



Repellent Lotion from Mixture of Basil (*Ocimum basilicum* L.) Essential Oil and *Aloe vera* Extract

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Abstract : Mosquitoes are vectors that can transmit the disease to humans such as Dengue Hemorrhagic Fever (DHF). One way to avoid mosquito bites by using mosquito repellent natural medicine raw materials taken from nature. Essential oils of basil leaves that have specific aroma can be used as a mosquito repellent. Essential oils of basil leaves when rubbed into the skin causing a bit of heat, therefore added aloe vera extract that can including moisturizers, provide a sense of cold in the skin as well as an antiseptic. The purpose of this study was to determine the repellent activity from essential oil of basil leaf and *Aloe vera* extract against *Culex pipiens* lotion. Essential oils with some concentrations (7.5% and 10%) are formulated in lotion. Physical properties (pH, homogeneity, emulsion type, and stability), irritation, moisture effect, and repellent activity of lotions are tested. The results showed that all the lotion preparations were homogeneous and easily poured, stable during storage of 12 weeks, and did not irritate the skin. From this research resulted a mosquito repellent lotion that is safe for health, can be used continuously and environmentally friendly.

Keywords: *Ocimum basilicum*, *Aloe vera*, essential oils, repellent, lotion.

Introduction

Repellents are substances that act locally or at a distance, deterring an arthropod from flying to, landing on or biting human or animal skin (or a surface in general)^{1,2}. Usually, insect repellents work by providing a vapor barrier deterring the arthropod from coming into contact with the surface³. Among them, essential oils, complex mixtures of volatile compounds isolated from a large number of plants, have been found to have these properties against various haematophagous arthropods, some of them being the basis of commercial repellent formulations⁴.

Plant essential oils are potential natural repellents that are expected to replace synthetic compounds. It contains monoterpenes such as α -pinene, cineole, eugenol, limonene, terpinolene, citronellol, citronellal, camphor and thymol that have mosquito repellent activity. They are obtained from non woody parts of the plant particularly leaves and their individual compounds due to natural synergism that discourages development of resistance. They are commonly used as fragrances, food flavours, confectionary, beverages, pharmaceuticals and are considered non-toxic to humans⁵.

Essential oils extracted from the plants are in a complex mixture of terpenes, sesquiterpenes, oxygenated derivatives and other aromatic compounds. These components are characteristic for basil aroma,

which are precursors to the presence of 1,8-cineole, methyl cinnamate, methyl cavicol and linalool. In general, these substances are volatile and are present at low concentrations⁶.

Aloe vera gel is useful for dry skin conditions, especially eczema around the eyes and sensitive facial skin⁷. The plant, being succulent, contains 99.5% water and the remaining solid material contains over 75 different ingredients including vitamins, minerals, enzymes, sugars, anthraquinones or phenolic compounds, lignin, tannic acids, polysaccharide, glycoproteins, saponins, sterols, amino acids, and salicylic^{8,9}.

Experimental

Apparatus

Laboratory glassware (Pyrex), pH meter (Exact Instrument), and Moisture Checker (Aramo).

Material

Essential oils of basil, aloe vera extract, aquadest, stearic acid, cetyl alcohol, lanolin, glycerin, methyl paraben and triethanolamine (TEA).

Preparation of lotion

The components of the formulation were shown in Table 1.

Cetyl alcohol, stearic acid, lanolin were melted over a water bath with temperature of 70-75°C (mixture 1). Glycerin, methyl paraben and triethanolamine were dissolved in hot water (mixture 2). Admixed mixture 1 and 2 gradually (Lotion Base) and add the aloe vera extract and essential oils of basil then homogenized it.

Table 1. Formula of the lotion

Component	Concentration (%)	
	F1	F2
Essential oils of basil	10	7,5
Aloe vera extract	10	7,5
Lotion Base ad	100	100

Physical Quality Evaluation of the Preparation

Homogeneity test

A certain amount of preparations were smeared on a piece of glass or other suitable transparent material, preparations should show a homogeneous composition and no visible coarse grains.

pH measurements

Determining pH of the preparation is done by using a pH meter. Instrument must first be calibrated using pH neutral buffer solution (pH 7.01) and acidic pH buffer solution (pH 4.01) until the instrument shows the pH values. Then, washed the electrode with distilled water then dried with paper towels. Place the electrode in the essence, pH of the essence appears in the display.

