REED DIFFUSER FROM ENDOPHITE BACTERIAL EXTRACT MUTANTS AS INNOVATION TO OVERCOME TERMINE PEST

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ABSTRACT

Reed Diffuser from Andalas mutant endophytic bacteria extract is the latest innovation as an anti-termite in addition to its natural aroma, the aroma of this extract will prevent termites from living or doing activities around this product. parts that contain cellulose such as buildings, clothing, and paper. The preparation of this business will be carried out in a preparatory stage, namely in collaboration with partners, then the production stages start from sterilization of tools, manufacture of media, preparation of solutions, microbial rejuvenation, manufacture of starters, fermentation, extraction of fermented products and packaging later. The marketing stage is carried out with various approaches ranging from online and offline. In reality, the termite-resistant Reed Diffuser must be able to compete with other termite-killing products that only act as exterminators. The sales target for this termite-resistant Reed Diffuser product are office employees, both administrative and archiving, as well as sellers of wooden home furnishings and clothing sellers, which will be very useful for them later in preventing economic and material losses due to termites.

Keywords: Reed Diffuser, Innovation, Product, Microbial

1. INTRODUCTION

Losses caused by termites (Isoptera) reached 3.73 trillion, 8 trillion, and 8.68 trillion (in 2000, 2015, and 2018 respectively) (Nandika, et al., 2003, Lesmana, 2015, respectively). Yusuf, 2018). Losses caused by termites affect various aspects of life, such as from agriculture, plantations, forestry, the wood industry and even to the world of archives and documentation (Sopandi, and Wasis, 2016). Documentation, especially those using paper must be managed and maintained to avoid damage (Nurmalina, 2019).

Damage to documents is caused by several things, one of which is by termites that eat paper. The damage to documentation that had been widely discussed was what happened in thousands of office archives at the state palace by termites, by eating several important state archives (Republika April, 2006). Therefore, efforts need to be made to inhibit pest attacks on paper.

Various efforts were made to save documents from damage caused by termites, ranging from natural and chemical approaches. Naturally, several plant extracts have been investigated which are known to have potential as termites. Research conducted by Hadi (2008) made termite-proof paper using Kiriyuh leaf extract. The results showed that the extract was less effective in eradicating termites. However, other research conducted by Arif et al., (2012) showed that filter paper soaked in palm fiber extract (Arenga pinnata Merr.) for one day and dried, effectively reduced the number of termites.

Andalas Plants (Morus macroura Miq.) is known as a plant that is resistant to termite attacks. Andaleh wood is well known as a potential building material. However, this West Sumatran mascot plant has become one of the rare plants today (Fajrina, 2012). The ability of Andalas plants to survive from termite pests is due to the presence of active anti-termite compounds produced. Active compounds from plant secondary metabolites can also be produced by utilizing endophytic bacteria. Endophytic bacteria are bacteria that live in plant tissues that can produce the same secondary metabolites as their host. Endophytic bacteria from the Andalas plant (Morus macroura Miq.) were isolated by Yandila, (2018) and Putri (2018). These bacteria have been tested for their ability to produce antimicrobial compounds. Based on the character of the host and the active compounds it has, it is very likely that these bacteria also have termite-repellent activity.

To increase the anti-termite potential produced by Andalas endophytic bacteria, a new innovation is needed, one of which is by inducing mutation of endophytic bacteria with UV light. Ultraviolet (UV) radiation is an energy source that has the ability to penetrate the cell walls of microorganisms and change their nucleic acid composition. Ultraviolet absorption by DNA can cause these microorganisms to be unable to replicate due to the formation of double bonds in pyrimidine molecules (Snyder et al., 1991).
So that a further effort is needed in eradicating termites, making an innovation of an anti-termite reeds diffuser product, which is derived from the Andalas mutant endophytic bacteria which has been proven to be effective as an anti-termite due to the presence of an anti-termite compound in the Andalas mutant endophytic bacteria which has the same nature as its host, the Andalas plant. alone.

Based on the description above, there is no similar product in which the main ingredient is the mutant Andalas endophytic bacteria itself. For this reason, an effort will be made to manufacture a product entitled "Reed Diffuser from Andalas Mutant Endophytic Bacteria Extract as an Innovation to Overcome Termite Pests".

