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DIFERENCESS IN TREATMENT OF INSECTICIDE GEL TYPES FOR AIR FRESHENER ESSENTIAL OIL OF CLOVE (S. AROMATICUM L,) AND LAWANG BARK (C. CULLILAWANG BLUME) WHICH ARE EFFECTIVE AGAINST CULEX QUINQUEFASCIATUS MOSQUITO DEATH

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Abstract

Analysis of the type treatment on an insecticidal gel developed for air freshener, derived from essential oils, cloves and bark to test its effectiveness against mosquito mortality. The goal is to find out whether these plants are suitable for use as an antidote to dengue fever (DHF) to make Indonesia better. The solvent used is gasoline benzene. In the manufacture of air freshener insecticidal gel, there are 4 (four) variations in concentration of clove flower essential oil (Syzygium aromaticum, L.), and Lawang bark (Cinnamomun cullilawang Blume), namely 0.5%, 1.0%, 1.5 % and 2%. There was a significant difference in mosquito mortality at each concentration of clove flower essential oil insecticide gel (Syzygium aromaticum, L.) and there was a significant difference in mosquito mortality at each insecticidal gel concentration of the bark of the bark of Lawang (Cinnamomun cullilawang Blume) essential oil. There was a significant difference in the mean of mosquito mortality in the interaction group of residual effects and the concentration of clove flower essential oil insecticide gel (Syzygium aromaticum, L.) and there was a significant difference in the average mosquito mortality in the interaction group of residue effect and insecticide gel concentration. Different essential oils of the bark of Lawang (Cinnamomun cullilawang Blume).

Keywords: Insecticidal gel, air freshener, essential oil, clove plant, grass bark and mosquito

1. INTRODUCTION

The Decree of the Minister of Health of the Republic of Indonesia Number 293/Menkes/SK/IV/2009 dated April 28, 2009 regarding "Elimination of Malaria in Indonesia" and the Circular Letter of the Minister of Home Affairs to all governors and regents/mayors Number 443.41/465/SJ dated February 8, 2010 contains about "Guidelines for the Implementation of the Malaria Elimination Program in Indonesia, which must be achieved gradually starting from 2010 until the entire territory of Indonesia is free of malaria no later than 2030", the malaria program in Indonesia aims to achieve elimination. Of the 34 provinces that have implemented this program, Maluku is one of the 5 regencies/cities that have not yet achieved elimination, while the provinces of Bali, East Java and DKI Jakarta have achieved 100% elimination (Indonesian Health Profile, 2018).

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To overcome these problems, various efforts have been made to avoid mosquito bites, one of which is the use of insecticides. Insecticides that are often used are synthetic chemical insecticides, but the use of these insecticides can cause vectors to become resistant. Insecticides that were originally effective for killing insects at a certain dose are no longer effective against the same population. In addition, the continuous use of chemical insecticides for a long time can cause adverse impacts such as environmental pollution. The residue is also difficult to degrade so that it can poison and kill humans, animals, and other insects that are not targeted (Arif, 2011).

One of the goals of the SDGs (Sustainable Development Goals) is “Ensuring healthy lives and supporting well-being for all at all ages” as stated in Goal 3 of the SDGs. The target to be achieved is “By 2030, end the epidemics of AIDS, tuberculosis, malaria and other tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases”.

Mosquitoes are insects that are included in the Phylum Arthropoda, this group of animals have the characteristics of a segmented body, has an exoskeleton and ribbed limbs. Compared to male mosquitoes, female mosquitoes are much more dangerous because they require human blood as a source of energy for the breeding process. In addition to sucking blood, when biting the victim, female mosquitoes can also act as vectors for several types of diseases such as Dengue Hemorrhagic Fever (DHF), malaria, filariasis and others (Susetya, 1994).

Mosquitoes are insects that belong to the Phylum Arthropoda, Class Insecta, and Order Diptera. This group of animals has the characteristics of a segmented body, has an exoskeleton and limbs that are notched, and has two scaly wings, a slender body and six long legs (Womack, 1993).

