless steel plate as a roof or on a tool with a length of 108 cm and a width of 30 cm, then cut and then each unite two corners of the surface to form a cone. Doing the connection between the two surface angles of the tube and the roof as well as connecting the base with the tube by using electric welding and then providing the Stainless Steel hinges and giving an acrylic padlock latch to lock the roof to keep it safe when operated. Furthermore, connecting the legs to the tube by means of the three rods of Stainless Steel Round Pipe with a length of 120 cm each combined with the main tube pads using electric welding. Make 4 trapezoid-shaped holes with feet 20 cm high, on the four

sides of the tubes facing each other as a place on the air freshener machine for spraying. Design and assemble a room air freshener machine by modifying the head of the refill tube sprayer to the size of the placement space on the air freshener machine combined with a special perfume bottle. This tool is ready to be tested.

B. Tool Performance Testing

Tool performance testing is done by looking at the ability of the tool to be an automatic rice-eating pest repellent by utilizing biological resources such as jengkol, garlic, and bintaro fruit as the main weapon that emits a scent that can repel the pests of the bird by automatic spraying at time intervals every 10/20/40 minutes once spray.

➤ Testing Natural Pesticides

- Preparing tools and natural pesticide ingredients that will be used, including 3 pieces of equipment that have been made before, each given a sample P1, P2, and P3.
- Soaking jengkol for 2 weeks to get a distinctive aroma and extracting garlic and bintaro by blending then the results of the extract are put into a bucket and then giving water to do soaking for 24 hours to get the maximum aroma.
- The results of the immersion of the three natural ingredients are then filtered using a filter to separate the water from the extracted pulp.
- Replacing refill tubes from air freshener machines with perfume bottles that have been assembled and modified beforehand.
- Entering the extracted water from 3 ingredients into each perfume bottle using a spout, using P1, P2 and P3 using 4 perfume bottles according to the number of air freshener machines in each appliance.
- Pair each of these bottles into each air freshener machine according to the treatment then put into the main tube on the appliance.

➤ Application of Field Tools

Application of tools in the field by checking the test results by looking at several observational parameters, including:

- Testing 1, which is conducting initial data collection of how many pests of birds that attack rice fields in 2 rice fields (A1 and A2) without using tools.
- Testing 2, namely testing the effectiveness of the material used in the comparison of 2 rice fields (A1 and A2), where A1 was given no tools and A2 was given the tools. Observations were indicated by how often the pests of rice-eating birds were around the tools in each instrument with different treatments (P1: jengkol, P2: garlic, P3: bintaro fruit) with each distance between 30 meters.
- Testing 3, namely testing the effectiveness of the interval of each spraying by comparison of 2 rice fields (A1 and A2), where A1 was not given a tool and A2 was given a tool. Observations are indicated by how long the effective time interval is needed by the device with 3 replications (U1: 10 minutes, U2: 20 minutes,

and U3: 40 minutes) with each distance between the tools 30 meters.

III. RESULTS

The process of assembling machine support devices is carried out by using a perfume bottle that matches the room size of the air freshener machine (figure 1) to replace the original refill tube in the air freshener machine so that the spray distribution and refill of extracted material can be easily carried out.



Fig 1:- Perfume Bottles Replacing Refill Tubes

The problem that arises when using the original refill tube from the air freshener machine is the difficulty of refilling the refill process, so that the material used will quickly run out for one time use. Therefore the use of perfume bottles is one solution in dealing with this. Perfume bottles used are bottles that have been designed and assembled according to the condition of the air freshener machine, other than that the bottle does not contain gas and is not airtight, so it can be done repeatedly.

The assembly process includes the process of replacing the sprayer head (eye nozzle) from the perfume bottle and replaced with the sprayer head from the original refill tube (figure 2), in addition to the installation that is adjusted to the size of the pipette on the perfume bottle so that the cutting and equalization of the surface of the pipette and the sprayer head are carried out.



Fig 2:- Assembly and Modification of Air Freshener

Making tools namely as many as 3 units of tools each consisting of a roof, a tube, a tube support, and feet, has 4 holes as a place of air freshener machine to be able to make room for spraying natural pesticides.

The process of working on the main tool that is using 3 pieces of Stainless Steel plates as a supporting leg of the tool which is under the foot in the form of a circular stainless plate to be a support for the tool to stand upright and can be a space against the tool feet to be given wood as a support stuck to the ground so that the tool can stand firmly (figure 3).