2. LITERATURE REVIEW

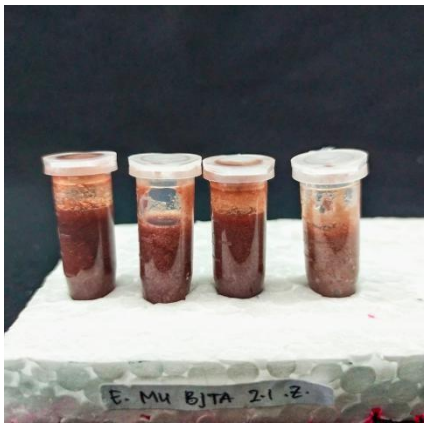
The long-term goal of this PKM-K is to make the Reed Diffuser derived from this mutant Andalas endophytic bacteria as a new breakthrough and business opportunity as an anti-termite. The short-term goals are: Produce innovative Reed Diffuser products to prevent termites. As a new breakthrough using Andalas endophytic bacteria extract as the main ingredient, Reed Diffuser is made as an anti-termite. To produce an environmentally friendly Reed Diffuser. The expected outcomes of this research are: Progress report, final report, entrepreneur product, scientific articles

OVERVIEW OF BUSINESS PLAN

Reed Diffuser from Andalas mutant endophytic bacteria extract is the latest

innovation as an anti-termite in addition to its natural aroma, the aroma of this extract will prevent termites from living or doing activities around this product. from nature but does not change its main function as an anti-termite.

This Reed Diffuser can be placed in a workspace that has a lot of important documents or archives so that it can prevent termites from living around the room, and can also be placed in a warehouse or building shop or wood can also be placed in a clothing store or warehouse so as to prevent termites from living and not being attracted to it. the room where this Reed Diffuser is placed. For a product description, see picture 1 with the brand name Zipuedwi



(a) (b)

Figure 1. (a) Raw Materials for Andalas Mutant Endophytic Bacteria Extract, (b) Reeds Diffuser Products

In marketing, promotion is very important. The success or failure of the promotion will have an impact on sales. Then the promotion strategy will be carried out directly in the form of promotions in the nearest environment both online ways such as on social media Instagram, Facebook, Twitter, TikTok to advertisements on the website later, as well as promotions in offline in the sales environment through brochures.

As a start in make products and sell Reed Diffuser, then starting from the surrounding environment and in collaboration with partners who can further promote this product, besides that this product is a very good innovation and the latest breakthrough in the world of innovative technology and in the field of biology itself.

Seeing from the current problem that there are many archives or documents, clothes, and buildings that are not used and live especially office documents or others during this pandemic, many people work from home so that documents or archives are not visible and not cleaned so that they become a termite habitat. issued This termite-resistant Reed Diffuser is one of the solutions and business opportunities.

Reed Diffuser anti termites This apart from the advantage that it can prevent termites from living in parts containing cellulose such as buildings, clothing, or paper, another advantage is that it does not need to use electricity and fire, by using wooden or bamboo sticks which function to absorb the extract of the mutant Andalas endophytic bacteria later and will spread in the environment. the whole room. In addition, by using reeds rods or fiber sticks which are environmentally friendly because the sticks are dipped in Andalas endophytic bacteria extract so that they can be termite-resistant, safe and comfortable to use, as well as a minimalist and modern design.

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Sales targets product Reed Diffuser is anti termites is Office employees, both administrative and archiving, as well as sellers of wooden furniture and clothing sellers, are very useful for them later in preventing economic and material losses due to termites. In reality, Reed Diffuser anti termites must be able to compete with other termite exterminator products whose function is only as an exterminator, while our products will be used as a termite exterminator as well as a fragrance and use a modern and minimalist design, so we need a good promotion so that our products can be seen by the wider community and able to compete with other products.

3. IMPLEMENTATION METHODS

There are three components that need to be done in the production process Reed Diffuser termites. First looking for partners and cooperation in the manufacture of products both in the purchase of tools and materials. Second production preparation, starting from raw material survey and preparation of extracts of mutant Andalas endophytic bacteria to manufacture of product packaging. The three stages of sales and promotion and the necessary promotional plans.