Mosquitoes are widely distributed throughout the world from the polar regions to the tropics, can be found at an altitude of 5,000 m above sea level to a depth of 1,500 m below ground level in mining areas. Worldwide, there are reported to be 3,100 species from 34 genera. Anopheles, Culex, Aedes, Culiseta, Mansonia, Haemagogus, Armigeres, Sabethes, and Psorophora are a group of mosquito genera that suck blood in humans and can act as vectors for the spread of disease. However, there are many groups of mosquitoes in Indonesia, namely groups of mosquitoes from the genus Aedes, Culex, Mansonia, and Anopheles (Hadi & Soviana 2010).

In their life, mosquitoes undergo a complete metamorphosis process, namely changes in body shape that pass through the stages of egg, larva, pupa, and adult. Adult mosquitoes live in the air, while the three early stages live and thrive in water (Anonymous, 2001).

Based on the Indonesian Health Profile in 2018, DHF cases in 2018 amounted to 65,602 cases, with the number of deaths as many as 467 people where the highest cases occurred in North Maluku Province (3.64%) and Maluku (3.15%). For malaria cases, the national malaria morbidity rate during 2018 was 0.84 per 1,000 populations.

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One effort to overcome this problem is to look for alternative insecticides that are environmentally friendly and relatively do not cause resistance. Insecticides that can meet these criteria include insecticides derived from plants, or commonly called vegetable insecticides. Because it is made from plants so that it is easily biodegradable in nature, does not pollute the environment and is relatively safe for humans and domesticated livestock, because the residue is easily lost. (Prijono and Triwidodo, 1993).

There are several types of plants that can produce compounds that can interfere with their attackers or chemical compounds that modify insect behavior (repellents, antractants) (Murad et al., 2004). Some of the plants that have been studied can be used as repellants because of their volatile oil content which gives off a pungent odor. This pungent odor is thought to be disliked by mosquitoes and other insects

One that is allegedly capable of providing a repellent effect is the clove plant (Syzigium aromaticum) and the bark of Lawang (Cinanommun Culilawang Blum) which are typical plants of the Maluku islands. Clove plant (S.aromaticum L) is a spice plant; the part that is often used is clove flower which is mostly used in the cigarette industry, which is around 80-90%. Meanwhile, clove leaves have not been utilized optimally and are still considered less useful waste. The content of clove leaves (S. aromaticum L) which gives a distinctive aroma to clove leaves is an essential oil component called eugenol. Eugenol is a volatile substance that is suitable for use as a repellent. Various research results show that the eugenol content in this plant can be used as a fungicide, bactericide, nematicide, and insecticide (Indriasih, 2015), mosquito repellent, essen

2 METHODOLOGY

2.1 Subjects

This type of research is a quasi-experimental (Sukandarrumidi, 2006) which aims to determine the insecticidal power of air freshener insecticide gel made from clove flower essential oil (Syzygium aromaticum, L.) and Lawang bark (Cinnamomun cullilawang Blume) against the death of Cx mosquitoes quinquefasciatus in the laboratory.

2.2 Research Design and Instruments

The analysis carried out by the researcher is by collecting primary data which includes the number of mosquito deaths both in the toxicity test and residue effect test, temperature and humidity of the media and room temperature obtained through direct observation and measurement. Meanwhile, secondary data was obtained through library research.

3. RESULT ANALYSIS

The clove plant has 4 types of roots, namely taproot, lateral root, fibrous root and hair root. The leaves of the clove plant are single leaves that are stiff and thick-stemmed with

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a petiole length of about 2-3 cm (Nuraini, 2014). The leaves are oval in shape. to lanceolate elongated, pointed tip, tapered base, flat edge, pinnate leaf bone, glossy top surface, 6 - 13.5 cm long, 2.5 - 5 cm wide, light green or light brown when young and dark green when young old (Kardinan, 2003).

Clove plants begin to flower after the age of 4.5–8.5 years, depending on environmental conditions. Clove flowers are small single flowers with a length of 1-2 cm and are arranged in a bunch that grows at the ends of the twigs. Each bunch consists of 2-3 panicle branches that can branch again. Young clove flowers are purplish, and then change becomes greenish yellow and turns pink again when it is old. Meanwhile, dried clove flowers will be blackish brown in color and have a spicy taste because they contain essential oils (Thomas, 2007).

