AMERICAN JOURNAL OF PHARMTECH RESEARCH

Journal home page: http://www.ajptr.com/

Development of herbal Mosquito Repellent formulation

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ABSTRACT

Mosquitoes are a major vector for diseases such as malaria, dengue, and yellow fever. Mosquito repellents today contain many synthetic chemicals, such as DEET, picardin, and permethrin. To safely repel mosquitoes, less effective alternatives made from essential oils have been used. To try to increase the effectiveness of the essential oil repellents, tests were conducted to find out if the essential oils have increased effectiveness when used in conjunction to each other. It was hypothesized that the essential oil mixture containing lemon eucalyptus and rosemary would make the most effective mosquito repellent. To test the hypothesis, a custom-made mosquito testing chamber with an aquarium warmer was used. A sugar based attractor and the prospective repellent solution were placed on a piece of cloth, which was tied to the aquarium warmer. The aquarium warmer was then placed into the testing chamber, where the mosquitoes resided. The effectiveness of the mosquito repellent was determined by the number of landings on the aquarium warmer over time. The results showed that the mosquito repellent made from Bael and eucalyptus was the most effective mosquito repellent.

Keywords : Herbal Mosquito repellent ,Rosemarry oil, bael oil

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Received 25 April 2018, Accepted 01 May 2018

Please cite this article as: Sivakumar B *et al*., Development of herbal Mosquito Repellent formulation . American Journal of PharmTech Research 2018.

INTRODUCTION

Most mosquito repellents today include harmful, synthetic chemicals that potentially have side effects after prolonged use. DEET, the active ingredient in the most commonly used insect repellent, has no known side-effects aside from occasional skin rashes, blisters, and skin and mucus membrane irritation (CDC, n. d.). Another common chemical used to make insect repellent clothing is permethrin. However, this active ingredient is known to be carcinogenic, can cause thyroid damage, and negatively affects pets such as cats or fish. (Bremmer, 2006)

Because imperfections exist in the current mosquito repellents, new repellents made from natural ingredients are needed. While some mosquito repellents made from natural plant oils exist on the market, they are not effective as DEET or other synthesized repellents. Also, the natural oils are highly volatile, thus reducing the duration of effectiveness of the repellent.

Researchers interested in developing natural mosquito repellents have therefore been comparing the effectiveness of different essential oils.

Materials and Method:

MATERIALS AND METHOD

Tray, Acrylic sheets, Packaging tape, Sucrose, Water, Mosquito eggs, mini mosquito breeder, Hacksaw

Herbal oils used:

Rosemary oi[Jiang,2011], Lemon Eucalyptus oil [Gillies,2010],Bael oil

Methods

Creation of a Mosquito Testing Chamber:

In creating a mosquito chamber a hacksaw was used for cutting the acrylic sheet. The acrylic sheet was then sliced into three panels. To reinforce the structure of the mosquito testing chamber, the sides of the panels were sawed. The resulting panels were pieced together to form a triangle. Because the resulting structure had very low stability and crevices that could allow mosquitoes to escape, packaging tape was used to seal the edges of the cube

For ventilation and ease of inserting mosquitoes into the mosquito testing chamber, a piece of zip was used to open face of the mosquito testing chamber. A small pocket was made near the edge of the cloth to allow the insertion of the attractor.

Raising the Mosquitoes

The mosquito egge were taken and were placed in a shallow container filled with about 1 inchs. of distilled water. The container was placed in an incubator with temperature set at 29° C. The larvae were fed a pinch of mosquito food every other day. Once the mosquito larvae reached the pupa stage, feeding was stopped due to the pupa's inability to eat. The pupa were then transferred into the mini mosquito breeder. When the adult mosquitoes emerge from the pupa, sucrose cubes were placed on top of the mini-mosquito breeder.

Preparation of the Mosquito Repellents

To prepare the mosquito repellents used for testing, three different concentrations of mosquito repellents were made. The first type of repellents consist of pure essential oils. The purpose of the pure essential oils was to determine the strongest repellent. If two or more of the essential oils showed similar repellencies, both essential oils were diluted to 10 percent. The diluted repellents were then tested to show which essential oil was the most effective. When the most essential was determined, the most effective essential oil was mixed with a different essential to form a new essential oil solution. The new solutions were diluted into 10 percent essential oil (5% strongest essential oil and 5% other essential oil) and 90 percent isopropyl alcohol.