Emulsion type test

Determination of the type of emulsion preparation is done by adding a little methyl blue into the preparation, if homogeneous in the external phase while stirring, then such emulsions are the type of oil in water (o/w), but when only blue spots means emulsions are the type water in oil (w/o).

Stability test

A total of 100 grams of each formula were put into plastic pots. Furthermore, the observations are in the form of changes in consistency, color and scent at the time of the preparation is finished as well as in storage for 12 weeks at room temperature¹⁰.

Irritation Test

Irritation test conducted on 15 volunteers with open patch test technique by attaching the preparation on the inner forearm.

Test of Moisture Effect

Using moisture checker Aramo SG[®]. Preparations tested was basil oil lotion 10%. First, the skin of the wrist volunteers measured moisture skin, smeared the lotion, wait approximately 20 minutes and then remeasured moisture skin by moisture checker.

Test of Repellent Activity

This test is performed on the hands of 15 volunteers. The right hand is not smeared with lotion while the left hand smeared with lotion. Then put in a box containing a mosquito and then left for 2 hours, observed mosquito bites and numbered¹¹.

$$\text{Protection power} = \frac{\sum \text{mosquito landed on control} - \sum \text{mosquito treatment}}{\sum \text{mosquito treatment}} \times 100\%$$

Results and Discussion

Physical Quality Evaluation of the Preparation

The result of physical quality evaluation of the preparation were shown in Table 2.

Table 2. Physical quality evaluation of the preparation

Parameter	Formula	
	F1	F2
Homogeneity	✓	✓
pH	6.57	6.61
Emulsion type	o/w	o/w
Stability	Stable	Stable
Irritation	–	–

Note: F1: Basil oil lotion 7.5%

F2: Basil oil lotion 10%

✓ : homogeneous,

– :no irritation

Based on the data in Table 2 above, showed that each formula was homogeneous. pH value was 6.57-6.61 which was within the range of permitted pH requirements for cosmetics (5-8)¹. Each formula were stable during storage and were non-irritating to the skin and it can be said that the overall preparation lotion are safe to use.

Test of Moisture Effect

Moisture effect measurement before and after smeared by lotion 10% on the hands of volunteers, such as in the Table 3.

Table3.Measurement results of water content in the skin

Volunteers	Before	After
A	30.7	32.8
B	26.3	32.0
C	21.0	29.0
D	24.8	27.6
E	33.8	34.5
F	32.7	37.9
G	27.7	32.4
H	20.8	30.7
I	21.0	30.6
J	20.8	33.7
K	29.9	34.8
L	32.0	38.6
M	33.0	38.3
N	31.1	36.3
O	31.1	37.5

Based on the data in Table 3, showed that losion can increasing the water content in the skin of volunteers hands. This is because the aloe vera extract in the lotion.

Test of Repellent Activity

Test preparation activity mosquito repellent against mosquitoes can be seen in the Table 4.

Table 4.Protection power lotion against mosquito bites

Volunteers	Protection Power (%)	
	F1	F2
A	93.3	100
B	92.3	100
C	91.6	100
D	90.9	100
E	92.8	100
F	92.3	100
G	90.0	100
H	90.9	100
I	91.6	100
J	92.8	100
K	92.4	100
L	92.3	100
M	91.8	100
N	91.7	100
O	92.7	100

Note: F1: Basil oil lotion 7.5%

F2: Basil oil lotion 10%

From the data, it can be concluded that the leaves of basil oil has activity as a repellent and can be seen starting at concentrations of basil oil 7.5% and 10%. It is caused by the compound eugenol contained triterpenoids and the basil leaves serve as larvicides. The concentration of active ingredients greatly affect the effectiveness of an anti-mosquito preparation. The higher concentration of active ingredient in the preparation of the repellent effect will be even greater.

Based on the calculation of protection power obtained results indicate that the combined concentration of the essential oils of basilbasil (*Ocimum basilicum* L.) and aloe (*Aloe vera* L.) extract with a concentration of 7.5% was effective as a mosquito repellent with an average protectionpower ≥ 90 % and at concentration of 10% has been really effective as a mosquito repellent with 100% protection power.

Conclusion

The results of the study showed that lotion from mixture basil essential oil and aloe vera extract has repellent activity and increasing skin moisture. The higher concentration of the essential oils of basil in the lotion can enhance the effect of repellent.

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