Clove leaves contain high phenolic components, namely eugenol compounds 70-80% this compound is antioxidant. Eugenol has properties as a stimulant, local anesthetic, carminative, antiseptic and antispasmodic (Nurdjannah, 2004). Eugenol ($C_{10}H_{12}O_2$) is a clear to pale yellow compound, viscous like oil, is easily soluble in organic solvents and slightly soluble in water. Eugenol has a molecular weight of 164.20 with a boiling point of 250–255ºC (Bustaman, 2011).

Separation of the chemical content of clove flower, clove stalk and clove leaf showed that clove flower and clover leaf contained saponins, alkaloids, flavonoids, glycosides, tannins and essential oils while clove flower stalks contained saponins, tannins, alkaloids, glycosides, flavonoids and oils essential (Talahatu, 2015).

Clove plants have long been used in the clove cigarette industry, food, beverages and medicine. The plant parts that can be used for the above purposes are flowers, flower stalks and clove leaves (Nurdjannah, 2004). Meanwhile, according to Nuraini, 2014 the clove plant was even used as a traditional medicine because it has properties to treat toothache, heartburn during menstruation, rheumatism, aches and pains, colds, as a body warmer and nausea reliever.

Dried clove flowers can be used as a flavoring agent for cigarettes and cholera. Clove oil obtained from the distillation of dried cloves (cloves oil), cloves stem oil and dried cloves (cloves leaf oil) are widely used as mouth fragrances, treat ulcers and toothaches, as pain relievers, flavoring dishes and fragrances (Nuraini, 2014).

Cinnamomun cullilawang Blume is a species of native Indonesian plant that grows in the Maluku islands. The name of the area of the skin of the Lawang, the wood of the Lawang (Ambon, Maluku). The typical odor of the skin of Lawang is a mixture of cloves, nutmeg, cinnamon and massoi (Sastrohamidjojo, 2004).

This plant grows wild in the forest. The characteristics of this tree are the wood is white and brittle. This plant belongs to the cinnamon group. Single leaf, stiff, elongated elliptical with a length of 5-15 cm and a width of 2.5-7 cm, pointed tip and flat edge. Young leaves

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are pale green, old leaves are green, with 3 veins and petiole 1-2 cm long. Fruit long round ± 1.5 cm, after the old black color.

Guenther, (2006) states the term "essential oil" or "etheric oil" is a term used for volatile oils obtained from plants by steam distillation. The Encyclopedia of Chemical Technology states that essential oils are compounds, which are generally liquid, which are obtained from plant parts, roots, bark, stems, leaves, fruit, seeds and flowers by means of steam distillation (Sastrohamidjojo, 2004). Oil produced from aromatic plants (Armando, 2009). Essential oils are also known as flying oils or etheric/essential oils, volatile (Kardinan, 2005).

In the 13th century, the distillation of essential oils was carried out by a doctor named Arnald de Villanova (1235-1311); he was the first to use distillate products other than turpentine in medicine. Then in the 14th century, techniques and distillation results were carried out by Hieronymus Brunschwig (1450-1534) on four kinds of essential oils, namely, turpentine oil, juniper oil, rosemary oil and spike oil. The high selling value of essential oils then began to be produced and traded in the 15th century, Walter Reiff (1556) a doctor in Strassburg, in the book "New Gross Destillirbuch" alluded to the essential oil processing industry of essential oil processing, especially spike oil in France. Spike oil or lavender is an essential oil that is packaged in small bottles and sold at high prices in France. This section of the book also mentions several other well-known oils produced by distillation, Reiff mentions that the high value oils are clove oil, nutmeg oil, walnut oil, fennel oil, cinnamon oil.

Kardinan (2005) states that essential oils are produced from various parts of plants such as roots, stems, twigs, leaves, flowers or fruit. Geunther (2006) explains that essential oils are one of the by-products of plant metabolism that are formed due to reactions between chemical compounds. The oil is synthesized in glandular cells in plant tissues.