Testing Mosquitoes Repellents

One day prior to testing the mosquitoes, the sucrose cube placed on top of the mini-mosquito breeder was removed, hence starving the mosquitoes for at least 24 hours. To test the mosquitoes, twenty drops of 30 % sucrose solution were dropped on a piece of cloth. The cloth was wrapped around an aquarium warmer, which was placed in the attractor insertion pocket. Because mosquitoes are cold-blooded, they are naturally attracted to heat sources. Also, because the

mosquitoes had been starved for more than 24 hours, they would be attracted to the sucrose solution. For the control set, only the aquarium warmer and the cloth with twenty drops of sucrose solution were placed in the attractor insertion pocket. For trials involving repellents, the essential oils were diluted with 91% isopropyl alcohol. The resulting mixture was then applied on the insulation material.

The mini mosquito breeder was placed inside the mosquito testing chamber. When the chamber was resealed, the mosquitoes were released from the mini-mosquito breeder using the glove compartments and were allowed to roam for thirty minutes. The number of landings on the attractor was recorded every minute.[JackMao,2017]

RESULTS AND DISCUSSION

The trials conducted against one set of mosquitoes consisting of 15

The mixtures used were shown in the following chart.

	Ingredients	**Duration**
Trail 1	Nothing (null)	10min
Trail 2	Sucrose solution	30min
Trail 3	100% Lemon eucalyptus oil + Sucrose solution	30 min
Trail 4	100% Rosemary Oil and Sucrose Solution	30min
Trial 5	100% Bael oil +Sucrose	30 min
Trail 6	10% Rosemary Oil and Sucrose Solution	30min
Trail 7	10% Lemon Eucalyptus Oil and Sucrose Solution	30min
Trial 8	10% Bael oil and sucrose	30 min
Trail 9	5% Lemon Eucalyptus Oil +5% Bael oil and Sucrose Solution	30min
Trial 1o	5%Rosemarry oil+5% Bael oil and sucrose Solution	30min.

Each trial had been conducting using the customized mosquito testing chamber under the same temperature 25 °C. In every trial, 20 drops of sucrose solution 16 drops of the repellent solution (if applicable).

In Trial 1 against the first set of the mosquitoes, mosquitoes were undisturbed by the insertion of the aquarium warmer wrapped inside odorless cloth. After ten minutes of testing, no mosquitoes reacted to the cloth.

In Trial 2, only 20 drops of sucrose were placed on the odorless cloth. For the 10 minutes that the testing ran, the average landing per minute was a little more than 3 mosquitoes per minute. After the first ten minutes, no more mosquitoes landed on the attractor. In the second minute of several mosquitoes landed.

However, it should be noted that most of the landings lasted less than a second before the mosquitoes flew away. This happened to Trial 3 (with pure Lemon Eucalyptus Oil) , Trial 4 (with pure Rosemary Oil) and trial 5 [pure bael oil],.

To test which oil is the most effective of the three, the Trials with the least landing(s) were selected Rosemary ,Lemon Eucalyptus, bael.

To test which one was the more effective as a repellent, each was diluted to 10% with isopropyl alcohol and the experiment was ran again in Trial 6 and Trial 7,8. The results showed that Trial 8 (bael) were less landings whereas the trial 6,7 are almost equal landings . (Lemon Eucalyptus, Rosemarry).

So the next series of test was made in combine with bael oil was made separately of both Lemon eucalyptus and rosemary oil, This time the time duration was kept for 1 hour .both the mixture were applied on the odorless cloth and observed and it was noted that there were rarely some mosquitos were landing after a period of 30 minuets in trial 9, and in tril 10 there were no mosquitoes were landed even after the period of hour

DISCUSSION

Different mixtures of essential were tested to determine the most effective repellent. While 100% bael oil was more effective than and 100% rosemary oil and Lemon eucalyptus oil, Since all three oils are repellent activity , so we tried in combination with bael of both of Lemon eucalyptus and rosemary oil .From the above report it was concluded that the combination of bael oil and rosemary have the effective mosquitoes repellent activity .

CONCLUSION

Since the Lemon eucalyptus and rosemary was already a proven mosquitoes repellent and there were no side effects have been observed .But some of the people are suffered from asthmatic problem, since bael oil has a very good antimicrobial and anti-asthmatic activity .By promoting the mosquito repellent in combination of bael and rosemary oil were observed that most effective repellent when compared to other combination. Since bael oil also have plenty of medicinal activity and it is a potent anti-asthmatic activity, it is very difficult for asthmatic people when they inhaling certain odour ,By giving the drug in combination with bael it is also comfortable for the asthmatic people without any inhaling problem and hence this preparation contains both mosquito repellent along with antiasthmatic property so that it will lead in to the market whereas the conventional mosquito repellent were producing asthma and other related problem.

ACKNOWLEDGEMENT:

We like to thanks management, Director, principal, teaching and non-teaching staff of Bharathi College of pharmacy for their continuous co-operation and support.

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