Production stage

Before being sterilized in an autoclave, the tools were washed and dried. The petridish were wrapped in newspaper or used HVS paper, while the test tubes, measuring cups and Erlenmeyer were wrapped in plastic and perforated around the plastic parts. Tools that are not heat resistant, sterilized with 70% alcohol. Sterilization for heat-resistant tools and materials, namely Petridish, paper discs, cotton buds, tips, sand, and medium which will be sterilized using an autoclave at a temperature of 121°C and a pressure of 15 Per Square Inchi (PSI) for 15 minutes. Instruments made of metal such as needles and tweezers are sterilized by burning them over a Bunsen flame until they turn red.

Preparation of Medium and Solution a. Medium Nutrient Agar (NA). NA medium was made by weighing 28 g of NA medium powder and put into a 1000 mL glass beaker. The NA medium powder was dissolved with aquadest to a volume of 1000 mL, heated while stirring until it boils and homogeneous, the erlenmeyer was covered with cotton and aluminum foil, then sterilized in an autoclave with a temperature of 121oC and a pressure of 15 PSI for 15 minutes.

Slanted NA medium was used for stock cultures. The slanted NA medium was made by adding 5 mL of dissolved NA medium into a test tube using a volumetric pipette. The test tube was covered with cotton and aluminum foil. Then the medium was sterilized in an autoclave. After sterilization is complete, the medium is removed from the autoclave, and stored at room temperature until the medium hardens. The position of the test tube is tilted by elevating the mouth of the test tube using a cotton swab. Prior to storage, ensure that the agar slanted medium is not contaminated.

1070 mL of MH_B medium was made, by weighing 35.3 grams of MH_B medium, each 500 ML was inserted into two 1000 mL erlenmeyer, and the 100 mL erlenmeyer was filled with 70 mL of medium. Furthermore, the medium is heated with a hot plate while stirring until homogeneous and boiling using a magnetic stirrer then tightly closed using cotton wrapped with wrapping, then sterilized in an autoclave at a temperature of 121oC and a pressure of 15 PSI for 15 minutes.

3. EXPERIMENTAL

Fig 1. Taxonomic groups of culturable endophytic

(A)bacteria and (B) fungi based on partial sequencing analysis of 16S rRNA and rDNA ITS, respectively. [Colour online.] (Source: courtesy of Scot)

4. RESULTS AND DISCUSSION

Developing Invert emulsion formulation of antagonists

Field performance of biocontrol agents has often been unpredictable and too variable for large-scale use. A good formulation is the key to the commercial success of biocontrol agents. A formulated microbial product is composed of a biocontrol agent plus ingredients to improve its survival and effectiveness (Schisler *et al*., 2004). It is important that the spray droplets are evenly spread and retained on the foliage. Though much information is available for various formulations but information on invert emulsion formulation of endophytic bacterial antagonists are not there in adequate level.

In present study, an attempt has been made to develop invert emulsion (water in oil) formulation of effective endophytic isolate *P. fluorescens* EPO. Fifteen different emulsifiers were used to homogenize the aqueous and oil phase. Out of twoconcentrations checked, tween 20 and tween 80 were produced least thickness of the layer in between the two phases. At one percent concentration tween 20 and tween 80 produced 1 mm thickness of the layer and in two percentconcentration no layer was observed between the two layers. It was followed by poly ethylene glycol,which produced 2 mm layer thickness in 1 per centand no layer was formed in 2 per cent.

Eleven different oils were used to assess the possible increase in the shelf life of endophytes ininvert emulsion. To assess the shelf life, colony forming units and the optical density value at 610 nm from the sample drawn at different day's interval was used. Similar type of invert emulsion was prepared by Batta, 2007 with antagonistic fungus *Trichoderma harzianum* at a concentrationof 6.0×10^7 conidia/ml in Coconut and Soybean oils, which provided maximum survival and controlthe postharvest diseases of fruits caused by *Rhizopus stolonifer, Botrytis cinerea* and *Penicillium expansum.*

The shelf life of endophytic *P. fluorescens* EPO15 was increased in all the oils used as days increased. The population was high at 90 Days afterinoculation (DAI) and there after it started to decline. *P. fluorescens* EPO 15 recorded maximummean colony forming units of 53.20 in rice bran oil which was significantly superior than other oil, followed by soybean (43.06 cfu) and sesame (42.33cfu) oil compared to the control (26.25 cfu)

5. CONCLUSION

In conclusion, production of stable and effective invert emulsion bioformulation is importantin the effective control of post harvest diseases of fruits. Bioformulation of the cells are highly

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