4. DISCUSSION

Essential oil components are divided into 2 groups, namely hydrocarbon components consisting of monoterpenes, seskiterpenes, diterpenes and polyterpenes, and oxygenated hydrocarbon components, consisting of alcohols, aldehydes, ketones, oxygen, esters and ethers. Citronella is one of the components of essential oils that can be used as an insect repellent, and is widely used as an anti-bacterial and fungal (Agusta, 2000).

Air freshener gel is a household product in the form of a gel preparation that releases fragrance into the room through the air. A gel is a solid or semisolid system of at least two constituents consisting of a dense, fence-like mass that is permeated by a liquid. Air freshener in gel dosage form is more practical and easier to use than air freshener in liquid form because it must be sprayed first. In addition, air freshener in gel dosage form

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is easier in terms of storage and packaging.

This type of fragrance is based on the consideration that the covering or protective aroma has a milder odor, is sometimes inactive or anesthetizes the olfactory nerve, reduces sensitivity to unpleasant odors, and reacts when paired with specific unpleasant odors to weaken the fragrance combination and odor intensity. Most of the perfumes used in practice are first category perfumes. Small amounts such as formaldehyde, acetaldehyde, and so on are found in the second category. The third group is limited by the specifics of the activeness of the perfume itself and is limited in number. The four elements of perfume notes are: Top Notes, Middle Notes, Base Notes and Bridge.

Insecticides are used to kill insects in the adult stage. The power of poison to kill insects varies. In addition to the species, age and developmental level of insects, it is also strongly influenced by the effectiveness of the insecticide itself. Based on the working power or the place of entry, it is classified as stomach poison, contact poison and fumigant (Soedarto, 1992).

Stomach poison is poison that enters the body through the mouth / digestive tract of insects. Insects are killed when the insecticide is eaten by insects (Kusombogo, 1993). The currently available insecticides are slightly stomach poison. Rangaoansih, et al. (1992, cit. Doke, 2007) stated that if the toxin compound is eaten by mosquitoes, it will react with mosquito stomach alkali to become toxic proteins, resulting in loss of mosquito gastric epithelial cells and swelling and then rupture.

Contact poison (contact poison) is poison that enters the body of insects through the skin. The insecticide enters the insect's body when there is contact between the body part and the surface containing the insecticide. Insecticides enter the insect's body through the body wall.

Fumigation is a poison that enters the body of insects through the respiratory tract. This poison enters the insect's body through the respiratory system (trachea) which is then circulated throughout the insect's body tissues. Fumigation easily evaporates into gas, because this property is commonly used to control pests (insects) in closed rooms and in the soil (Kusombogo, 2006).

5. CONCLUSION

There are several conclusions from the researchers, namely: 1) Analysis of the essential oil compounds of clove flower (Syzygium aromaticum, L.), and bark of Lawang (Cinnamomun cullilawang Blume), using the GCMS method. Clove essential oil contains compounds; Caryophylle (2.32%), Eugenol (86.79%), Phenol,2-methoxy-4-(2-propenylo)-acetate (9.295). Lawang bark essential oil contains compounds; Linalool (4.76%), Eugenol (89.78%), Phenol, 2-methoxy-4-(2-propenylo)-acetate (1.35%). 2) There was a significant difference in mosquito mortality at each concentration of clove

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flower essential oil insecticide gel (Syzygium aromaticum, L.) and there was a significant difference in mosquito mortality at each insecticidal gel concentration of the bark of Lawang (Cinnamomun cullilawang Blume) essential oil. 3) There was a significant difference in the mean of mosquito mortality in the interaction group of residual effects and the concentration of clove flower essential oil insecticide gel (Syzygium aromaticum, L.) which was different and there was a significant difference in the mean of mosquito mortality in the interaction group of residual effect and concentration. insecticidal gel of the essential oil of the bark of different Lawang (Cinnamomun cullilawang Blume) bark.

There are also some suggestions from researchers, namely: 1) By knowing the content of essential oil compounds that have the potential as vegetable insecticides, further research is needed, namely the isolation of insecticidal compounds. 2) By knowing the insecticidal

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