In the process of working on the tube using a Stainless Steel plate (figure 3) with a length of 108 cm and a width of 35 cm, then cut and then each unite two surface angles to form a circle then do the connection with the help of electric welding and then polishing on the tube and used welding to add aesthetic value to the tube.



Fig 3:- Main Tools

Working on the roof of the tool also uses a Stainless Steel plate with a length of 108 cm and a width of 30 cm,

then cutting is done using a grinder, then each uniting two corners of the surface to form a conical circle and then connecting by using an electric welding then polishing the roof and used welding to add aesthetic value to the roof.

The use of stainless steel as the main material in the tool (figure 3) as a whole so that the tool can withstand various weather conditions in the field and can be used for a long period of time. This is in accordance with the opinion of Sumardji (2011), which states that stainless steel is not as easily corroded as other steel metals so that it can be used in the long run.

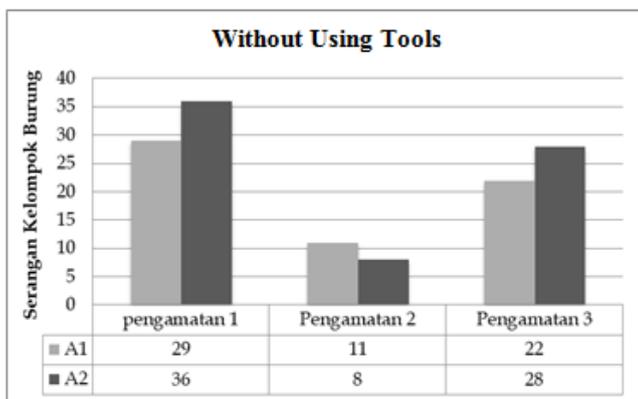


Fig 4:- Graph of The Initial Test Without Using Tools (Note: A1 = plot of paddy 1 for 20 acres; A2 = plot of paddy 2 for 20 acres)

Based on the graph (Figure 4) displays data on the number of birds that attack rice plants at 3 times, namely in the morning (06.00 - 08.00), afternoon (11.00 - 13.00) and in the afternoon (15.00 - 17.00). So the data obtained that the most bird groups attack is in the morning and evening which the results of this test are in accordance with the opinion of Syahminan (2017), which states that where when the rice plants have yellowed then usually farmers will be more active in taking care especially during the hours Critical hours ie 6-10 am and 2 - 6 pm are the time for birds to eat. As for this observation, observations were made of groups or groups of birds, which on average 1 group of birds included 7-10 birds.

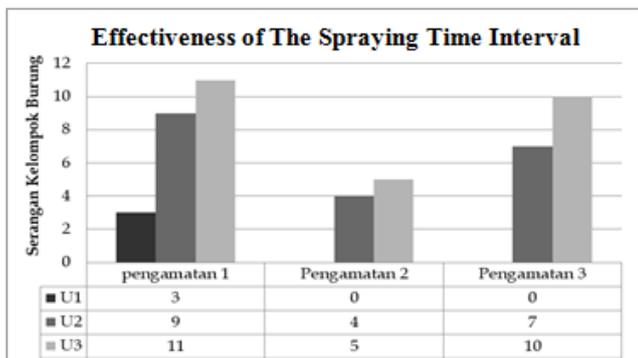


Fig 5:- Graph of The Results Test of Spraying Time Interval from Air Freshener Modification (Note: U1 = interval of 10 minutes; U2 = interval of 20 minutes; U3 = interval of 40 minutes)

Based on the graph (Figure 5) shows the effectiveness data of the spraying interval which consists of 3 treatments / testing, namely U1 (10-minute interval), U2 (20-minute interval), U3 (40-minute interval). For the material used, namely jengkol extract which had previously been tested for the effectiveness of the material so that the test was carried out again to find the best time interval in spraying the jengkol extract. In testing the spray interval, the use of time intervals of 10 minutes, 20 minutes and 40 minutes is in accordance with the time interval setting on the air freshener machine, so that it can be more easily operated.

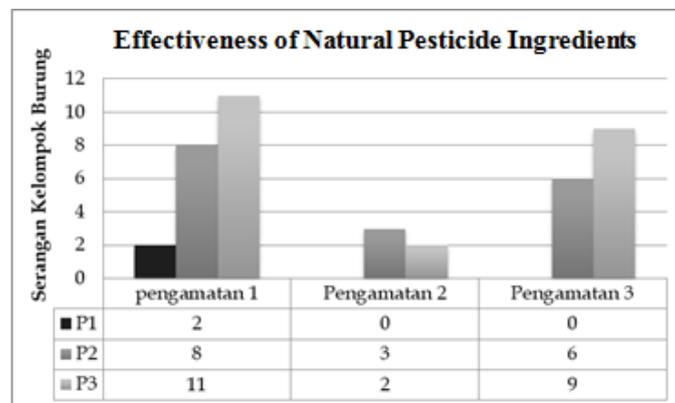


Fig 6:- Graph of The Results Test of Effectiveness of Natural Pesticides from a Modified Air Freshener (Note: P1 = jengkol extract; P2 = garlic extract; P3 = bintaro fruit extract)

Based on the graph (Figure 6) displays data on the results of testing the effectiveness of materials consisting of 3 ingredients namely P1 (Jengkol), P2 (Garlic), P3 (Bintaro Fruit). The data above is the average result of 2 locations that were carried out as a place of testing with 3 observations namely in the morning, afternoon and evening. Observation 1 (06.00-08.00), Observation 2 (11.00-13.00) and observation 3 (15.00-17.00). So that the data obtained in testing P1 (jengkol extract) at observation 1, observation 2 to observation 3 at least avian pest attack at the test location compared with testing P2 (Garlic Extract) and P3 (bintaro fruit extract). In jengkol extract of bird attack there are only 2 groups of birds which previously were dozens of groups of birds that alighted and attacked the rice plants. For testing other ingredients also have an effect on reducing the number of groups of birds that perch but the most influential or most effective way of dealing with these bird pests can be seen in the table that is jengkol extract. This is closely related to the content of jengkol which is quite effective in repelling bird pests. In line with the statement of Wiasih et al (2013), that jengkol contains many substances, including the following: protein, calcium, phosphorus, jengkolat acid, vitamins A and B1, carbohydrates, essential oils, saponins, alkaloids, terpenoids, steroids, tannins and glycosides. Also supported by research from Simbolon et al. (2017), which states that rice-eating pests if given jengkol extract have similarities, namely tears coming out, moving to and fro, breathing difficulty, repetitive somersault, lack of appetite, and not actively moving which often occurs in rat pests, Likewise

in bird pests, but in different reactions so it is very effective in repelling pests.

IV. CONCLUSION

Tests that have been carried out show that the modification of air freshener combined with natural pesticides is an automatic tool that has an effective effect in repelling rice-eating bird pests. Can be seen from the three natural pesticide ingredients used, all three have the ability to repel bird pests but the most effective is jengkol extract with a very pungent aroma. The time interval of spraying from the best modified air freshener is 10 minutes intervals due to the high level of bird pest attack. The results of the modification of the room air freshener into an automatic tool has an interesting aesthetic form of modernity and is very effective in repelling bird pests so that it can become a new technology in the agricultural sector especially in repelling plant pests.

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REFERENCES

- [1]. Salsabila, A. 1991. Smart and Unique Birds. Padang (ID): Andalas University.
- [2]. Simbolon, MS., Sitepu, SF. & Pinem, MI. 2017. Effect of Jengkol (*Pithecellobium lobatum* (Jack) Prain) Rind on the Consumption Rate of Eating Rice Rats (*Rattus Argentiventer* (Rob & Kloss) in The Laboratory. *Journal of Agroecotechnology*, Faculty of Agriculture, USU., Vol.5.No.2 (54): 4444-453.
- [3]. Sumardji. 2011. Comparative Study of Corrosion Resistance of Stainless Steel Tip SS 304 and SS. 201 Using the Cyclic U-Bend Test Method with Temperature and pH Variations. *Rotor Journal*. Vol. 4, No. 1, 1-8.
- [4]. Syahminan. 2017. Bird Repellent Prototype in Rice Plants Based on Arduino Microcontroller. *Spirit Journal*. Vol. 9, No. 2: 26-34.
- [5]. Wiasih, V., Permana, A., Silvyani, N., Naila F. & Paramita. 2013. Utilization of "Uje" (Jengkol Skin) as a Natural Larvaside in *Aedes Aegypti* Mosquitoes. Semarang (ID): Dian Nuswantoro University.
- [6]. Ziyadah K. 2011. Eating ability, Feed Preferences and Testing of Toxic Bait on Peking Bondol (*Lonchura punctulata* L.) and Javanese bondol (*Lonchura leucogastroides* Horsfield & Moore). [Thesis]. Bogor (ID): Bogor Agricultural Institute.